ADVANTEST®

ADVANTEST CORPORATION

D3371

Transmission Analyzer

Operation Manual (Vol.1)

MANUAL NUMBER FOE-8370624D01

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Safety Summary

To ensure thorough understanding of all functions and to ensure efficient use of this instrument, please read the manual carefully before using. Note that Advantest bears absolutely no responsibility for the result of operations caused due to incorrect or inappropriate use of this instrument.

If the equipment is used in a manner not specified by Advantest, the protection provided by the equipment may be impaired.

- **Warning Labels**

Warning labels are applied to Advantest products in locations where specific dangers exist. Pay careful attention to these labels during handling. Do not remove or tear these labels. If you have any questions regarding warning labels, please ask your nearest Advantest dealer. Our address and phone number are listed at the end of this manual.

Symbols of those warning labels are shown below together with their meaning.

DANGER: Indicates an imminently hazardous situation which will result in death or serious personal injury.

WARNING: Indicates a potentially hazardous situation which will result in death or serious personal injury.

CAUTION: Indicates a potentially hazardous situation which will result in personal injury or a damage to property including the product.

- **Basic Precautions**

Please observe the following precautions to prevent fire, burn, electric shock, and personal injury.

- Use a power cable rated for the voltage in question. Be sure however to use a power cable conforming to safety standards of your nation when using a product overseas.
- When inserting the plug into the electrical outlet, first turn the power switch OFF and then insert the plug as far as it will go.
- When removing the plug from the electrical outlet, first turn the power switch OFF and then pull it out by gripping the plug. Do not pull on the power cable itself. Make sure your hands are dry at this time.
- Before turning on the power, be sure to check that the supply voltage matches the voltage requirements of the instrument.
- Connect the power cable to a power outlet that is connected to a protected ground terminal. Grounding will be defeated if you use an extension cord which does not include a protected ground terminal.
- Be sure to use fuses rated for the voltage in question.
- Do not use this instrument with the case open.
- Do not place anything on the product and do not apply excessive pressure to the product. Also, do not place flower pots or other containers containing liquid such as chemicals near this

product.

- When the product has ventilation outlets, do not stick or drop metal or easily flammable objects into the ventilation outlets.
- When using the product on a cart, fix it with belts to avoid its drop.
- When connecting the product to peripheral equipment, turn the power off.

- **Caution Symbols Used Within this Manual**

Symbols indicating items requiring caution which are used in this manual are shown below together with their meaning.

DANGER: Indicates an item where there is a danger of serious personal injury (death or serious injury).

WARNING: Indicates an item relating to personal safety or health.

CAUTION: Indicates an item relating to possible damage to the product or instrument or relating to a restriction on operation.

- **Safety Marks on the Product**

The following safety marks can be found on Advantest products.

 : ATTENTION - Refer to manual.

 : Protective ground (earth) terminal.

 : DANGER - High voltage.

 : CAUTION - Risk of electric shock.

- **Replacing Parts with Limited Life**

The following parts used in the instrument are main parts with limited life.
Replace the parts listed below before their expected lifespan has expired to maintain the performance and function of the instrument.
Note that the estimated lifespan for the parts listed below may be shortened by factors such as the environment where the instrument is stored or used, and how often the instrument is used.
The parts inside are not user-replaceable. For a part replacement, please contact the Advantest sales office for servicing.

Each product may use parts with limited life.
For more information, refer to the section in this document where the parts with limited life are described.

Main Parts with Limited Life

Part name	Life
Unit power supply	5 years
Fan motor	5 years
Electrolytic capacitor	5 years
LCD display	6 years
LCD backlight	2.5 years
Floppy disk drive	5 years
Memory backup battery	5 years

- **Hard Disk Mounted Products**

The operational warnings are listed below.

- Do not move, shock and vibrate the product while the power is turned on.
  Reading or writing data in the hard disk unit is performed with the memory disk turning at a high speed. It is a very delicate process.

- Store and operate the products under the following environmental conditions.
  An area with no sudden temperature changes.
  An area away from shock or vibrations.
  An area free from moisture, dirt, or dust.
  An area away from magnets or an instrument which generates a magnetic field.

- Make back-ups of important data.
  The data stored in the disk may become damaged if the product is mishandled. The hard disc has a limited life span which depends on the operational conditions. Note that there is no guarantee for any loss of data.

- **Precautions when Disposing of this Instrument**

When disposing of harmful substances, be sure dispose of them properly with abiding by the state-provided law.

Harmful substances: (1) PCB (polycarbon biphenyl)
(2) Mercury
(3) Ni-Cd (nickel cadmium)
(4) Other
Items possessing cyan, organic phosphorous and hexadic chromium and items which may leak cadmium or arsenic (excluding lead in solder).

Example: fluorescent tubes, batteries

Environmental Conditions

This instrument should be only be used in an area which satisfies the following conditions:

- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations
- Altitude of up to 2000 m

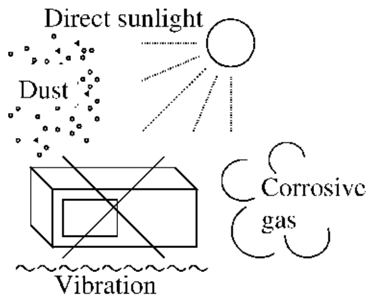
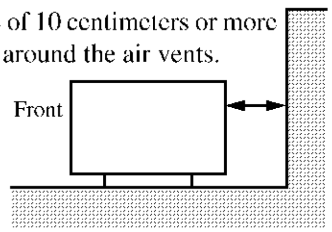


Figure-1 Environmental Conditions

- Operating position

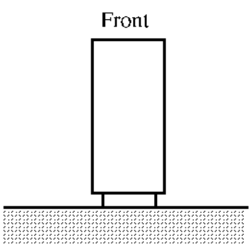
A clear space of 10 centimeters or more must be kept around the air vents.



The instrument must be used in a horizontal position.
A cooling fan, which prevents the internal temperature from rising, is equipped with the instrument.
The air vents on the case must be unblocked.

Figure-2 Operating Position

- Storage position



This instrument should be stored in a horizontal position.
When placed in a vertical (upright) position for storage or transportation, ensure the instrument is stable and secure.

-Ensure the instrument is stable.
-Pay special attention not to fall.

Figure-3 Storage Position

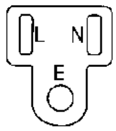
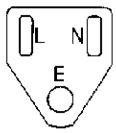
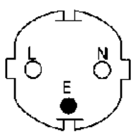
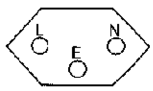
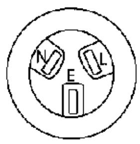
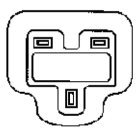
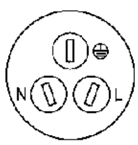
- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

  Impulse withstand voltage (over-voltage) category II defined by IEC60364-4-443

  Pollution Degree 2

Types of Power Cable

Replace any references to the power cable type, according to the following table, with the appropriate power cable type for your country.

Plug configuration	Standards	Rating, color and length	Model number (Option number)
	PSE: Japan Electrical Appliance and Material Safety Law	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
	CEE: Europe DEMKO: Denmark NEMKO: Norway VDE: Germany KEMA: The Netherlands CEBEC: Belgium OVE: Austria FIMKO: Finland SEMKO: Sweden	250 V at 6 A Gray 2 m (6 ft)	Straight: A01404 (Option 96) Angled: A01414
	SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
	SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: ---------
	BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417
	CCC:China	250 V at 10 A Black 2 m (6 ft)	Straight: A114009 (Option 94) Angled: A114109

CAUTIONS ON USING THE D3371

1. Cautions about Input/Output Signal Connections

CAUTION: ***This product, provided with internal circuits using high-frequency electronic components, is quite sensitive to factors such as static electricity and is damaged easily. Therefore, follow the following precautions when using the product.***

1. Discharge static electricity from anything connected to the input/output terminals before making any connections. In particular, DC blocking capacitors, devices and any cables being used may be charged. If such a discharge occurs, this product may be damaged due to the discharge released when a connection is made. Therefore, discharge any static electricity by following the examples below before making any connections.

   Example 1: Cables

   The dielectric between the core conductor and outside conductor both possesses capacity. Therefore, the cables may be charged. Before making a connection, connect the core conductor with the outside conductor directly with a wire for short-circuiting.

   Example 2: DC blocking capacitor/Bias Tee

   The capacitor may be charged. Connect one of the electrodes at the center with the other electrode directly with a wire to short-circuiting the capacitor before making a connection.

2. To remove the direct current component from the output of this product, use a Bias Tee as shown in Figure-2.

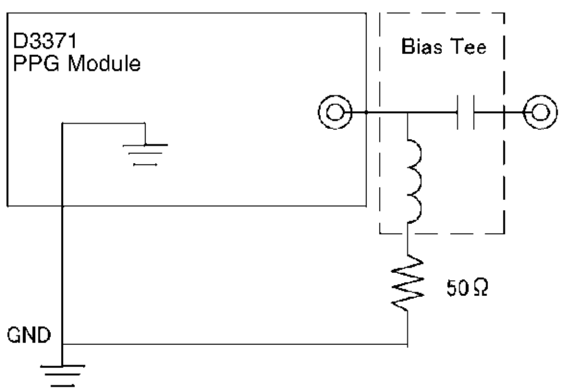


Figure-1 Removal of direct current component with a Bias Tee

To add a direct current voltage after the direct current component is removed, use two Bias Tees, as shown in Figure-2.

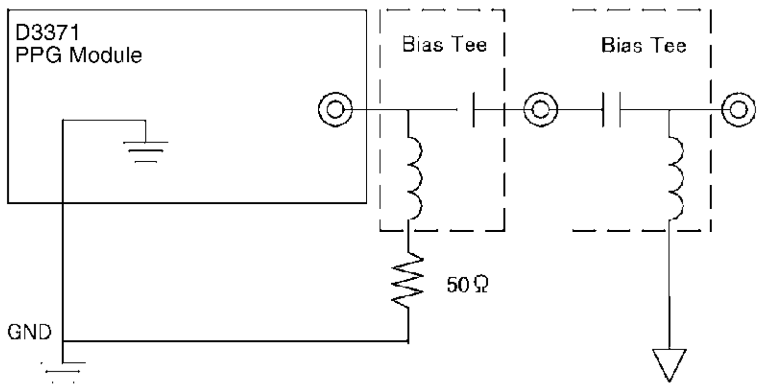


Figure-2 Addition of a direct current voltage

If a capacitor is connected in series with an output terminal on this product and a rapid voltage variation is applied to the capacitor from an object to which the product is connected for measurement, the additional voltage/current to the output may damage the internal circuit. Treat as if dealing with a Bias Tee: Remove the capacitor or Bias Tee in advance.

2. Limitations Imposed when Using Windows 98

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  - **LIMITATION ON SOFTWARE PROGRAMS USED ON THE INSTRUMENT.** The combination of software programs you use on the INSTRUMENT shall address not more than two (2) general office automation or consumer computing functions. Such functions include, but are not limited to: email, word processing, spreadsheets, database, network browsing, scheduling, and personal finance.

Certificate of Conformity

This is to certify, that

Transmission Analyzer

D3371 Series

instrument, type, designation

complies with the provisions of the EMC Directive 89/336/EEC in accordance with EN61326 and Low Voltage Directive 73/23/EEC in accordance with EN61010.

ADVANTEST Corp.

Tokyo, Japan

ROHDE&SCHWARZ

Engineering and Sales GmbH
Munich, Germany

PREFACE

The document for the D3371 Transmission Analyzer (referred to as the analyzer hereafter) consists of the following two volumes.

D3371 Transmission Analyzer Operation Manual (This manual)

This manual provides information on how to operate the analyzer and the associated functions. To use the analyzer safely, be sure to read this manual first.

D3371 Transmission Analyzer Remote Programming Manual

This manual provides information on the remote programming used with the analyzer. The interface referred to in this manual is GPIB.

- Organization of this manual

  This manual consists of the following chapters.

Safety Summary	To use the analyzer safely, be sure to read this section first.
1. INTRODUCTION	Describes a list of accessories, the operating environment, cautions on using the analyzer and the procedure used to confirm that the analyzer is operating correctly. Read this section before attempting to use the D3371.
2. OPERATION	Describes the names and functions of each part on each panel and explains the basic functions of the analyzer.
3. MEASUREMENT EXAMPLE	Shows some setup examples to help you learn how to operate the analyzer.
4. REFERENCE	Describes a list of conditions for measurement, and the functions.
5. TECHNICAL TERMS AND INFORMATION	Describes the operating principles and the measurement methods of the analyzer.
6. SPECIFICATIONS	Shows the specifications for the analyzer.
A.1 Trouble Shooting	
A.2 SYSTEM RECOVERY	
A.3 Messages	
A.4 Explanation of Terms	
A.5 Example of Measurement Result Printout	
A.6 Data Files	

- Typeface conventions used in this manual

Panel keys and buttons on the screen, menus, etc. are denoted in this manual as shown below.

Panel keys:

Boldface type Example: **TAB**

Key Sequences:

SHIFT-ESC means that SHIFT and ESC are pressed in the order presented.

Example: **SHIFT-ESC**

Buttons, lists or tabs which are displayed on the screen:

Bold Example: **[OK], [Exit]**

Menus:

The notation **[File]-[Open]** means that the **[File]** menu is selected, and then the **[Open]** command is selected from the **[File]** menu.

Example: **[File]-[Open]**

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Windows, Windows 98, Windows 98 SE, Microsoft and MS-DOS are trademarks or registered trademarks of Microsoft Corporation.

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EasyRestore is a trademark or registered trademark of PowerQuest Corporation.

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LIST OF TABLES

1. INTRODUCTION

This chapter describes the operating environment, information which should be read before using the D3371, the method used to confirm that the D3371 and the accessories included with the D3371 are functioning properly. Read this chapter completely before using the D3371.

1.1 D3371 Description

The D3371 transmission analyzer is an instrument that incorporates a pulse pattern generator (PPG) of 10 Mbits/s thru 3.6 Gbits/s and an error detector (ED) that measures bit errors into a compact unit. Each measurement function is a controlled by a module which is independent of other functions so that the user can configure the instrument according to their intended purpose.

This D3371 provides: versatile input/output interface functions that include the support of small amplitude devices, LD direct modulation and EA modulation, superior output waveforms, test patterns simulating real circuits such as G-bit Ethernet and SONET/SDH, jitter tolerance measurement functions to evaluate jitter tolerance performance of devices or systems, and error analysis functions to make the identification of bit error-generated positions and the analysis of error-generating factors easier.
The D3371 has been designed to respond to customer demands from development to production for a variety of communication systems targeted for IP network markets, optical modules and digital devices.

The key features of the D3371 are listed below:

1. Built-in precision synthesized clock generator
   10 MHz thru 3.6 GHz
2. Variety of test patterns
   Pseudorandom (PRBS) pattern 2^n-1 (n: 7, 9, 10, 11, 15, 23 or 31)
   Programmable (PROG) pattern (1 thru 8, 388, 608 (2^{23}) bits)
   Zero substitution (ZSUB) pattern 2^n (n: 7, 9, 10, 11 or 15)
   STM-N (STM) patterns (n: 4, 16) in ITU-T recommendation G.707 (a pattern option)
   Flexible (FLEX) patterns combining PRBS patterns and multiple PROG patterns (a pattern option)
3. Bit error measurement
   Error rate
   Error count
   Error interval (EI)/Error free interval (EFI)
   Frequency measurements
   Error performance
4. Burst pattern signal generation and bit error measurement functions
5. Jitter tolerance measurement functions (a jitter tolerance option)
6. Error phase analysis functions (an error phase analysis option)
7. Auto search function
   (Sets PRBS patterns, and automatically sets the threshold voltage for data entry and the input clock phase to their optimum measurement values.)

8. Equipped, as standard, with a remote control function (compliant with GPIB) that allow you to configure automatic measurement systems.
9. Equipped with a module structure that can be expanded as required.
10. A high resolution 10.4 inch LCD
11. A touch screen interface which provides easy operation of the various functions
    (Equipped with a data knob that allow users to perform operations equivalent to the panel keys of conventional analyzers.)
12. Equipped with a printer interface (parallel).
13. Ethernet (10BASE-T).

1.2 Instrument Configuration

Modules that can be installed on the D3371 Transmission Analyzer are shown below.

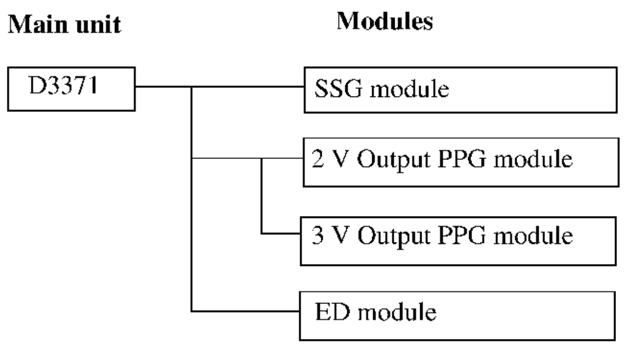


Table 1-1 List of Modules

Modules *1	Name	Model	Description
PPG module	Pulse pattern generator 2 V output module	OPTD3371 + 10 OPTD3371 +10A *2	The pulse pattern generator has a maximum amplitude of 2 V_{P-P}.
	Pulse pattern generator 3 V output module	OPTD3371 + 11 OPTD3371 +11A *2	The pulse pattern generator has a maximum amplitude of 3 V_{P-P}.
ED module	Error Detector module	OPTD3371 + 12 OPTD3371 +12A *2	Error Detector
SSG module	3.6 G Synthesizer module	OPTD3371 + 13 OPTD3371 +13A *2	Synthesized clock generator with a frequency range of 10 MHz to 3.6 GHz

*1: Two or more modules which have the same function cannot be installed at the same time.
*2: For more information on the model name, refer to Section 1.4, "Options."

1.3 Accessories

The table below lists the standard accessories shipped with the D3371. If any of the accessories are damaged or missing, contact the nearest ADVANTEST Field Office or representative. Additional accessories should be referred to by model number when ordered.

Table 1-2 List of Standard Accessories for the D3371 Main Unit

Name of accessory	Model number	Quantity	Remarks
Power cable	A01402	1	*1
Ferrite core	DEE-003093-1	4	EMC, EMS (Refer to Section 1.6.)
Touch pen	AHN-STPEN-1	1	Pen used for all touch panel operations
Certificate of Authenticity	-	1	Windows license *2
D3371 Operation manual	ED3371	1	(This manual)
D3371 Remote Programming Manual	ED3371-PM	1	
System Recovery Disk	-	1	Set of two floppy disks

*1: Select a suitable power cable for your country when ordering the D3371 (see Table 1-6). Order the power cable by model number or option number.

*2: Keep the Certificate of Authenticity (Windows license card) because it contains a license key which is required when reinstalling D3371 system software.

Table 1-3 List of Standard Accessories for the SSG Module

Name of accessory	Model number	Quantity	Remarks
Coaxial cable	DCB-FFC973X01	1	Semi-rigid cable used to connect the SSG-PPG module

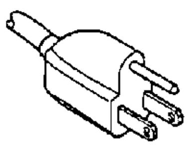
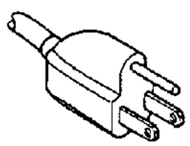
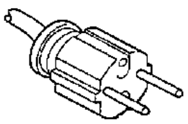
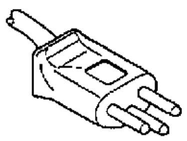
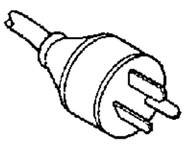
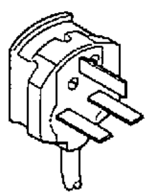
Table 1-4 List of Standard Accessories for the PPG Module

Name of accessory	Model number	Quantity	Remarks
Coaxial cable	SF104-11SMA-1000	3	SMA-SMA cable
50Ω terminator	HRM-601A	4	

Table 1-5 List of Standard Accessories for the ED Module

Name of accessory	Model number	Quantity	Remarks
Coaxial cable	SF104-11SMA-1000	2	SMA-SMA cable

Table 1-6 Power Cable Types

Plug configuration	Standards	Rating, color and length	Model number (Option number)
	JIS: Japan Law on Electrical Appliances	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
	CEE: Europe DEMKO: Denmark NEMKO: Norway VDE: Germany KEMA: The Netherlands CEBEC: Belgium OVE: Austria FIMKO: Finland SEMKO: Sweden	250 V at 6 A Gray 2 m (6 ft)	Straight: A01404 (Option 96) Angled: A01414
	SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
	SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: ---------
	BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417

1.4 Options

The options available for the D3371 are shown below.

The following option modules (other than pre-installed ones) have to be installed at an ADVANTEST factory. For information on available combinations, contact the nearest ADVANTEST Field Office or representative.

Module option

OPTD3371+10	Pulse Pattern Generator 2 V Output module
OPTD3371+11	Pulse Pattern Generator 3 V Output module
OPTD3371+12	Error Detector module
OPTD3371+13	3.6 G Synthesizer module

Function option

OPTD3371+70	Jitter Tolerance Option
OPTD3371+71	Pattern Option
OPTD3371+72	Error Phase Analysis Option

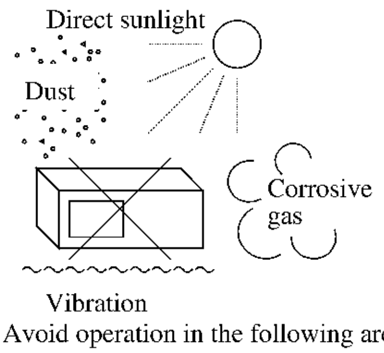
1.5 Operating Environment

This section describes the environmental conditions and power requirements of the D3371.

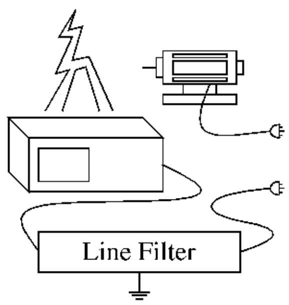
1.5.1 Environmental Conditions

The D3371 should only be used in a place which satisfies the following conditions:

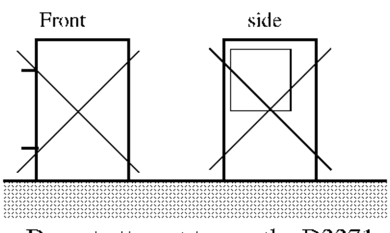
- Ambient temperature: 5°C to +40°C (operating temperature)
- Relative humidity: 40% to 85% (without condensation)
- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations
- A low noise area
  Although the D3371 has been designed to withstand a certain amount of noise riding on the AC power line, it should be used in an area of low noise. Use a noise cut filter when ambient noise is unavoidable.
- An area allowing unobstructed air flow
  There is an exhaust cooling fan on the rear panel and exhaust vents on both sides and the bottom (toward the front) of the D3371. Never block these vents. The resulting internal temperature rise will affect measurement accuracy.
  Keep the rear panel 10 centimeters away from the wall. In addition, do not attempt to use the D3371 when it is standing on its rear panel or on either side panel.



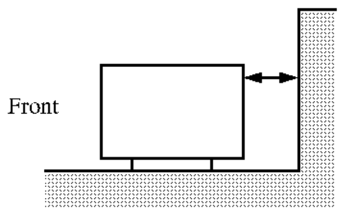
- Avoid operation in the following areas.



- Use a noise cut filter when there is a large amount of noise riding on the power line.



- Do not attempt to use the D3371 when it is standing on its rear panel or on either side panel.



- Keep the rear panel 10 centimeters away from the wall

Figure 1-1 Operating Environment

1.5.2 Power Supply Specifications

The power supply specifications for the D3371 are listed in Table 1-7.

CAUTION:

1. ***To prevent damage, operate the D3371 within the specified input voltage and frequency range.***
2. ***Power consumption is 450 VA or less. Connect the D3371 to an AC outlet with a capacity well above 450 VA.***
3. ***Be sure, however, to use a power cable conforming to the voltage and safety standards of the country the D3371 is being used in (see Table 1-6).***

Table 1-7 Power Supply Specifications

	100 VAC Operation	200 VAC Operation	Remarks
Input voltage range	90 V to 132 V	198 V to 250 V	Automatically switches between input levels of 100 VAC and 200 VAC.
Frequency range	47 Hz to 63 Hz		
Power consumption	450 VA or below		

1.5.3 Circuit Breaker

The circuit breaker is located on the rear panel (see Figure 1-2). It is automatically turned off when an over-current flows.

CAUTION:

1. ***If the circuit breaker is turned off, there may be some problem with the D3371. Contact the nearest ADVANTEST Field Office or representative for information on repairing the D3371.***
2. ***Avoid using the circuit breaker instead of the POWER switch to turn the power on and off.***

Use the procedure below to check the circuit breaker or to turn it on:

1. Turn the **POWER** switch off.
2. Press the part of the switch marked with a black dot to turn the circuit breaker on.

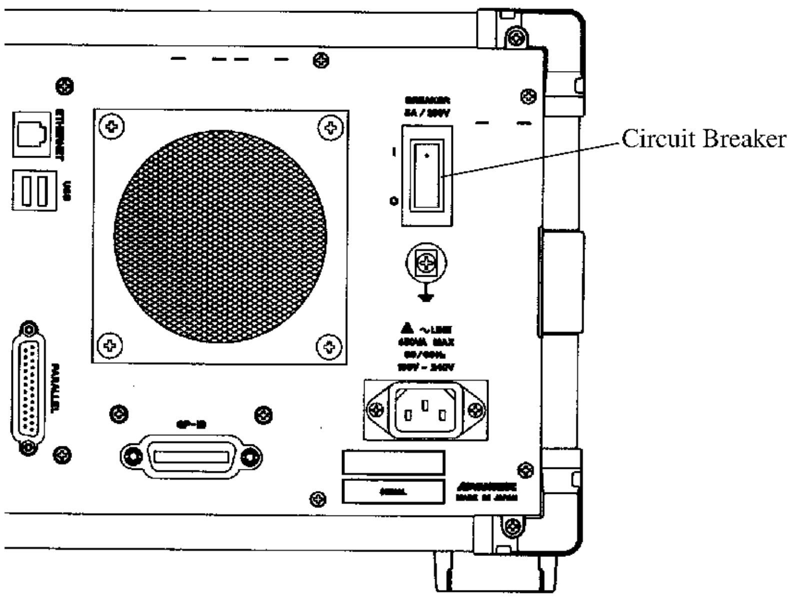


Figure 1-2 Circuit Breaker

1.5.4 Power Cable

CAUTION:

1. ***Use a power cable rated for the voltage being used. Be sure however to use a power cable conforming to safety standard of your country when using this instrument overseas (See Table 1-6).***
2. ***Be sure to plug the power cable into an electrical outlet which has a safety ground terminal. This instrument will not be grounded if it is used with an extension cord that does not have a ground terminal.***

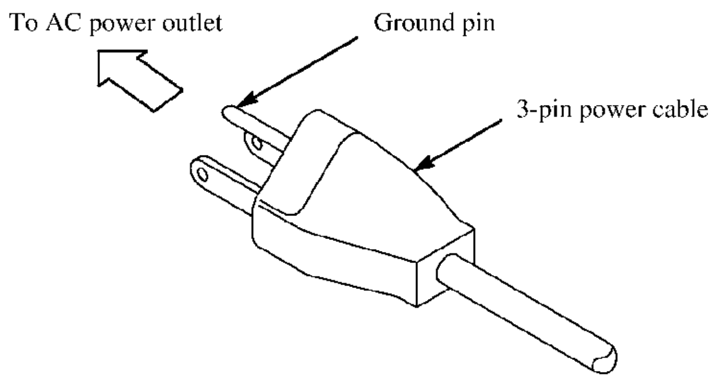


Figure 1-3 Power Cable

1.6 Safety precautions when using the D3371

This section contains important information related to the general use of the D3371.

1.6.1 Connecting Input/Output Signal Cables

CAUTION: ***The ultra high frequency components inside the D3371 are susceptible to electro-static discharges and damage easily. To avoid trouble, observe the following precautions:***

1. Discharge any static electricity before connecting the cables or equipment to the I/O connectors. For cables in particular, temporarily connect the inner and outer conductors before connecting them to the instrument. Anti-static wrist straps should be worn to protect against static electricity.
2. Note the following regarding DATA OUTPUT, $\overline{\text{DATA}}$ OUTPUT, CLOCK OUTPUT, and $\overline{\text{CLOCK}}$ OUTPUT of the PPG module:
   - Output signal is set to OFF when the power is turned on.
   - Connect a 50 Ω terminator to connectors that will not be used.
   - When the output is set to OFF, the output is 0 V terminated with 50 Ω. (However, for a frame ground, there can also be a potential difference of several mV.) Carefully check the input conditions of the unit under test (UUT) or device under test (DUT) before connecting.
   - Any output connections must be terminated with a purely resistive load of 50 Ω. This is not necessary, however, if a DC blocking capacitor has been used to prevent the supply of voltage to the pattern generation output. (Voltage can be applied to the 50 Ω load. Never set the output to ON in the no load status.
   - When voltage or current is supplied to output, always terminate with -2 V (ECL) or +1.3 V (LVPECL)/CML.
   - The output signal becomes undefined if the output is set to ON under the following conditions:

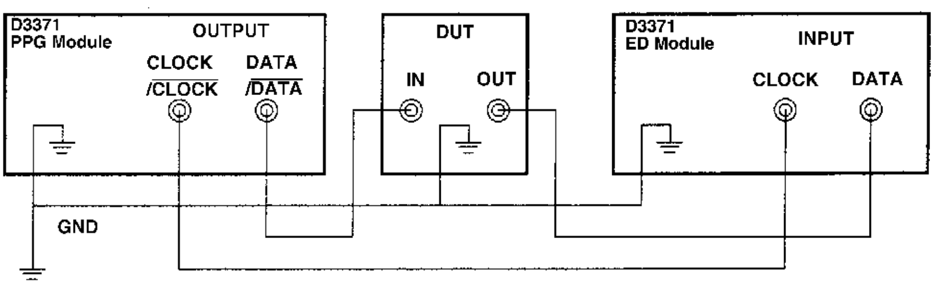
     The source clock for PPG module operation is not available (not attached to the CLOCK INPUT connector), or the input frequency range or input amplitude of the source clock for PPG module operation does not satisfy the input specifications.
3. The ED module DATA INPUT and CLOCK INPUT connectors
   - When the power is off, or while the D3371 is starting up, 0 V terminated with 50 Ω is set on the connectors. When the D3371 has finished starting up, the termination voltage is set to the most recently set level before it was turned off.
   - The maximum permissible input voltage to the ED module input terminal is shown in Table 1-8. Never attempt to input a voltage exceeding this value.

Table 1-8 Maximum Input Voltage for the Input Terminal

Input terminal	Terminating type	Maximum input voltage range
DATA INPUT	to GND (0V)	-4.2V to +2.5V
	ECL (-2V)	-4.5V to +0.5V
	LVPECL (+1.3V)	-2.9V to +3.8V
	PECL (+3V)	-1.2V to +4.5V
CLOCK INPUT	CML	Vcc-4.2V to Vcc+1.0V *1
	to GND (0V)	-2.5V to +2.5V
	ECL (-2V)	-4.5V to +0.5V
	LVPECL (+1.3V)	-1.2V to +3.8V

*1 Vcc is termination voltage of CML (setting range: 0 to 3.50 V, setting resolution: 0.01 V)

4. Connect a pure resistance of 50Ω terminated with 0 V to each of the high-speed signal output terminals as the load, but never attempt to apply any voltage to these terminals:
   - BURST OUTPUT
   - TRIGGER OUTPUT
   - 10 MHz OUTPUT
   - CLOCK OUTPUT (SSG)
   - ERROR OUTPUT
   - AUX OUTPUT
5. Connect the ground terminal on the rear panel of the D3371 and the ground pin of the power plug. In addition, connect the ground to the same ground potential as that for the equipment connected to the I/O connectors (see Figure 1-4).



Be sure to ground the GND terminal of measuring instrument and device to be tested before their I/O terminals are connected.

Figure 1-4 Grounding the D3371 and the Device under Test

6. Ground floating instruments such as digital multimeter through a resistance of 10 kΩ to 100 kΩ (see Figure 1-5).

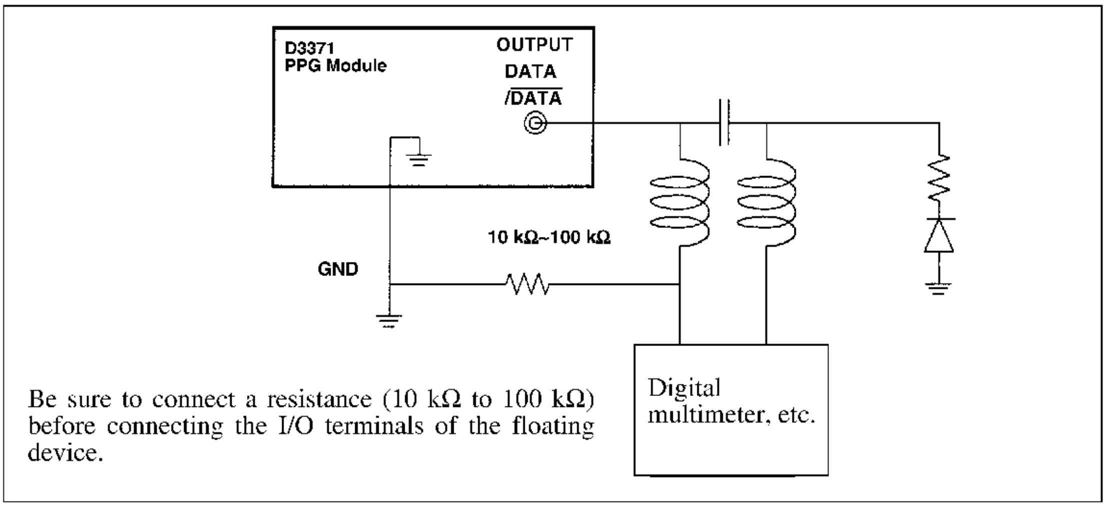


Figure 1-5 Grounding a Floating Instrument

1.6.2 Before Turning the D3371 Power On

Do not connect any device under test before the D3371 power is turned on.

1.6.3 Opening the Chassis

The chassis of this instrument should only be opened by an authorized customer service engineer. ADVANTEST shall not be liable for any accidents which result when the chassis is opened by unauthorized personnel.

CAUTION: ***Opening the chassis may expose the user to electrical shocks.***

1.6.4 When Abnormal Conditions Occur

If unusual sounds, smells or smoke is seen or smelt coming from the D3371, turn the **POWER** switch off, remove the power cable from the AC power outlet and contact the nearest ADVANTEST Field Office or representative immediately.

1.6.5 Front Feet

Four feet (two at the front and two at the rear) are attached to the bottom of the D3371.
The front feet can be extended so that the front of the instrument is raised.

The extensions may wear out over time. If this occurs, contact the nearest ADVANTEST Field Office or representative for information on how to replace them.

Read the instructions below to use the D3371 safely.

Note the following when using the extensions so that the weight of the D3371 is evenly distributed.

- Use the D3371 on a flat surface.
- Do not put any objects on the D3371.
- Do not lean on the D3371.
- Do not place anything (hands or other objects) under the D3371.
- Do not slide the D3371.
- Do not use excessive force when pressing keys (more than 1 kg).

Make sure the extensions are folded shut when:

- Transporting the D3371.
- Connecting or disconnecting cables.
- Using the D3371 on a cart.
- The D3371 is not in use.
- The D3371 is in storage.
- The extensions may wear out over time.

1.6.6 Life Span of the Backup Lithium Battery

The life span of the D3371's backup lithium battery is three years. When the service life of the battery has ended, an error message is displayed when the D3371 power is turned on, and the startup is terminated. We recommend that the backup lithium battery be replaced early enough to prevent this situation from arising. For more information on replacing the battery, contact the nearest ADVANTEST Field Office or representative.

1.6.7 The Touch Screen

The touch panel display of the D3371 includes a pane of glass. Do not use excessive force when using the touch panel because it may be damaged. Only use an appropriate type of pen (not ball point or mechanical pencils) with the display.

1.6.8 The Hard Disk Drive

The D3371 is equipped with a hard disk drive. The following actions should not be performed.

- Turning the D3371 power off while the HDD access indicator on the front panel is lit.
- Subjecting the D3371 to excessive vibrations or shocks.

1.6.9 Notes for Safe Use of the D3371

CAUTION: ***The D3371 uses Windows 98. Since the measurements are enabled using Windows applications, do not modify the Windows environment unless specifically instructed to do so in this manual. The D3371 is not a data-processing unit and can only be used as described in this manual.***

In particular, the following actions should be avoided:

- Installing application programs *1
- Changing or deleting Control Panel settings (this restriction does not apply to the operations described in Section 2.7.4, "Connecting a Printer" and Section 2.7.5,"Connecting the D3371 to a Network.")
- Adding or deleting files in the C drive
- Starting up other applications or manipulating files while measurements are being performed
- Updating the Windows operating system

*1: If user installed software causes the D3371 to cease operating correctly, a fee will be charged to re-install the system environment. Setting up the system again will delete all files that have been created or stored on the hard disk since the system was purchased. Any required files should be backed up before requesting that the system be re-install again.

1.6.10 EMI and EMS Compliancy

The following procedures are used to meet EMI and EMS specifications. Attach the supplied ferrite cores (refer to Section 1.3) to the D3371 end of the cables used to connect the printer, LAN, and USBs (keyboard and mouse) to the D3371. (See Figure 1-6.)
If a ferrite core is already attached however, no ferrite core has to be connected.

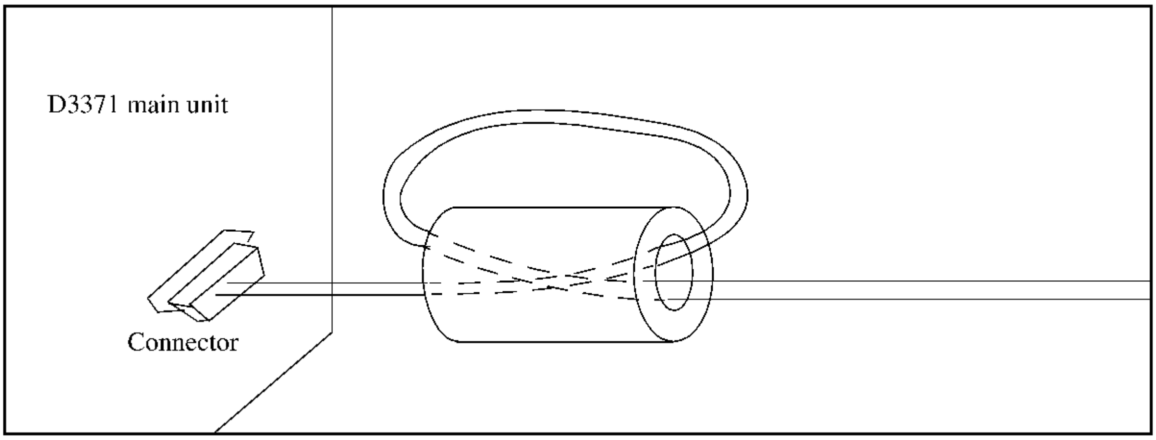


Figure 1-6 Attaching a Ferrite Core

1.6.11 Electromagnetic Interference

The D3371 may cause electromagnetic interference and effect television and radio reception.

If the D3371 power is turned off and the electromagnetic interference is reduced, then the D3371 has caused the problem.

Electromagnetic interference may be prevented by doing the following:

- Change the direction of antenna of the television or the radio.
- Place the D3371 the other side of the television or the radio.
- Place the D3371 away from the television or the radio.
- Use another line of power source for the television or the radio than the D3371.

1.6.12 Prevention of Electrostatic Buildup

To prevent damage to semiconductor parts from electrostatic discharge (ESD), the precautions shown below should be taken. We recommend that two or more countermeasures be combined to provide adequate protection from ESD. (Static electricity can easily be built up when a person moves or an insulator is rubbed.)

Table 1-9 ESD Countermeasures

ESD Source	Suggested Countermeasure
Operator	Use a wrist strap (see Figure 1-7).
Floor in the work area	Installation of a conductive mat, the use of conductive shoes, and grounding (see Figure 1-8).
Workbench	Installation of a conductive mat and grounding (see Figure 1-9).

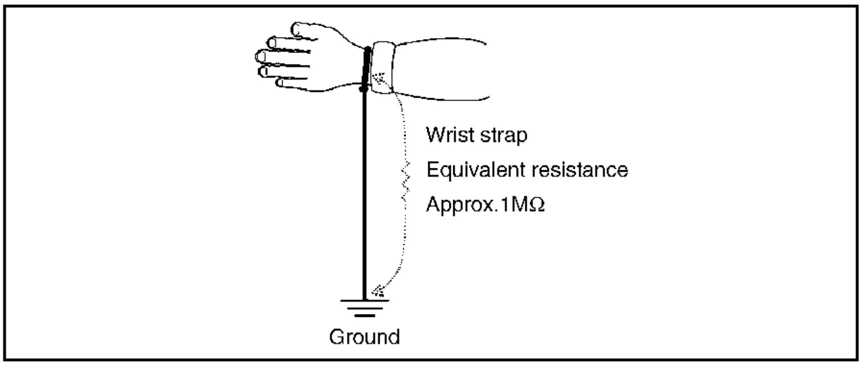


Figure 1-7 Countermeasures for Static Electricity of Human Bodies

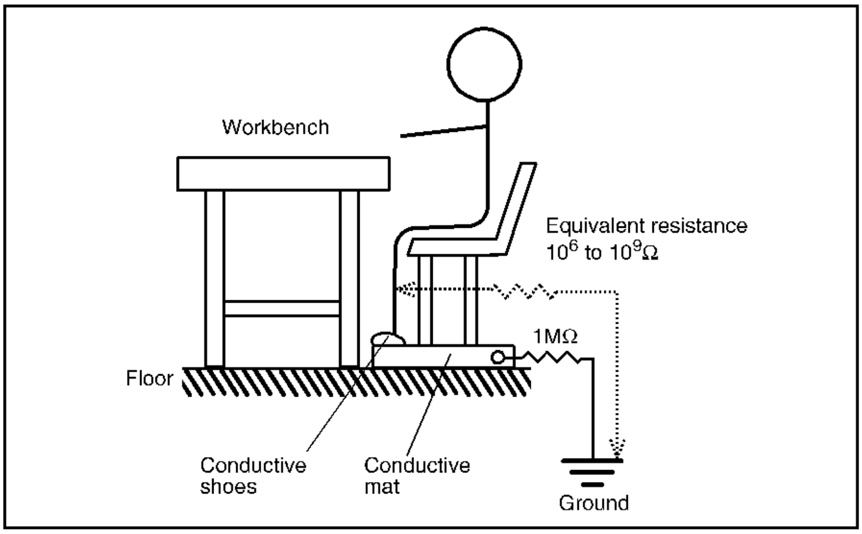


Figure 1-8 Countermeasures for Electrostatic on Work Floor

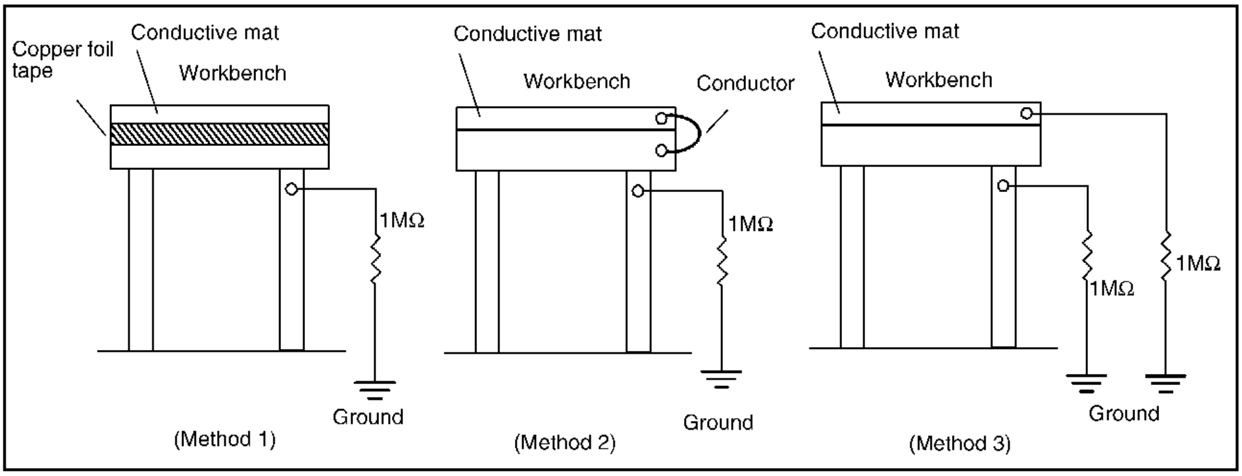


Figure 1-9 Countermeasures for Electrostatic on Work Bench

1.7 Setup

This section describes how to set up the D3371.
The procedure described in this section is required for a D3371 that has the SSG and PPG modules installed. The built-in SSG module includes the necessary clocks (the connections between these modules are removed before shipping at the factory to prevent damage caused during transportation).

CAUTION: ***The system setup should be performed on a flat workbench with the power cable disconnected from the AC outlet.***

1. Check that the **POWER** switch on the front panel is turned off.
2. Connect the coaxial cable attached to the SSG as shown in Figure 1-10.

CAUTION: ***Use the supplied semi-rigid coaxial cable only. ADVANTEST Corporation shall not be liable for problems resulting from the use of unauthorized cables.***

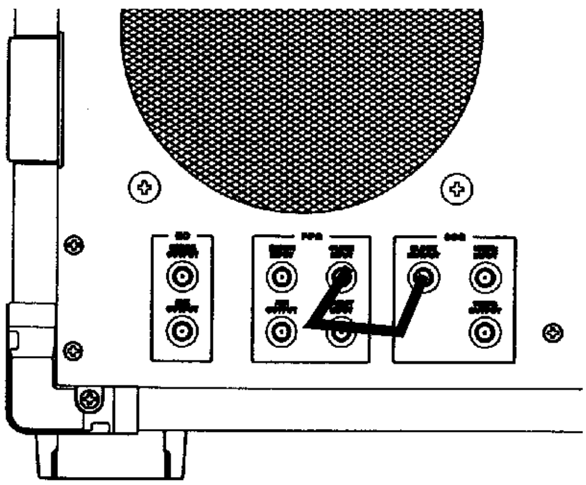


Figure 1-10 Connecting the Built-in SSG Module

1.8 System Checkout

This section describes the system checkout which must be performed when operating the D3371 for the first time. Follow the procedure below to confirm that the D3371 is operating correctly:

CAUTION: ***The hard disk or files may be damaged if the D3371 power is turned off while the D3371 is being starting up.***

NOTE: ***To ensure accurate measurements using the built-in SSG module, turn on the D3371 transmission analyzer, wait at least 30 minutes for he D3371 to warm up.***

1.8.1 Turning on the Power

1. Check to see if the **POWER** switch (on the front panel) is turned off.
2. Perform the module setup (refer to Section 1.7, "Setup").
3. Connect the supplied power cable to the AC power supply connector on the rear panel.

CAUTION:

1. ***To prevent damage, operate the D3371 within the specified input voltage and frequency ranges (refer to Section 1.5.2).***
2. ***Power consumption is 450 VA or less. Connect the D3371 to an AC outlet that has a capacity well above 450 VA.***

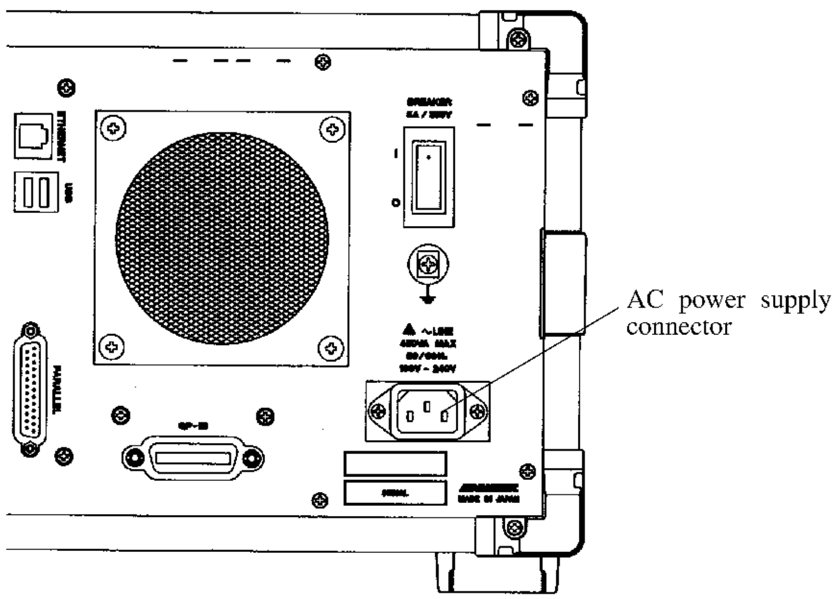


Figure 1-11 Power Cable Connections

4. Connect the power cable to the AC outlet.
5. Turn the **POWER** switch (on the front panel) on.

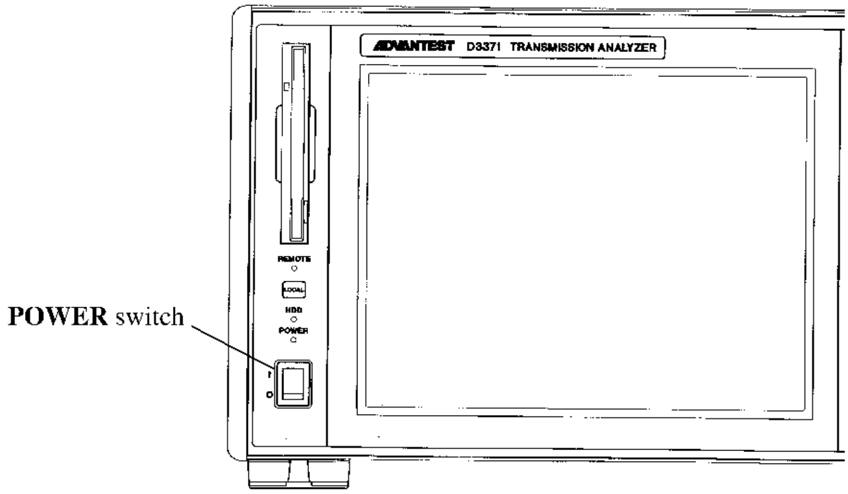


Figure 1-12 POWER Switch

When the power is turned on, the D3371 checks the internal memory while the ADVANTEST logo screen is being displayed.
Then, the measurement initialization screen is displayed. If the measurement initialization screen is not displayed, contact the nearest ADVANTEST Field Office or representative immediately.

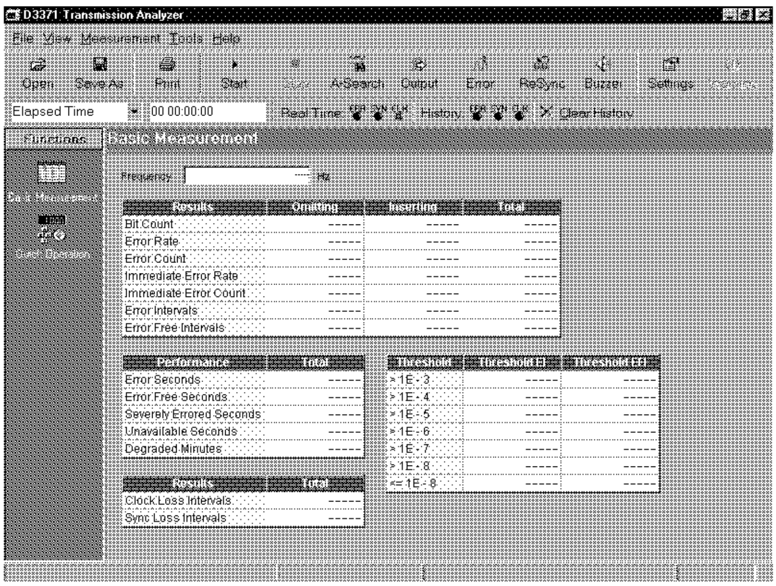


Figure 1-13 Measurement Initialization Screen

NOTE:

1. ***The screen display may be different from the one shown in Figure 1-13, depending on the previously saved conditions.***
2. ***Refer to Chapter 2.7.12, "Self-Test" when the measurement initialization screen and information as shown in Figure 1-14 are displayed.***
3. ***Do not press any keys before the measurement initialization screen is displayed.***
4. ***Scandisk is performed when the D3371 was not shut off according to the procedure shown in Section 1.8.2.***
   For more information, refer to Section 1.8.3, "Scandisk."
5. ***If the drift exceeds the tolerance for the delay line (which is used to adjust the amount of clock delay), a calibration is automatically performed. If calibrations are performed frequently, there is a possibility that the delay line is at the end of its life and needs to be replaced. (For more information, refer to Section 1.13,"Replacing Parts with Limited Life."***

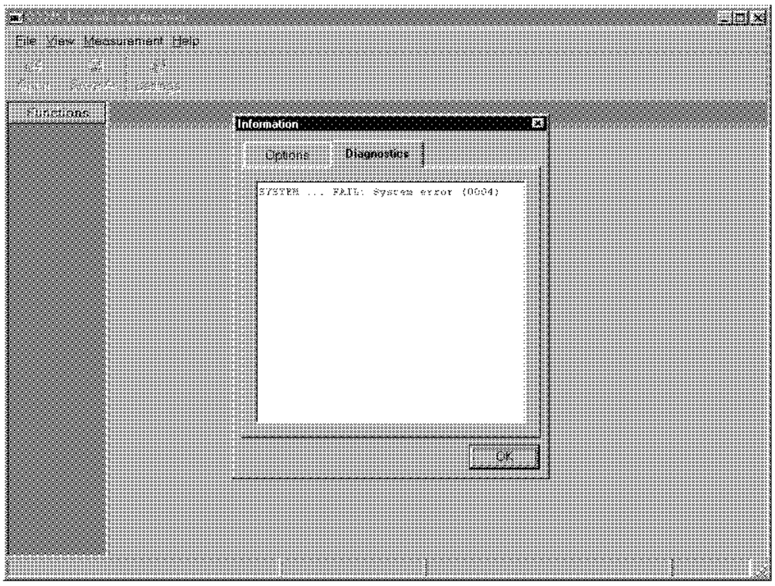


Figure 1-14 Self-test Error Display

1.8.2 Exiting the D3371 and Turning the Power Switch Off

The D3371 uses Windows as the operating system.

To turn the D3371 off, use either of the following procedures.

Using the touch panel

1. Click **[File]-[Exit]** on the menu bar.
   The screen shown in Figure 1-15 is displayed.

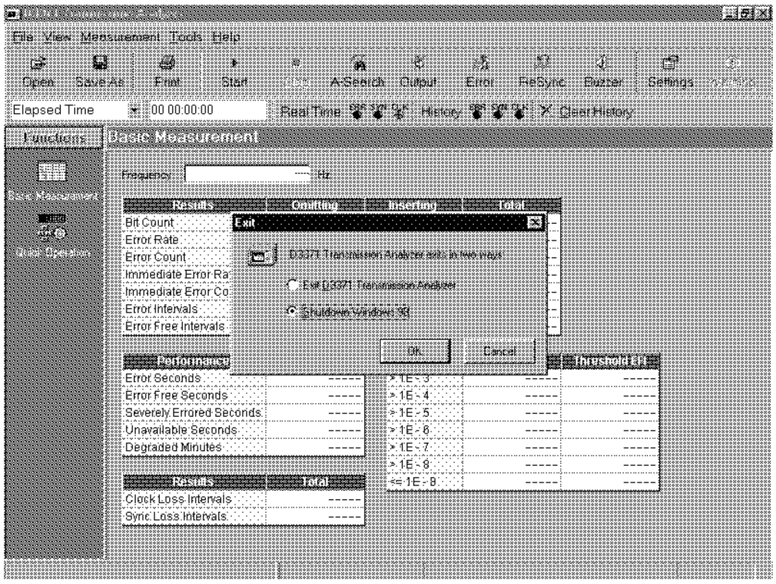


Figure 1-15 System Shutdown Menu

2. Select **[Shutdown Windows 98]** and click the **[OK]** button.
   The screen display turns off and then the **POWER** indicator is turned off.
3. Turn the **POWER** switch off.

Using the panel keys

1. Press **EXIT (SHIFT-ESC)**.
   The screen shown in Figure 1-15 is displayed.
2. Press the cursor keys ↑ or ↓ to select **[Shutdown Windows 98]**, and press **ENTER**.
   The screen display turns off and then the **POWER** indicator is turned off.
3. Turn the **POWER** switch off.

CAUTION: ***Wait at least 30 seconds between power-up and power-down to ensure a normal system startup.***

1.8.3 Scandisk

If the D3371's power was turned off without performing one of the procedures outlined in Section 1.8.2, "Exiting the D3371 and Turning the Power Switch Off," correctly the Scandisk function automatically starts when the D3371 power is turned on again. The D3371 application is automatically started when the Scandisk function has been completed.

CAUTION:

1. ***To prevent problems from occurring, do not interrupt Scandisk when it is checking the hard disk.***
2. ***If an error occurs while the Scandisk function is being carried out, follow the instructions as displayed.***

1.8.4 Drive Configuration of the D3371

The drive configuration of the D3371 is as follows:

A: Floppy disk drive

C: Hard disk drive for the system

D: Hard disk drive for the user

CAUTION: ***Do not modify or delete any of the files on the C drive.***

1.9 Cleaning, Storing and Transporting the D3371

1.9.1 Cleaning

Remove dust from the outside of the D3371 by wiping or brushing the surface with a soft cloth or small brush. Use a brush to remove dust from around the panel keys. Hardened dirt can be removed by using a cloth which has been dampened in water containing a mild detergent (except for the touch screen display).

CAUTION:

1. ***Do not allow water to get inside the D3371.***
2. ***Do not use organic cleaning solvents, such as benzene, toluene, xylene, acetone and similar compounds, since these solvents may damage the plastic parts.***
3. ***Do not use cleanser.***

- Cleaning the Touch Panel Display

  Clean the surface with a piece of soft cloth. However, hardened dirt can be removed using a soft cloth dampened in ethanol.

  CAUTION:

  1. ***Do not scrub the touch panel surface, because it is sensitive and can easily be damaged.***
  2. ***The touch panel includes a pane of glass. Do not subject the touch panel to excessive force.***

1.9.2 Storing

Store the D3371 in an area which has a temperature from -20°C to +70°C and a relative humidity from 30% to 85%. If the D3371 will be stored for a long period (more than 90 days), put the D3371 in a vapor-barrier bag with a drying agent and store the D3371 in a dust-free location out of direct sunlight.

1.9.3 Transporting

CAUTION:
Extreme caution should be exercised when transporting or moving the D3371 because of its weight.

1. ***Use a dolly that can support the weight of the D3371.***
2. ***The D3371 should only be moved with two or more people.***

When the D3371 is shipped, use the original container and packing material. If the original packaging is not available, double-pack the D3371.

1. If the PPG module is installed in the D3371, make sure that the supplied 50Ω terminators are connected to each of the following high-speed signal terminals.

DATA OUTPUT
$\overline{\text{DATA}}$ OUTPUT
CLOCK OUTPUT
$\overline{\text{CLOCK}}$ OUTPUT

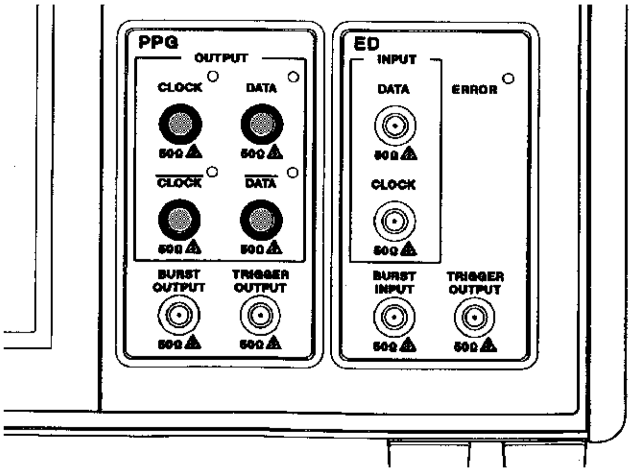


Figure 1-16 Connecting 50Ω Terminators

2. If the SSG module is installed in the D3371, disconnect the Semi-rigid coaxial cable.
3. Attach the protective cover of the touch panel display to the D3371.
4. Enclose the D3371 in protective sheeting (put a drying agent to protect the D3371 from humidity).
5. To double-pack the D3371, use a corrugated cardboard container with a thickness of 5 mm or more and internal dimensions of at least 10 cm larger than the external dimensions of the above package. The minimum thickness of the cushion between the first and second packages is 4 cm. Surround the first package with the cushion.

   Cushion the D3371 on all sides with packing material such as antistatic foam (the thickness of the material must be 4 cm or more).
6. Seal the corrugated cardboard container with shipping tape or an industrial stapler.
7. Prepare a corrugated cardboard container for the external packaging.
   Seal the corrugated cardboard container with shipping tape or an industrial stapler.
8. Close the second package and secure it with string.

If the D3371 is shipped ADVANTEST or its representatives for service or repair, attach a tag to the D3371 that shows the following information:

- Owner and address
- Name of a contact person at your location
- Serial number of the D3371 (located on the rear panel)
- Description of the service requested

1.10 When Disposing the D3371

When disposing the D3371, make sure that the appropriate laws for the disposal of electrical instruments are obeyed.
The D3371 uses a backlight lithium battery and parts containing gallium arsenic which contain harmful substances listed in the Safety Summary. For more information, contact the nearest ADVANTEST Field Office or representative.

1.11 Warm-up

After the D3371 temperature has reached room temperature, turn the **POWER** switch ON and let the D3371 warm up for 30 minutes.

1.12 Calibration

Calibration work should be performed at an ADVANTEST CORPORATION site. When the D3371 is to be calibrated, please contact the nearest ADVANTEST Field Office or representative.

Desirable Period	One year

1.13 Replacing Parts with Limited Life

The D3371 uses the following parts that have a limited life span and are not listed in the Safety Summary.

The following parts may need to be replaced after their expected lifespan has expired.

Part name	Life span
Lithium battery for backup	3 years
Touch panel	1 million times
Key switches	1 million times
Rotary encoder	2,500,000 rotations
Delay line	10,000 times *1

*1: The D3371 uses a motor-driven trombone delay line to adjust the amount of clock delay.

2. OPERATION

This chapter introduces the names and functions of the parts on each panel and explains the basic operating procedures needed to operate the D3371.

2.1 Panel Description

This section describes the various names and functions of parts located on the D3371 and modules.

2.1.1 D3371 Main Unit

This section describes the front and rear panels on the D3371 main unit.

2.1.1.1 Front Panel

This section indicates and describes each section of the front panel.

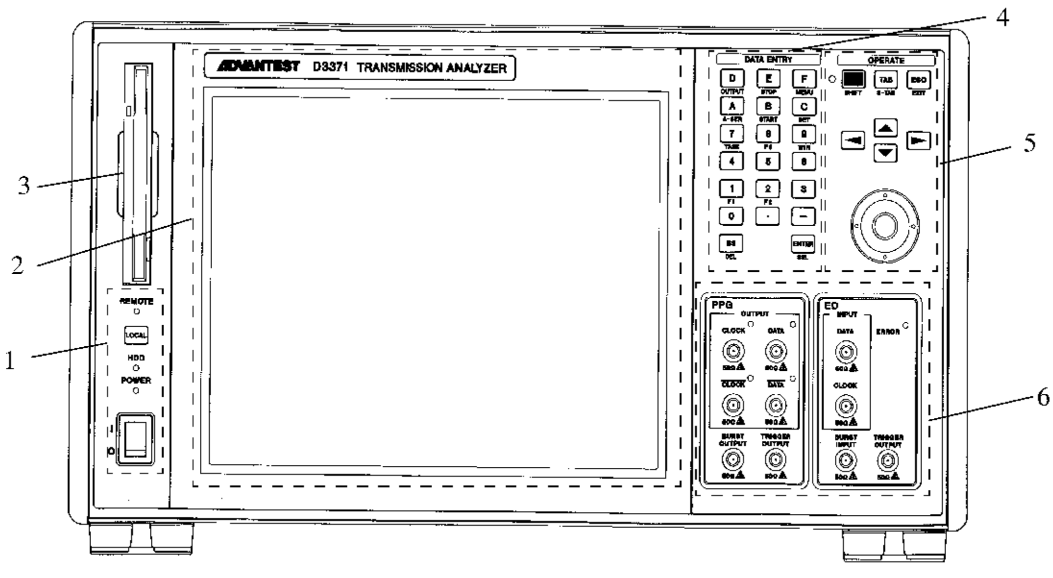
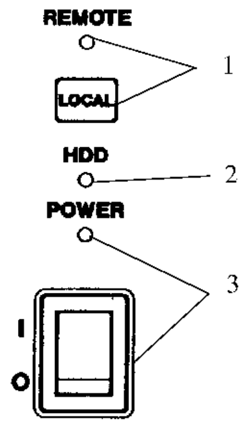


Figure 2-1 Front Panel of the D3371

1. SYSTEM Section
2. Display Section
3. Floppy Disk Drive Section
4. DATA ENTRY Section
5. OPERATION Section
6. Module Section

1. SYSTEM Section



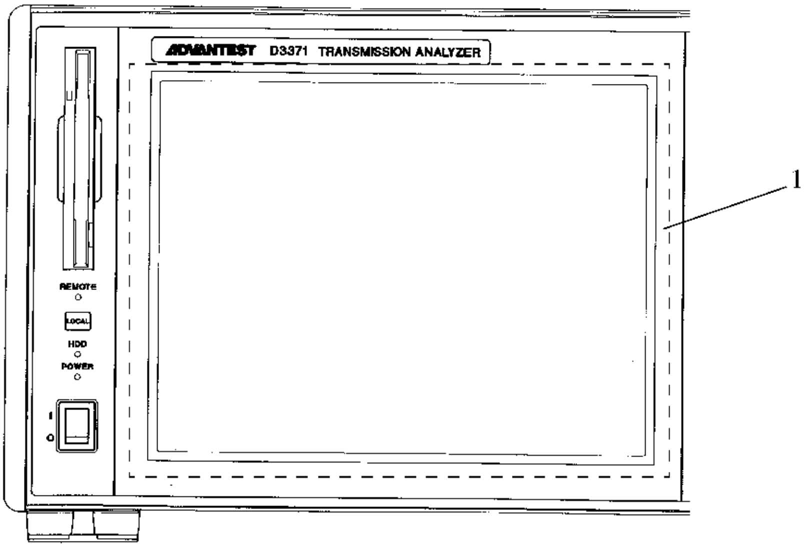
1.	**LOCAL** key	Turns off GPIB remote control. (When REMOTE indicator is lit)
	REMOTE indicator	Lights when the D3371 is in the remote state
2.	**HDD** access indicator	Lights while the HDD is being accessed

CAUTION: ***Do not turn the D3371 power off while the HDD is being accessed.***

3.	**POWER** switch	Used to turn the D3371 power on or off
	POWER indicator	Lights when the D3371 power is on. This indicator is automatically turned off when the D3371 is turned off.

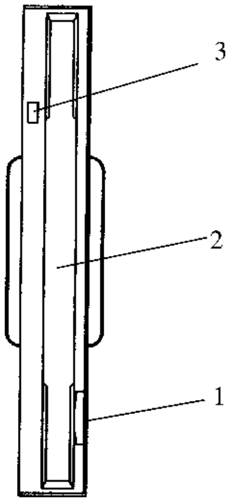
CAUTION: ***Confirm that the indicator is not lit first. Then, turn the POWER switch off. For more information, refer to Section 1.8.2, "Exiting the D3371 and Turning the Power Switch Off."***

2. Display Section



1. Touch Screen Display — Displays measurement data, setting conditions and other information.
The D3371 is mounted with a touch screen. The D3371 can be operated by touching the touch screen with an appropriate tool (touch screen pen) .
For more information on the items displayed, refer to Section 2.1.5, "Screen Display."

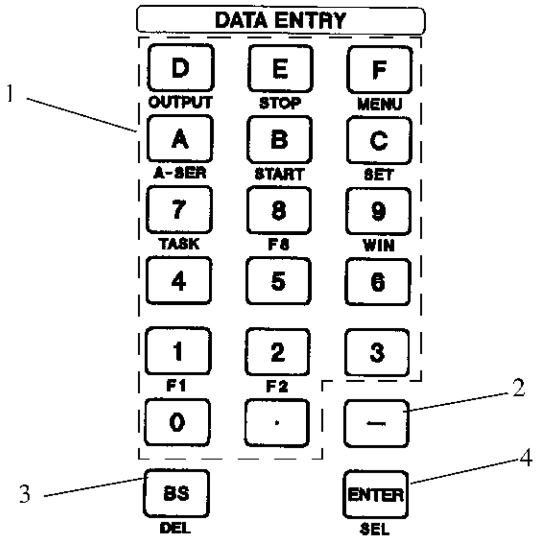
3. Floppy Disk Drive Section



1.	Eject button	Used to eject a floppy disk from the drive
2.	Floppy disk drive door	Where the floppy disk is inserted
3.	Access indicator	Lights while the floppy disk in the drive is being accessed

CAUTION: ***Do not take the floppy out while the access indicator is lit.***

4. DATA ENTRY Section

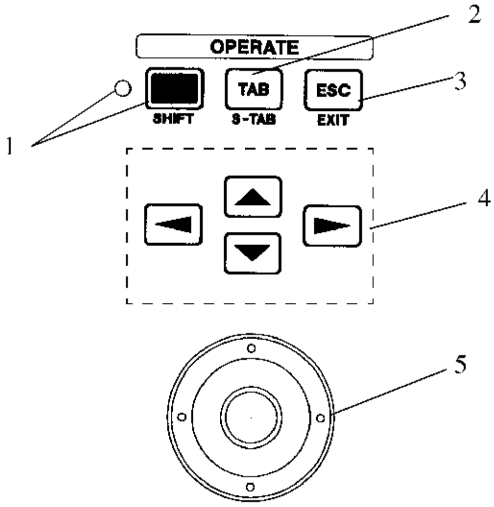


1.	Numeric keys	Used to enter numeric values or data. There are ten number keys (**0** through **9**), hexadecimal keys (**A** through **F**) and a decimal point key (**.**).

NOTE: ***The extended functions (use the SHIFT key) of the numeric keypad can be used when a D3371 application is operating and the Settings window or a dialog box is not displayed.***

	OUTPUT key **(SHIFT-D)**	Turns the clock and data outputs on or off
	STOP key **(SHIFT-E)**	Stops measurements
	MENU key **(SHIFT-F)**	Displays the menu
	A-SER key **(SHIFT-A)**	Performs an auto search
	START key **(SHIFT-B)**	Starts measurements
	SET key **(SHIFT-C)**	Sets up the measurement conditions
	WIN key **(SHIFT-9)**	Displays the **[START]** menu on the task bar
	TASK key **(SHIFT-7)**	Alternates between Windows (applications)
	F8 key **(SHIFT-8)**	Performs a touch screen calibration
	F1 key **(SHIFT-1)**	Not used
	F2 key **(SHIFT-2)**	Not used
2.	Minus key	Enters a negative sign (-)
3.	**BS** key	Corrects numeric values or data entered
	DEL key **(SHIFT-BS)**	Deletes numeric values or data entered
4.	**ENTER** key	Applies the input data or operation entered
	SEL key **(SHIFT-ENTER)**	Selects input data entered

5. OPERATE Section

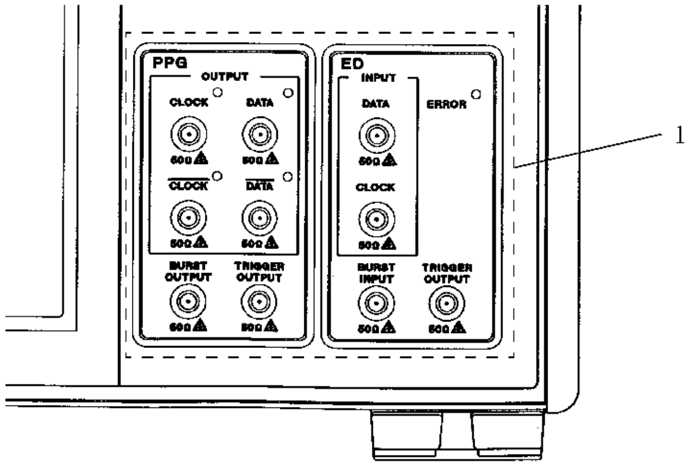


1.	**SHIFT** key	Specifies shift mode to enable the extended functions. The extended functions are written in blue letters beneath the keys. To start the Close Program, press this key for at least five seconds with the LED is off.

> ***CAUTION:*** ***Not normally used. Always select [Cancel] when starting the Close Program .***

	LED indicator	The LED turns on when shift mode is selected. Pressing the **SHIFT** key while the LED indicator is lit turns the shift mode (and this indicator) off.
2.	**TAB** key	Moves the cursor to the next item
	S-TAB key **(SHIFT-TAB)**	Moves the cursor to the previous item (reverse order of the TAB key)
3.	**ESC** key	Cancels the current operation, or data previously entered
	EXIT key **(SHIFT- ESC)**	Terminates any applications which are running and closes Windows For more information, refer to Section 1.8.2, "Exiting the D3371 and Turning the Power Switch Off"
4.	Cursor keys	Moves the cursor (↑, ↓, → and ←)
5.	Data knob	Data input for the setup items corresponding to this knob can be adjusted by turning the data knob to the left or right

6. Module section



1. Front panels on the module panels
   Each built-in module has a unique front panel.
   For more information, refer to Sections 2.1.2, 2.1.3 and 2.1.4.

2.1.1.2 Rear Panel

This section describes the rear panel of the D3371.

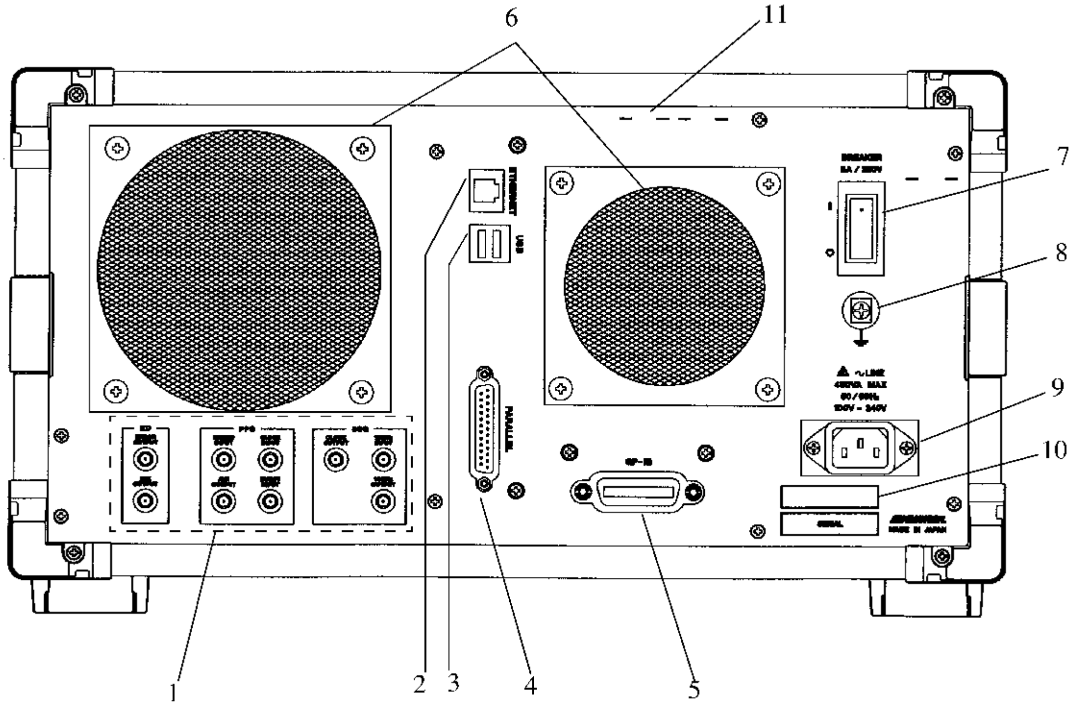


Figure 2-2 Rear Panel of the D3371

1.	Measurement module rear panel	Each built-in module has a unique rear panel. For more information, refer to Sections 2.1.2, 2.1.3 and 2.1.4.
2.	**ETHERNET** connector	Connects to a 10Base-T interface network
3.	**USB** connectors	Connects to the keyboard and mouse. Either connector can be used for the keyboard or the mouse
4.	**PARALLEL** connector	Connects to the printer
5.	**GP-IB** connector	Connects to an external controller for remote control using a GPIB interface
6.	Fan	Used to vent excess heat from the D3371 ***CAUTION:*** ***Do not block the vent.***
7.	Circuit breaker	Automatically turnes off when an overcurrent flows
8.	Ground terminal	Use this terminal to ground the D3371
9.	AC power connector	Connect the supplied power cable from the D3371 to an AC power source

10. Serial number	Serial number of the D3371
11. License for the built-in software	The license seal for the D3371's built-in software is attached
	NOTE: Do not remove the license seal.

2.1.2 3.6 G Synthesizer Module (SSG Module)

This section describes the front and rear panels located on the SSG module.

2.1.2.1 Front Panel

There are no terminals and connectors on the front panel of this module.

2.1.2.2 Rear Panel

This section describes the connectors located on the rear panel.

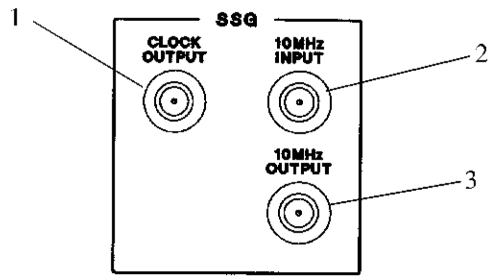


Figure 2-3 SSG Module Rear Panel

1. **CLOCK OUTPUT** connector (SMA-type female connector)
   Outputs the clock generated in this module
   This clock is used for the PPG module. For more information, refer to Section 1.7,"Setup."

2. **10 MHz INPUT** connector (SMA-type female connector)
   Inputs the 10 MHz reference signal
   Used to input the external reference signal.
   This signal is used to synchronize the clock output from this module.

3. **10 MHz OUTPUT** connector (SMA-type female connector)
   Outputs the 10-MHz reference signal
   If an external input is used as a reference signal, 10 MHz INPUT is buffered into this connector and then output.

2.1.3 Pulse Pattern Generator 2 V/ 3 V Output Module (PPG Module)

This section describes the front and rear panels located on the PPG module.

2.1.3.1 Front Panel

This section describes the connectors on the front panel.

CAUTION: ***Refer to Section 1.6, "Safety precautions when using the D3371;" when connecting the UUT or DUT to clock output and data output. Be sure to discharge any static electricity before connecting cables or equipment to the I/O connectors. In addition, connect a 50 Ω terminator to the CLOCK OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT, DATA OUTPUT, and $\overline{\text{DATA}}$ OUTPUT connectors that will not be used.***

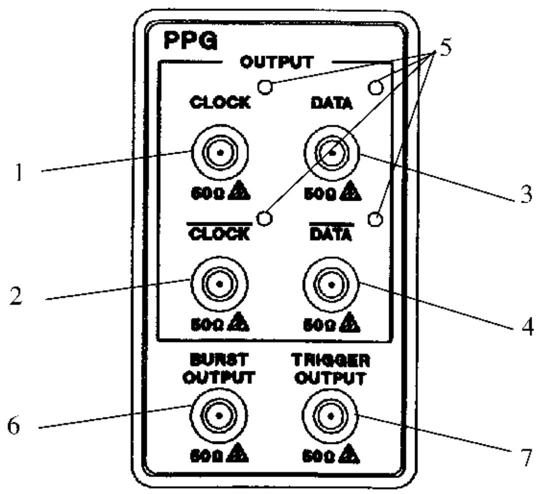


Figure 2-4 PPG Module Front Panel

1. **CLOCK OUTPUT** connector — Outputs the Clock
   The amplitude, offset, amount of clock delay, and termination voltage can be varied.
2. **$\overline{\text{CLOCK}}$ OUTPUT** connector (SMA-type female connector)
   Outputs the inverted clock
   The amplitude, offset, amount of clock delay, and termination voltage can be varied.
3. **DATA OUTPUT** connector — Outputs the Data
   The amplitude, offset, amount of clock delay, and termination voltage can be varied.
4. **$\overline{\text{DATA}}$ OUTPUT** connector (SMA-type female connector)
   Outputs the inverted data
   The amplitude, offset, amount of clock delay, and termination voltage can be varied.
5. **OUTPUT** indicator — Lights when the output is enabled

6. **BURST OUTPUT** connector (SMA-type female connector)
   Outputs the burst control signal
   Synchronization with data output is established.

7. **TRIGGER OUTPUT** connector (SMA-type female connector)
   Outputs the trigger
   Used for monitoring waveform with oscilloscopes or for other purposes.

2.1.3.2 Rear Panel

This section describes the connectors on the rear panel.

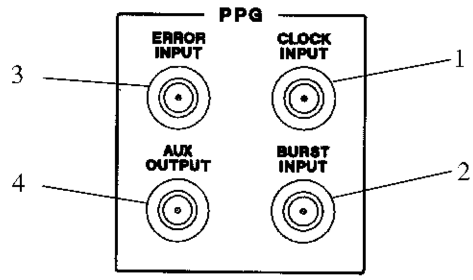


Figure 2-5 PPG Module Rear Panel

1. **CLOCK INPUT** connector (SMA-type female connector)
   Inputs the source clock for operations of this module
   This connector is used to input the SSG module clock output or an external clock.

2. **BURST INPUT** connector (SMA-type female connector)
   Inputs the burst control signal
   This signal controls data output as a gate signal when set to the burst mode.

3. **ERROR INPUT** connector (SMA-type female connector)
   Inputs the external control signal to add errors
   This signal is used to add a bit error to the data output from the outside.

4. **AUX OUTPUT** connector (SMA-type female connector)
   Outputs the auxiliary signal
   When a STM pattern or a FLEX pattern is generated, a signal indicating a pattern data type is output.

2.1.4 Error Detector Module (ED Module)

This section describes the front and rear panels located on the ED module.

2.1.4.1 Front Panel

This section describes the connectors on the front panel.

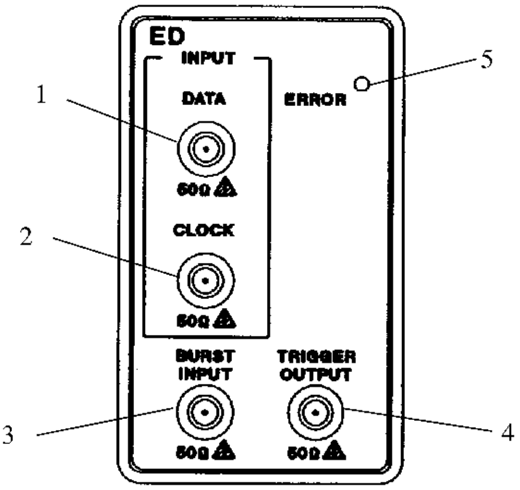


Figure 2-6 ED Module Front Panel

1. **DATA INPUT** connector (SMA-type female connector)
   Inputs data
   The threshold voltage and termination voltage can be varied.

2. **CLOCK INPUT** connector (SMA-type female connector)
   Inputs clock
   The amount of clock delay and termination voltage can be varied.

3. **BURST INPUT** connector (SMA-type female connector)
   Inputs the burst control signal
   This signal controls data output as a gate signal when set to burst mode.

4. **TRIGGER OUTPUT** connector (SMA-type female connector)
   Outputs the trigger
   Used for monitoring waveform with oscilloscopes or for other purposes.

5. **ERROR** indicator
   This indicator starts blinking when a bit error, loss of synchronization, or loss of clock is detected.

2.1.4.2 Rear Panel

This section describes the connectors on the rear panel.

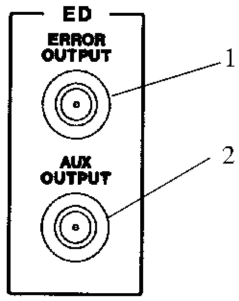


Figure 2-7 ED Module Rear Panel

1. **ERROR OUTPUT** connector (SMA-type female connector)
   Outputs a bit error detection signal
   When a bit error is detected, the OR result is output using a negative RZ signal at a 1/32 bit rate for the clock input.

2. **AUX OUTPUT** connector (SMA-type female connector)
   Outputs the auxiliary signal
   When an STM pattern or a FLEX pattern is generated, a signal indicating a pattern data type is output.

2.1.5 Screen Display

This section describes the configuration and elements of the window.

There are two types of windows: The basic window, displayed when the D3371 is first turned on (see Figure 2-8), and the settings window, displayed when setting the measurement conditions (see Figure 2-9).

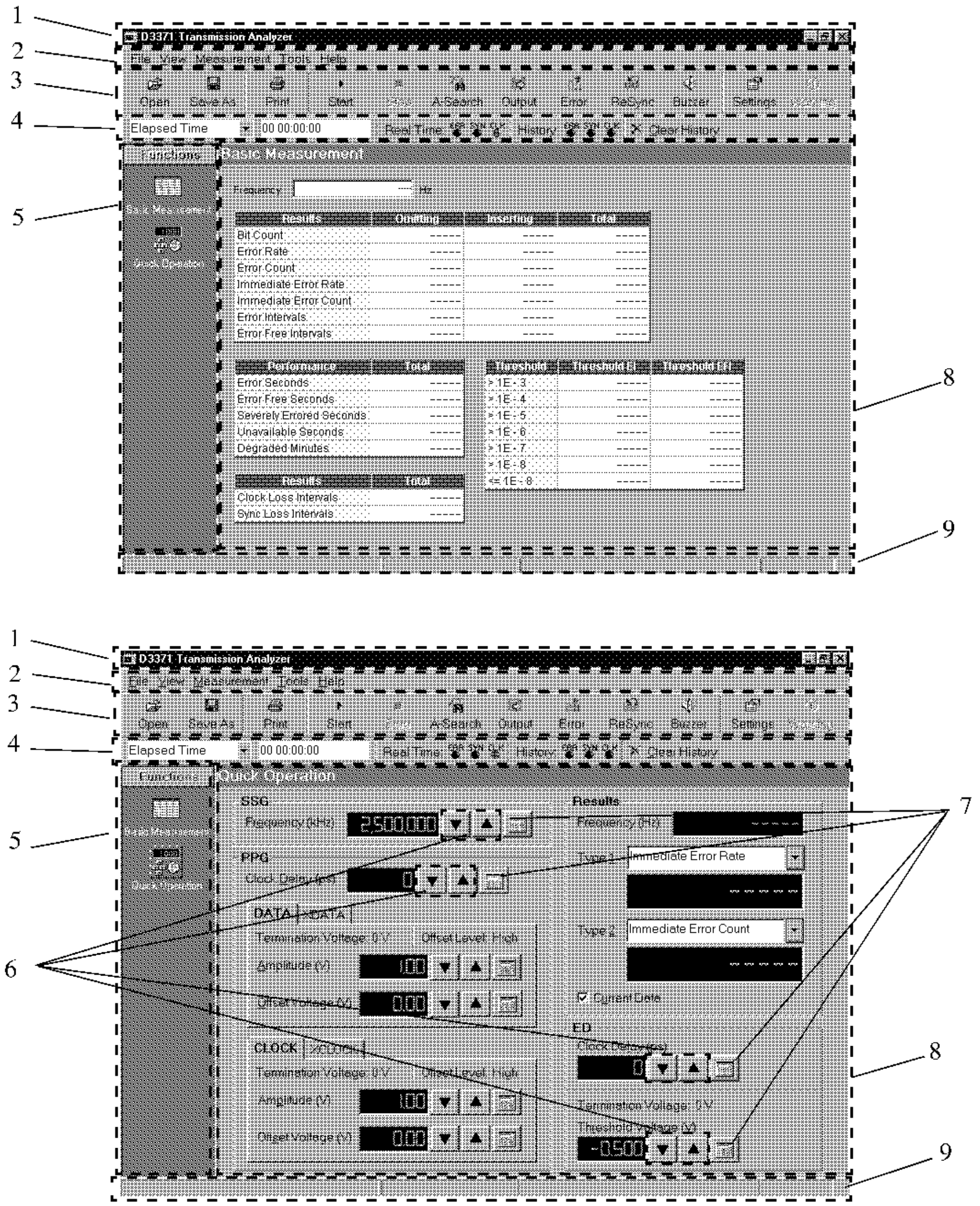


Figure 2-8 Basic Window

1.	Title bar	Displays the title and the Windows operation buttons There are four types of buttons: [_], [□], [🗗] and [×].
	[_] (Minimize) button	Clicking this button reduces the window to a button on the task bar
	[□] (Maximize) button	Clicking this button displays the window on full screen. When the window has been maximized, this button changes to the [🗗] (Restore) button.
	[🗗] (Restore) button	Clicking this button restores the window to its previous size
	[×] (Close) button	Clicking this button closes the window
2.	Menu bar	Commands available for the D3371 are displayed in menus here. The requireed command can be selected from the appropriate menu.
3.	Standard tool bar	Buttons assigned to standard operations are selected here. Required commands are selected by pressing the appropriate button.
4.	Monitor tool bar	Displays the measurement status of the ED module This monitor tool bar is displayed only when the ED module is installed.
5.	Functions bar	Measurement function are selected here.
6.	[▲][▼] box	This is a box with [▲][▼] buttons at the right end of the text display area. Specify a numeric value to be set using the [▲] or [▼] button. To increase the value, click the [▲] button and to decrease the value, click the [▼] button. The value can also be set using the data knob of the panel key. To increase the value, turn the data knob clockwise and to decrease the value, turn the data knob counterclockwise. To select the increment/decrement unit, use the left and right arrow keys of the panel keys to specify the digits for increment/decrement.
7.	**[Virtual Keyboard]** button	This button is located to the right of the [▲] and [▼] boxes. The Virtual Keyboard is used to enter numbers directly from the touch screen. It can be displayed by clicking the Virtual Keyboard button.
8.	Measurement data display area	Measurement data is displayed here. The displayed contents are selected from the Functions bar.
9.	Status bar	The current operating status is displayed here.

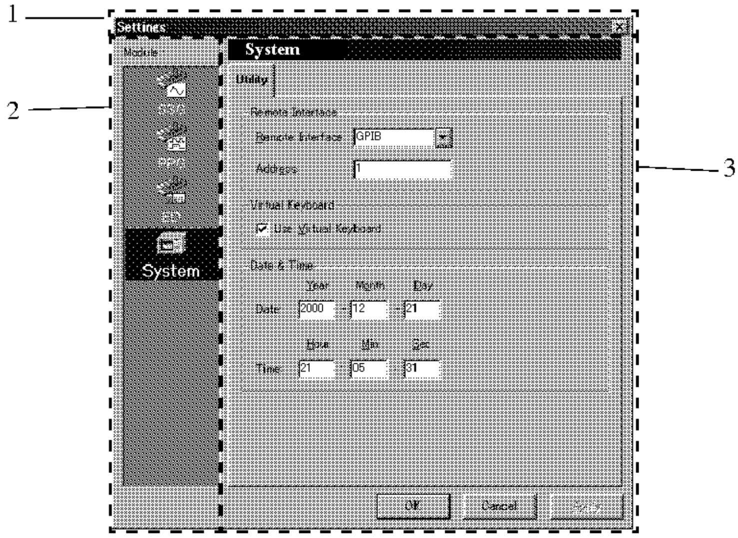


Figure 2-9 Settings Window

1.	Title bar	Displays the title
2.	Module selection list bar	Modules are selected here
3.	Setting data display area	Settings and entered data is displayed here.

2.1.5.1 Settings Window

In the D3371 Transmission Analyzer, measurement conditions are set from the Settings window. This section describes the various parts in the Settings window and how to use them.

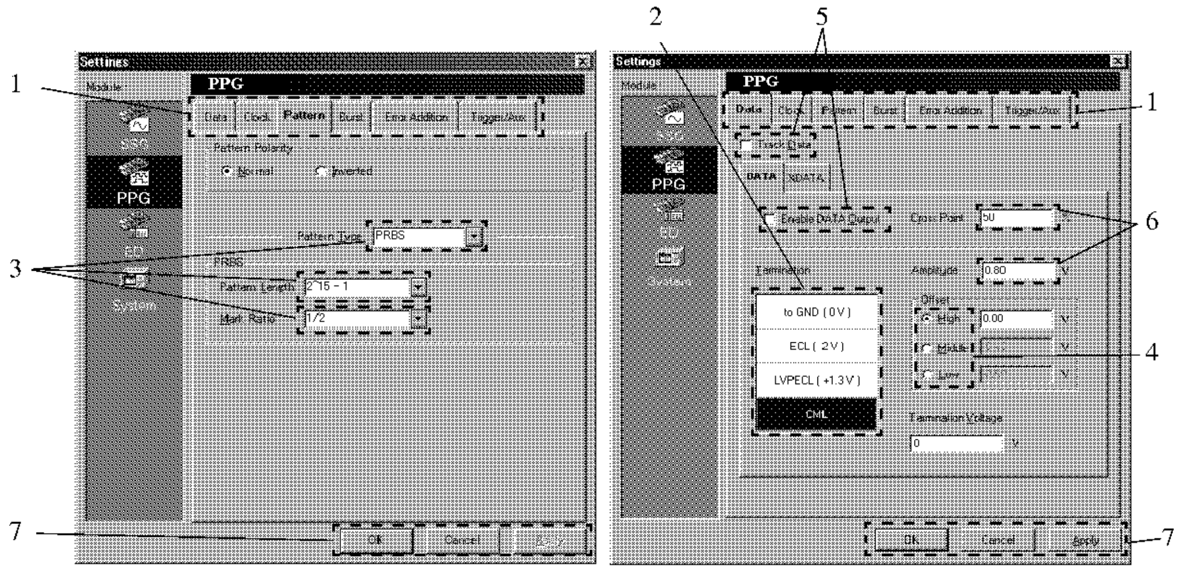


Figure 2-10 Components of the Settings Window

1. Tab — Tabs contain groups of related settings
   Click on a target tab name to change the selected tab and display other tabs. The cursor keys can also be used to select different tabs.

2. List box — Displays a list of selectable items. Click an item to select it, or use the up and down cursor keys on the panel.

3. Drop-down list box — This is a box with a down arrow button at the right end of the text display area. In the drop-down list box, clicking on any area of the box or the down arrow button allows the user to display a list of selectable items. Click an item to select it. When the item is selected, the list of items is closed and the selected item is displayed. For the panel keys, the user can select the item using the up and down cursor keys.

4. Option button — An item is selected by clicking on its title, or on the option button placed at the head of the item. Only one option button can be selected at a time. A black dot is displayed in the selected option button. To select an item using the panel keys, use the cursor keys. Use the appropriate cursor keys to select the desired option button.

5. Checkbox — Clicking on the title of an item or the box at the head of the item allows the user select or deselect the checkbox. When the item is selected, a check mark (✓) is displayed in the box. Unlike the option button, any number of items with checkboxes can be selected. To select a check box using the panel keys, press **SEL (SHIFT-ENTER)**.

6. Text box

This box is used to enter numeric data for a setting using the panel keys. In addition, the D3371 supports data entry from the touch screen using the Virtual Keyboard function. For more information, refer to Section 2.2.4, "How to Enter Numeric Values."

7. Command button

Click this button to perform the command indicated on the button. For the panel keys, the command can be performed by pressing **ENTER** after selecting the command button.

When the **[OK]** button is clicked, the setting data is confirmed and the Settings window is closed.

When the **[Cancel]** button is clicked, the set data is returned to the contents of the setting before the change operation and the Settings window is closed.

NOTE: ***Once the [Apply] button has been clicked, clicking the [Cancel] button will not restore the previous settings.***

When the **[Apply]** button is clicked, the setting data is confirmed, but the Settings window remains open.

2.2 Basic Operation

This section explains how to use the measuring functions of the D3371.

2.2.1 Operating Devices

The D3371 is equipped with panel keys and touch screen. These devices are equivalent to a keyboard and mouse used in a Windows system.

To operate D3371, use the touch screen to operate the Windows system. Numeric data can also be entered directly from the panel key. Furthermore, a keyboard and mouse that have **USB** interfaces supported by Windows 98 English version can be used. The keyboard and mouse can be connected to the **USB** connectors on the rear panel.

CAUTION: ***To avoid interrupting the measurement, do not connect the keyboard and mouse with the USB interface to the D3371 while measurement is in process.***
To connect a keyboard and mouse with USB interfaces, refer to the relevant manual.

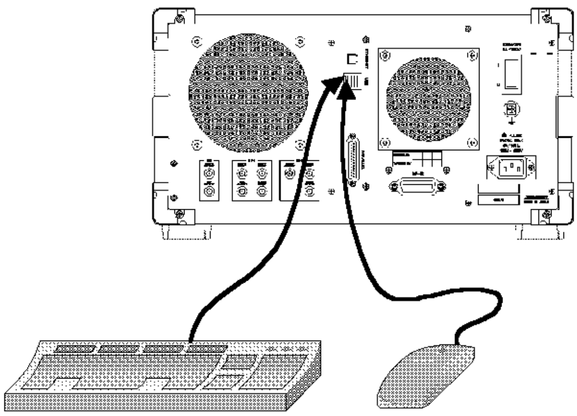


Figure 2-11 Connecting a Keyboard and Mouse

2.2.2 Using the Touch Screen

This section explains how to use the touch screen.

Use the supplied touch pen to operate the touch screen. To operate the touch screen, directly touch the screen display with the tip of the pen.

CAUTION: ***Always use the pen provided with the touch screen to operate the touch screen. Never touch the the touch screen surface with mechanical pencils, ball-point pens or other hard objects, or the panel may get damaged.***

When using the touch screen for the first time, calibrate the touch screen (refer to Section 2.7.7, "Calibrating the Touch Screen").

Using the touch screen

- Clicking

  Tapping the pen once on the target without dragging the point. This motion is equivalent to clicking a mouse button.

- Double-clicking

  Quickly tapping the pen twice on the target. This motion is equivalent to double-clicking a mouse button.

- Dragging

  Moving the pen while the point is in contact with the target on the panel. This motion is equivalent to moving the mouse with its button pressed down.

- Dropping

  Dragging the pen while in contact with the target in the panel and lifting the pen from the panel. This motion is equivalent to dragging the mouse to a target point and then releasing the button.

NOTE: ***Right button operations of a mouse cannot be simulated with the touch screen.***

2.2.3 Using the Panel Keys

This section explains how to use the panel keys.

The panel keys are directly connected to the Windows system as a keyboard device, and can be used in a similar way to a keyboard.

NOTE: ***We recommend that the touch screen and mouse be used following the basic rules of a Windows system. Commands can also be accessed from the panel keys by selecting the appropriate menu.***

1. Menu operation

- Opening a menu

  Press **MENU (SHIFT-F)**. The **[File]** menu is displayed.

- Moving the cursor in the drop-down menu

  Press the cursor keys ← and → to move the cursor to the desired menu.

- Moving the cursor into a submenu

  The ▶ mark appearing to the right of a command name indicates that there is a submenu. Press the key → to move the cursor to the desired menu.

- Selecting a command from the menu

  Press the cursor keys ↑ and ↓ to move the cursor to the desired item.

- Executing the selected command

  Press **ENTER**.

- Closing a menu

  Press **ESC**. The displayed menu is closed. When a submenu is selected, the next higher submenu is displayed.

2. Using the Settings window

- Moving the cursor to the next item

  Press **TAB**.

- Moving the cursor in the opposite direction

  Press **S-TAB (SHIFT-TAB)**.

- Changing selected items with the buttons such as the TAB, LIST and OPTION buttons

  Change selected items using the cursor keys ←, →, ↑ and ↓.

- Selecting or unselecting a check box

  Press **SEL (SHIFT-ENTER)** to toggle the selection on or off.

3. Extended functions of the numeric keys (use the SHIFT key)

   The extended functions of the numeric keys can be used when the D3371 application is operating and the Settings window or a dialog box is not displayed. Refer to Section 4.4.4, "Panel Key," for an explanation of the relationship between menu bar operations and the extended functions.

2.2.4 How to Enter Numeric Values

To input numeric values, use the touch screen or panel keys in the text box where the settings are displayed. In either case, the cursor is displayed inside the text box (see Figure 2-12).
When the numeric value entered exceeds the range for that setting, a warning message is displayed showing the valid range for that particular setting. If this happens, press the **[OK]** button and try again.

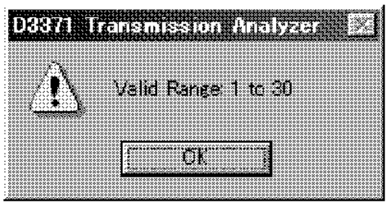


Figure 2-12 Example of Warning Message Display

1. Entering numeric values using the touch screen

To enter numeric values using the touch screen, turn the Virtual Keyboard function on. Clicking an item for which data entry is possible, displays the Virtual Keyboard dialog box (see Figure 2-13). The Unit button is displayed (depending on the contents of the entry item). When a frequency is entered as shown in Figure 2-17, for example, the **[GHz]**, **[MHz]** and **[kHz]** buttons are displayed.

Numeric values can be entered by by clicking the buttons on the Virtual Keyboard. There are numeric buttons **[0]** through **[9]**, a decimal point button **[.]** and a **[±]** button. Clicking the **[±]** button toggles the sign for the data being entered.

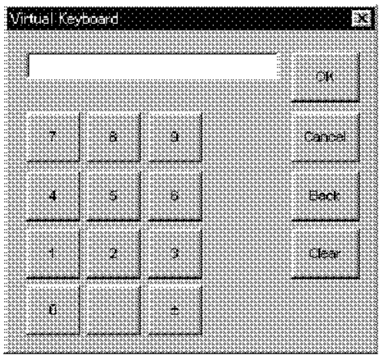


Figure 2-13 Virtual Keyboard

- To make a correction, click the **[Back]** button. Data entered is deleted one character at a time from the cussor insertion point.
- To confirm the data entered, click the **[OK]** button.
- To cancel the data entered, click the **[Cancel]** button. All characters being entered are ignored and the previous data is restored.
- To delete the data being entered, click the **[Clear]** button. All characters being entered are deleted and new numeric data can be entered.

The following procedure shows how to set a frequency of 2.5 GHz.

Turning the Virtual Keyboard function on

NOTE: The Virtual Keyboard is set to ON state for use in the factory default setting.

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.

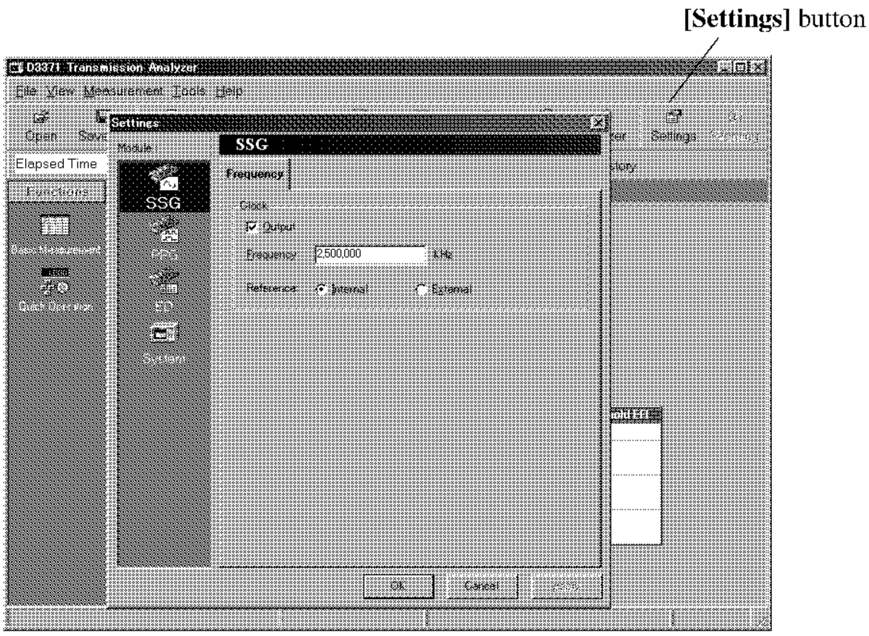


Figure 2-14 Settings Button on the Standard Tool Bar

2. Click **[System]** on the Module selection list bar.

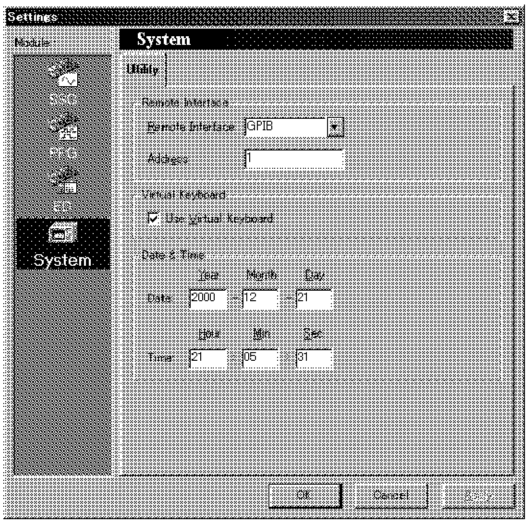


Figure 2-15 System Selection Dialog Box on the Module Selection Bar

3. Make sure that the **[Use Virtual Keyboard]** check box is selected.

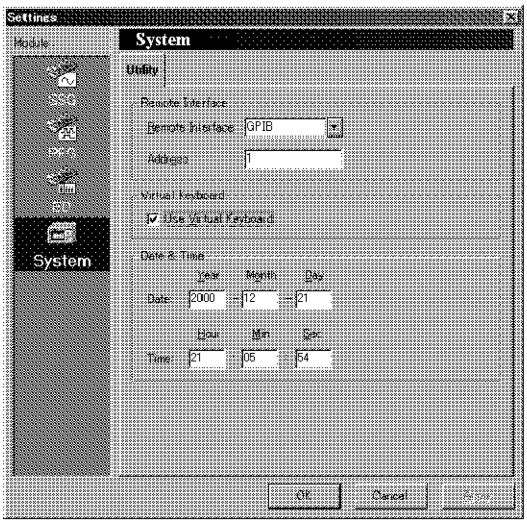


Figure 2-16 Virtual Keyboard Selection Dialog Box Window

4. Click the **[OK]** or **[Apply]** button.
   The Virtual Keyboard function is turned on

Entering numeric values

5. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
6. Click **[SSG]** on the Module selection list bar.

7. Click the Frequency text box.
   The Virtual Keyboard is displayed.

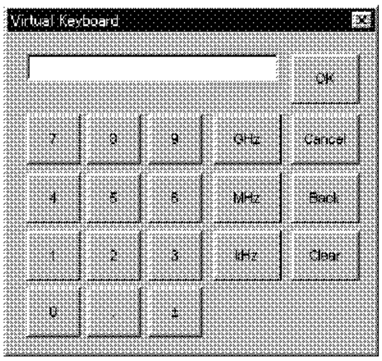


Figure 2-17 Virtual Keyboard Unit Button

8. Press **[2]**, **[.]**, **[5]** and **[GHz]**, then click the **[OK]** button.
   The frequency is set to 2.5 GHz.

2. Entering numeric values using the panel keys

The panel keys are directly connected to the Windows system as a keyboard device, and can be used in a similar way as a keyboard.
Using the panel keys, the user can perform all required operations for the D3371. While many normal Windows functions cannot be accessed from the panel keys, these functions should not normally be required.

NOTE: ***When using panel keys, enter numeric values by selecting the command from the menu bar. The user can directly enter the numeric values using the numeric keys, decimal point key and minus key in the DATA ENTRY section.***

- Correcting the data being entered
  Pressing the → or ← key moves the cursor to the position where the data was changed.
  Pressing the **BS** key deletes the character to the left of the cursor.
  Pressing **DEL** (**SHIFT-BS**) deletes the character to the right of the cursor.
- To confirm data and move to the next item, press the **TAB** key.
- To cancel the value entered, press the **ESC** key.

The following procedure shows how to set a frequency of 2.5 GHz.

1. Press **SET** (**SHIFT-C**).
   The Settings window is displayed.

   NOTE: ***If an [SSG] module has been selected, go to step 3.***

2. Use **TAB** to move the item. Then, select the Module list bar.
   An SSG module is selected.

3. Use **TAB** to move the item. Then, select the **[Frequency]** text box.
   The text box settings are displayed as selected.
4. Enter **[2]**, **[5]**, **[0]**, **[0]**, **[0]**, **[0]**, **[0]**, **[0]**, **[0]**, and **[0]**. Then, press **ENTER**.
   This sets 2.5 GHz and closes the Settings window.

2.3 Common Settings of the each Measurements

This section explains how to set the basic conditions for measurement. For more information on the basic conditions, refer to Chapter 4, "REFERENCE." Settings can be made using the touch screen or the mouse. Make sure that the Virtual Keyboard is selected. For more information on the Virtual Keyboard, refer to Section 2.2.4, "How to Enter Numeric Values."

2.3.1 Before Setting the Measurement Conditions

Set up the D3371, turn on the power, and initialize the settings.

CAUTION: ***If the power switch is turned off while D3371 is starting up, hard disks or files may be damaged.***

NOTE: ***To ensure accurate measurements using the built-in SSG module, turn on D3371 and wait at least 30 minutes for the D3371 to warm up.***

Setup

1. Refer to Section 1.7, "Setup" for information on connecting the SSG and PPG modules.

Turning on the power

2. Confirm that the **POWER** switch on the front panel is turned off.
3. Plug the power cable into the AC power connector on the rear panel.

   CAUTION: ***Do not apply an input voltage or frequency exceeding the specified range or the D3371 may be damaged (refer to Section 1.5.2).***
   The power consumption is 450 VA or less. Use a power supply with enough capacity to provide this amount of power.

4. Set the **POWER** switch on the front panel to on.

   The **POWER** indicator is lit. The D3371 checks the internal memory while the ADVANTEST logo window is being displayed. The system startup window is displayed first. Then, the measurement initialization window is displayed.

   NOTE: ***The actual information displayed may differ from the ones described above, depending on the previous settings and how the D3371 was used.***

Initializing the settings

Initialize the settings of D3371.

5. Click **[Measurement]-[Set Installation Defaults]** on the menu bar.

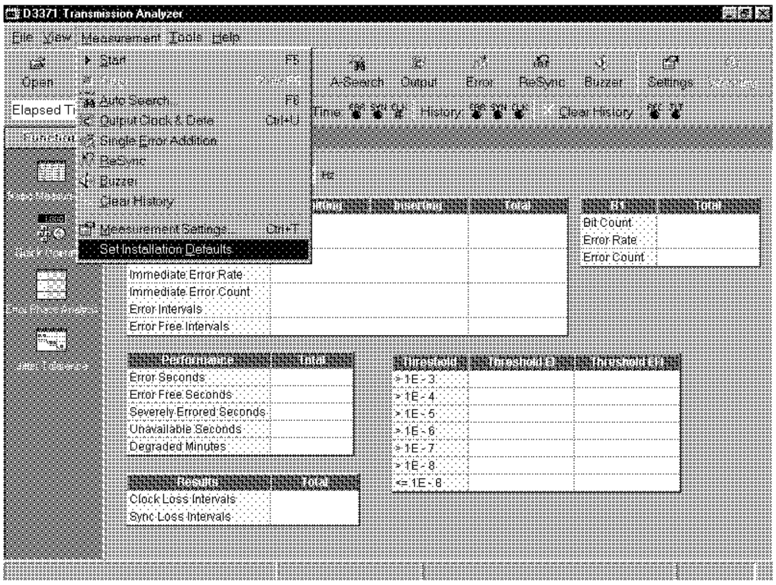


Figure 2-18 Set Installation Defaults Selection Window

2.3.2 Pattern Generation Clock Settings

The pattern generation clock is supplied through the CLOCK INPUT connector of the PPG module. The clock may be supplied by an external clock generator or by the built-in SSG module. If an external clock generator is used, refer to the instruction manual of the clock generator for how to provide settings for the generator. This section explains how to provide settings of the SSG module assuming the built-in SSG module supplies the clock.

CAUTION:

1. ***To use the SSG module as the clock source, connect the SSG and PPG modules. For more information, refer to Section 1.7, "Setup".***
2. ***To ensure accurate measurements using the built-in SSG module, turn on the D3371 and wait at least 30 minutes for the D3371 to warm up.***

NOTE: ***To use an external clock generator, input the external clock to the CLOCK INPUT connector on the rear panel of the PPG module.***
The pattern generation frequency which is the same as the clock frequency of the clock generator is used.

- ***Input amplitude:*** ***0.5 V_{P-P} to 2 V_{P-P}***
- ***Input waveform:*** ***Rectangular wave or sine wave (175 MHz to 3.6 GHz)***
  Rectangular wave (10 MHz to 175 MHz)
- ***Duty ratio:*** ***50%±5%***
- ***Input impedance:*** ***50 Ω (nominal value) to 0 V***

2.3.2.1 Clock Frequency Setting

This section explains how to set a clock frequency.

Selecting the SSG module

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click **[SSG]** on the module selection list bar.
   The frequency tab of the SSG module is displayed.

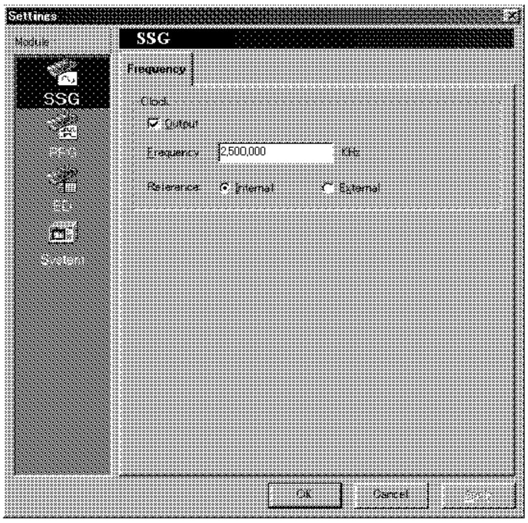


Figure 2-19 Frequency Settings Tab

Setting whether or not the clock output is turned on

3. Click the **[Output]** check box to select it.
   To output a clock, the check box must be selected.

Setting a frequency

4. Click the **[Frequency]** text box.
   The Virtual Keyboard is displayed.
5. Input a frequency through the Virtual Keyboard.
   - Range: 10,000 kHz to 3,600,000 kHz
   - Setting resolution: 1 kHz

Selecting a reference signal input source

6. Select a signal using the **[Reference]** option button.
   [Internal]: An internal reference signal is used.
   [External]: An external reference signal is used. The external reference signal must be input to the 10 MHz input connector on the rear panel of the SSG module.
   - Input level: 0 dBm±5 dB
   - Input frequency: 10 MHz
   - Input frequency accuracy required: ±10 ppm or less
   - Coupling: AC

Confirming the settings

7. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.2.2 Jitter Setting

This section explains how to set jitter (jitter tolerance option).

Selection in an SSG module

1. Click the **[Settings]** button on the standard tool bar.

   The Settings window is displayed.

2. Click **[SSG]** on the module selection list bar.

   The SSG module frequency setting dialog box is displayed.

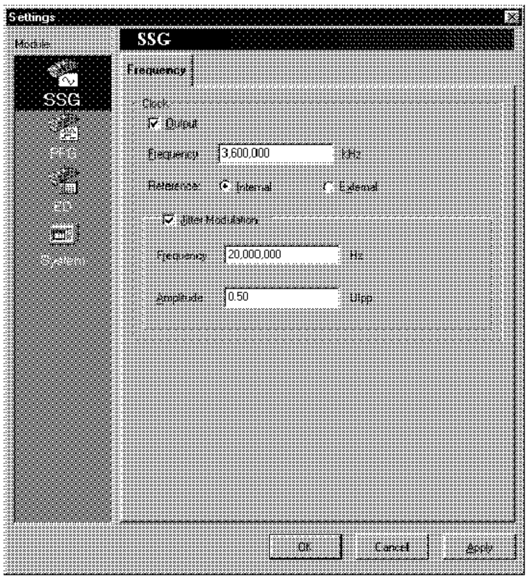


Figure 2-20 Frequency Settings Dialog Box Window

Enabling/disabling Jitter

3. Make a selection by clicking the **[Jitter Modulation]** check box.

   Set the check mark (✓) to enable jitter. If jitter is enabled, jitter is added to the clock of the SSG module.

Jitter frequency setting

4. Click the **[Frequency]** text box.
   The Virtual Keyboard is displayed.
5. Input jitter frequency through the Virtual Keyboard.

Clock frequency	Jitter frequency range	Setting resolution
10 MHz ≤ clock frequency <175 MHz	10 Hz to 2 MHz	
175 MHz ≤ clock frequency <800 MHz	10 Hz to 5 MHz	
800 MHz ≤ clock frequency <3200 MHz	10 Hz to 20 MHz	10 Hz

Setting jitter amplitude

6. Click the **[Amplitude]** text box.
   The Virtual Keyboard is displayed.
7. Input jitter amplitudes through the Virtual Keyboard.

Jitter setting range

The following shows setting ranges of jitter frequency and jitter amplitudes.

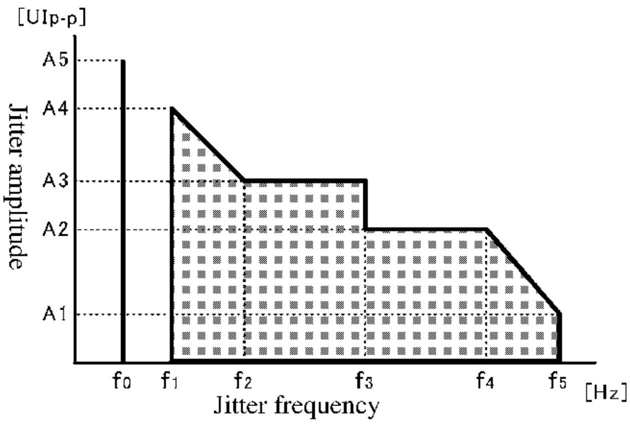


Figure 2-21 Jitter Setting Range

Band 1 (800 MHz ≤ clock frequency ≤ 3200 MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 300k	20M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	800	500	50	20	0.3
Band 2 (175 MHz ≤ clock frequency < 800 MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 125k	5M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	800	500	50	20	0.5
Band 3 (10 MHz ≤ clock frequency < 175 MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 200k	2M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	200	120	12	5	0.5

Setting the resolution of the jitter amplitude

	Jitter amplitude range [UI_{P-P}]	Setting resolution [UI_{P-P}]
Band1 Band2	0 to 5	0.01
	5 to 50	0.1
	50 to 500	1
	500 to 800	2
Band3	0 to 1	0.01
	1 to 10	0.1
	10 to 100	1
	100 to 200	2

Confirming the changed settings

8. Click the **[OK]** button in the Settings window or the **[Apply]** button.
   The updates are set. If the **[OK]** button is clicked, the Settings window closes.

2.3.3 Basic Input and Output Interface Settings

2.3.3.1 Data Output Settings

This section explains how to set the data output interface for the PPG module. Data is output from the DATA OUTPUT and $\overline{\text{DATA}}$ OUTPUT connectors on the front panel of the PPG module.
The pattern set in the PPG module is output to the data output interface.

CAUTION:

1. ***Static electricity must be discharged from cables and devices before connecting them to the input-output terminals. Always connect a 50 Ω terminator to an unused CLOCK OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT, DATA OUTPUT, or $\overline{\text{DATA}}$ OUTPUT connector. Refer to Section 1.6, "Safety precautions when using the D3371," for more information on setting the data output interface.***
2. ***The UUT or DUT may be damaged if the items set in the data output interface are not appropriate. To prevent this, check the set items thoroughly before confirming the data output interface settings. The output is set to off immediately after the D3371 has been turned on. Note that when the output is set to off, the output is 0 V terminated with 50 Ω. (A potential difference of several millivolts may occur for Frame GND).***

Displaying the data output interface settings

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click **[PPG]** on the module selection list bar.
   The PPG module is selected.
3. Click the **[Data]** tab.
   The data output interface tab for the PPG module is displayed.

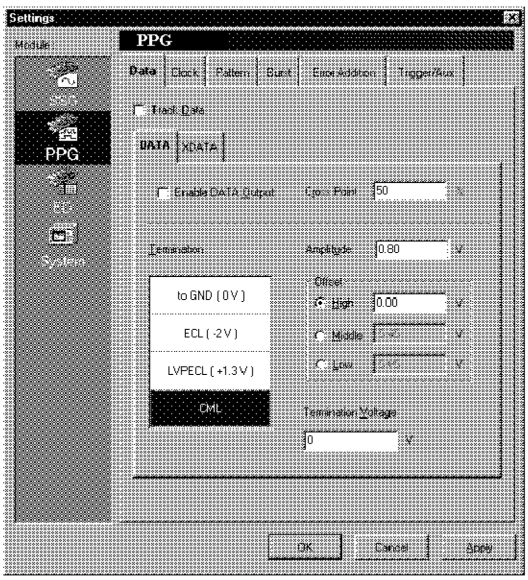


Figure 2-22 Data Output Interface Settings Tab

Setting the tracking to ON or OFF

4. Click the **[Track Data]** check box to select it.

   To turn tracking on, the check box must be selected.

   When the tracking function is turned on, the amplitude, offset reference, offset voltage, termination voltage, cross point, and the output ON/OFF setting defined in **[XDATA]** is linked with **[DATA]**.

NOTE: If the tracking function is turned ON and then turned OFF, the items defined in [XDATA] cannot be returned to their previous settings.

Selecting an output connector

5. Click the **[DATA]** or **[XDATA]** tab to select an output connector.

   [DATA]: The data output interface of the DATA OUTPUT connector is selected.

   [XDATA]: The data output interface of the $\overline{\text{DATA}}$ OUTPUT connector is selected.

Turning data output to on

6. Click the **[Enable DATA Output]** (or **[Enable XDATA Output]**) check box to turn data output on.

   To output a data signal, the check box must be selected.

   The OUTPUT indicator of each output connector is lit on when data output is selected.

NOTE: Click the [Output] button on the standard tool bar or [Measurement]-[Output Clock & Data] on the menu bar to turn the clock output and data output for the PPG module on or off at the same time. Clock output includes CLOCK OUTPUT and $\overline{\text{CLOCK}}$ OUTPUT, and data output includes DATA OUTPUT and $\overline{\text{DATA}}$ OUTPUT.

Setting a cross point

7. Click the **[Cross Point]** text box.

   The Virtual Keyboard is displayed.

8. Input a data output cross point through the Virtual Keyboard.
   - Range: 20% to 80%
   - Setting resolution: 1%

Selection of a termination type

9. Select a termination type from the **[Termination]** list box.

   A termination type of the load side that is terminated with 50 Ω is set here.

   • Items to be selected from:
   to GND (0V), ECL (-2V), LVPECL (+1.3V), CML

Setting of termination voltage

10. The setting is enabled if the termination type is set to CML. Click the text box and input a termination voltage through the Virtual Keyboard.

    • Voltage setting range: 0 to 3.5 V

    • Setting resolution: 0.05 V

Setting an amplitude

11. Click the **[Amplitude]** text box.

    The Virtual Keyboard is displayed.

12. Input a data output amplitude value through the Virtual Keyboard.

Termination type	Amplitude setting range	Setting resolution
to GND(0V)	$0.30V_{P-P}$ to $+2.00V_{P-P}$ (2 V output module) $0.30V_{P-P}$ to $+3.00V_{P-P}$ (3 V output module)	0.01V
ECL(-2V)	$0.60V_{P-P}$ to $+1.00V_{P-P}$	
LVPECL(+1.3V)	$0.60V_{P-P}$ to $+1.00V_{P-P}$	
CML	$0.30V_{P-P}$ to $+1.00V_{P-P}$	

Selecting an offset reference

13. Select an offset reference by clicking the **[Offset]** option button.

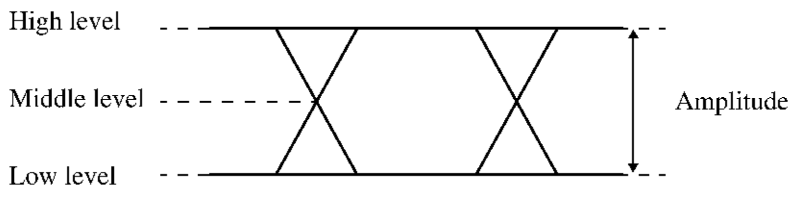
    Select High, Middle or Low level for the offset reference. When the reference offset value is changed, values other than the reference offset value are calculated based on the following conversion formula:

    High Offset value
    = Middle Offset value + amplitude/2
    = Low Offset value + amplitude

    Middle Offset value
    = High Offset value - amplitude/2
    = Low Offset value + amplitude/2

    Low Offset value
    = High Offset value - amplitude
    = Middle Offset value - amplitude/2

Offset definition



Setting an offset

14. Click the **[Offset]** text box.
    The Virtual Keyboard is displayed.
15. Input a data output offset value through the Virtual Keyboard.
    - Offset voltage range (Offset reference: in "High" setting)

Termination type	offset setting range	Setting resolution
to GND(0V)	-2.00V to +2.00V *1	0.01V
ECL(-2V)	-1.00V to -0.60V	
LVPECL(+1.3V)	+2.30V to +2.70V	
CML	Vcc-0.20V to Vcc+0.20V *2	

*1: If an amplitude exceeding 2 V_{P-P} is set on the 3 V output module, the offset range is limited to a range from -1.00 V to +1.00 V.
*2: Vcc indicates the CML termination voltage.

Confirming the settings

16. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.
    Clicking the **[OK]** button closes the Settings window.

2.3.3.2 Clock Output Settings

This section explains how to set the clock output interface for the PPG module. Clock is output from the CLOCK OUTPUT or $\overline{\text{CLOCK}}$ OUTPUT connector on the front panel of the PPG module.

CAUTION:

1. ***Refer to Section 1.6, "Safety precautions when using the D3371," for information on how to set the clock output interface. To prevent damage to the equipment, static electricity must be discharged from cables and devices before connecting them to the input-output connectors. Always connect a 50 Ω terminator to an unused CLOCK OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT, DATA OUTPUT, or $\overline{\text{DATA}}$ OUTPUT connector.***
2. ***The UUT or DUT may be damaged if the items in the clock output interface are set incorrectly. To prevent this, check the settings thoroughly before confirming the clock output interface settings. Clock output is off by default (when the power is first turned on). 50 Ω and 0V are output while the clock output is off (the potential difference of several millivolts may occur for Frame GND).***

Displaying the clock output settings

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click **[PPG]** on the module selection list bar.
   The PPG module is selected.
3. Click the **[Clock]** tab.
   The clock output tab for the PPG module is displayed.

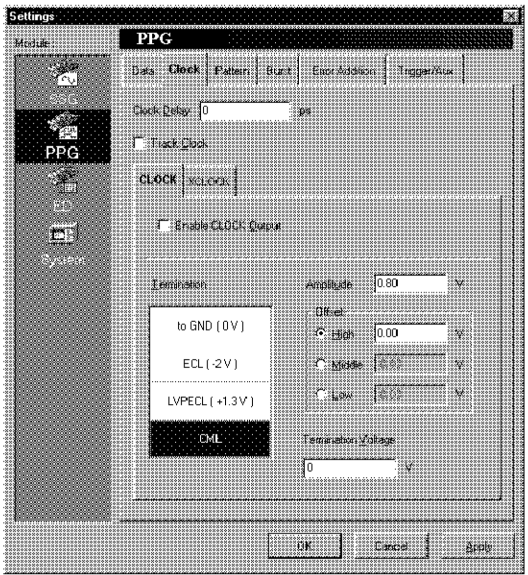


Figure 2-23 Clock Output Interface Settings Tab

Setting the clock delay

4. Click the **[Clock Delay]** text box.

   The Virtual Keyboard is displayed.

5. Input the clock delay through the Virtual Keyboard.
   - Range: -1000 ps to +1000 ps
   - Setting resolution: 1 ps

Setting tracking to ON or OFF

6. Click the **[Track Clock]** check box to select it.

   To set tracking to ON, the check box must be selected.

   The amplitude, offset reference, offset voltage, termination voltage, and the output ON/OFF setting defined in **[XCLOCK]** is linked with **[CLOCK]** when the tracking function is turned on.

NOTE: If the tracking function is turned ON and then turned OFF, the items defined in [XCLOCK] cannot be returned to their previous settings.

Selecting an output connector

7. Click the **[CLOCK]** or **[XCLOCK]** tab to select an output connector.

   [CLOCK]: The clock output interface of the CLOCK OUTPUT connector is selected.

   [XCLOCK]: The clock output interface of the $\overline{\text{CLOCK}}$ OUTPUT connector is selected.

Turning clock output on

8. Click the **[Enable CLOCK Output]** or **[Enable XCLOCK Output]** check box to turn clock output on.

   To output a clock, the check box must be selected.

   The OUTPUT indicator on each output connector is lit when clock output is turned on.

NOTE: Click the [Output] button on the standard tool bar or [Measurement]-[Output Clock & Data] on the menu bar to turn the clock output and data output for the PPG module on or off at the same time. Clock output includes CLOCK OUTPUT and $\overline{\text{CLOCK}}$ OUTPUT, and data output includes DATA OUTPUT and $\overline{\text{DATA}}$ OUTPUT.

Selection of a termination type

9. Select a termination type from the **[Termination]** list box.

   A termination type of the load side that is terminated with 50 Ω is set here.

   • Items to be selected from:
     to GND (0V), ECL (-2V), LVPECL (+1.3V), CML

Setting of termination voltage

10. The setting is enabled if the termination type is set to CML. Click the text box and input a termination voltage through the Virtual Keyboard.

   • Voltage setting range: 0 to 3.5 V

   • Setting resolution: 0.05 V

Setting an amplitude

11. Click the **[Amplitude]** text box.

   The Virtual Keyboard is displayed.

12. Input a clock output amplitude value through the Vertual Keyboard.

Termination type	Amplitude setting range	Setting resolution
to GND(0V)	$0.30V_{P-P}$ to $+2.00V_{P-P}$	0.01V
ECL(-2V)	$0.60V_{P-P}$ to $+1.00V_{P-P}$	
LVPECL(+1.3V)	$0.60V_{P-P}$ to $+1.00V_{P-P}$	
CML	$0.30V_{P-P}$ to $+1.00V_{P-P}$	

Selecting an offset reference

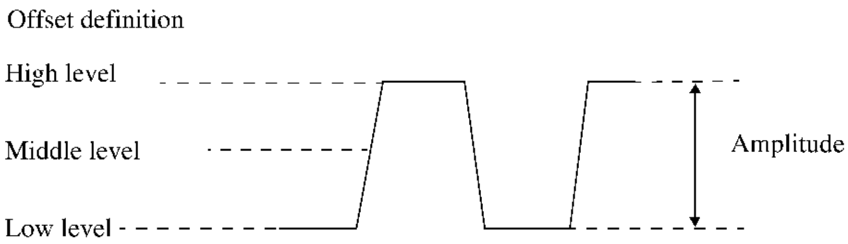
13. Select an offset reference by clicking the **[Offset]** option button.

   Select High, Middle or Low level for the offset reference. When the reference offset value is changed, values other than the reference offset value are calculated based on the following conversion formula:

   High Offset value
   = Middle Offset value + amplitude/2
   = Low Offset value + amplitude

   Middle Offset value
   = High Offset value - amplitude/2
   = Low Offset value + amplitude/2

   Low Offset-value
   = High Offset value - amplitude
   = Middle Offset value - amplitude/2



Setting an offset

14. Click the **[Offset]** text box.

    The Virtual Keyboard is displaed.

15. Input a clock output offset value through the Virtual Keyboard.
    - Offset voltage range (Offset reference: in "High" setting)

Termination type	Offset setting range	Setting resolution
to GND(0V)	-2.00V to +2.00V	0.01V
ECL(-2V)	-1.00V to -0.60V	
LVPECL(+1.3V)	+2.30V to +2.70V	
CML	Vcc-0.20V to Vcc+0.20V *1	

*1: Vcc indicates the CML termination voltage.

Confirming the settings

16. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

    Clicking the **[OK]** button closes the Settings window.

2.3.3.3 Data Input Setting

This section explains how to set the data input interface for the ED module. Data is input to the DATA INPUT connector on the front panel of the ED module.
Data output from the UUT or DUT is input to the data input interface.

NOTE: ***Refer to section 1.6, "Safety precautions when using the D3371," for information on connecting the UUT or DUT to the DATA INPUT connector.***

Displaying the data input interface settings

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click **[ED]** on the module selection list bar.
   The ED module is selected.
3. Click the **[Data]** tab.
   The data input interface tab for the ED module is displayed.

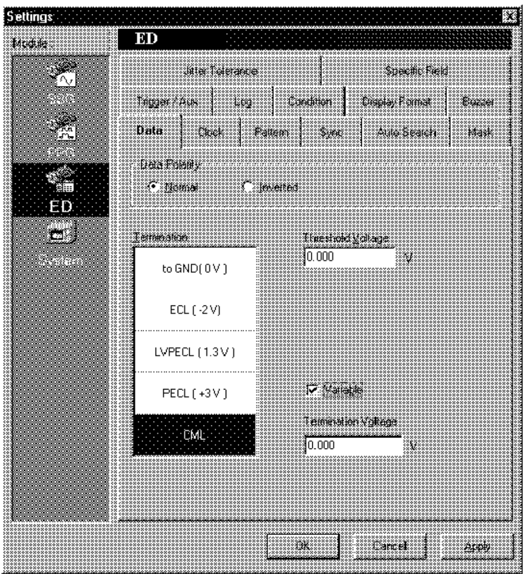


Figure 2-24 Data Input Interface Settings Tab

Setting the input polarity

4. Select the input polarity by clicking the **[Data Polarity]** option button.
   [Normal]: Normal input is selected.
   [Inverted]: Inverted input is selected.

Selection of a termination type

5. Select a termination type from the **[Termination]** list box.

   A termination load of 50 Ω is set here.

   • Items to be selected from:
     to GND (0V), ECL (-2V), LVPECL (+1.3V), PECL(+3V), CML

Setting of a termination voltage

6. Make a setting by clicking the **[Variable]** check box.

   The setting is enabled if the termination type is set to ECL (-2 V), LVPECL (+1.3 V), PEC (+3 V) or CML. Setting the check mark (✓) enables the setting of a termination voltage. A termination voltage is input through the Virtual Keyboard that is displayed by clicking the text box.

Termination type	Termination voltage range	Setting resolution
ECL(-2V)	-2.30V to −1.70V	0.05V
LVPECL(+1.3V)	+1.00V to +1.60V	
PECL(+3V)	+2.70V to +3.30V	
CML	0V to +3.50V	

Setting the threshold voltage

7. Click the **[Threshold Voltage]** text box.

   The Virtual Keyboard is displayed.

8. Enter the threshold voltage for data input through the Virtual Keyboard.

Termination type	Threshold voltage range	Setting resolution
to GND(0V)	-2.040V to +2.040V	0.001V
ECL(-2V)	-1.850V to -0.750V	
LVPECL(+1.3V)	+1.450V to +2.550V	
PECL(+3V)	+3.150V to +4.250V	
CML	Vcc-1.10V to Vcc+0.10V *1	

*1: Vcc indicates the CML termination voltage.

Confirming the settings

9. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.3.4 Clock Input Setting

This section explains how to set the clock input interface for the ED module. Clock is input to the CLOCK INPUT connector on the front panel of the ED module.

NOTE: ***Refer to section 1.6, "Safety precautions when using the D3371," for information on connecting the UUT or DUT to the DATA INPUT connector.***

Displaying the clock input interface settings

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click **[ED]** on the module selection list bar.
   The ED module is selected.
3. Click the **[Clock]** tab.
   The clock input interface tab for the ED module is displayed.

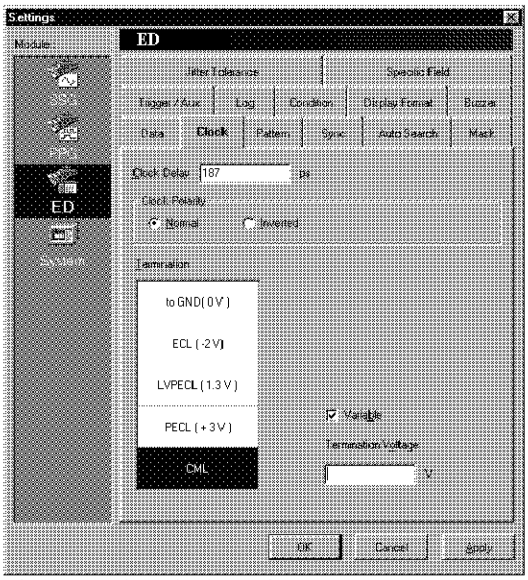


Figure 2-25 Clock Settings Tab

Setting the clock delay

4. Click the **[Clock Delay]** text box.
   The Virtual Keyboard is displayed.
5. Input the clock delay through the Virtual Keyboard.
   - Range: -1000 ps to +1000 ps
   - Setting resolution: 1 ps

Setting the input clock polarity

6. Select the input clock polarity from the **[Clock Polarity]** option button.

   [Normal]: Normal input is selected.

   [Inverted]: Inverted input is selected.

Selection of a termination type

7. Select a termination type from the **[Termination]** list box.

   A termination load of 50 Ω is set here.

   - Items to be selected from:
     to GND (0V), ECL (-2V), LVPECL (+1.3V), PECL(+3V), CML

Setting a termination voltage

8. Make a setting by clicking the **[Variable]** check box.

   The setting is enabled if the termination type is set to ECL (-2 V), LVPECL (+1.3 V), PEC (+3 V) or CML. Setting the check mark (✓) enables the setting of a termination voltage. The termination voltage is input through the Virtual Keyboard which is displayed by clicking the text box.

Termination type	Terminating voltage	Setting resolution
ECL(-2V)	-2.30V to −1.70V	0.05V
LVPECL(+1.3V)	+1.00V to +1.60V	
PECL(+3V)	+2.70V to +3.30V	
CML	0V to +3.50V	

Confirming the settings

9. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.4 Generated and received pattern settings

This section explains how to set a generated pattern for the PPG module and a received pattern for the ED module. Select one pattern from the pseudo random (PRBS) patterns, zero substitute (ZSUB) patterns, and programmable (PROG) patterns and set as the generated and received patterns of the D3371.

To set the same pattern as the generated and received patterns, use the pattern linkage function. The items defined in the generated pattern of the PPG module are similarly defined in the received pattern of the ED module when the pattern linkage function is used. Refer to Chapter 5, "TECHNICAL TERMS AND INFORMATION," for more information on each pattern.

Patterns can be selected in the same way as the definition process for the PPG and ED modules. This section includes an example showing how to select a pattern for the PPG module.

Displaying the pattern settings

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click **[PPG]** on the module selection list bar.
   The PPG module is selected.
3. Click the **[Pattern]** tab.
   The pattern tab for the PPG module is displayed.

NOTE: Select the [Pattern] tab of the ED module to set a pattern for the ED module.

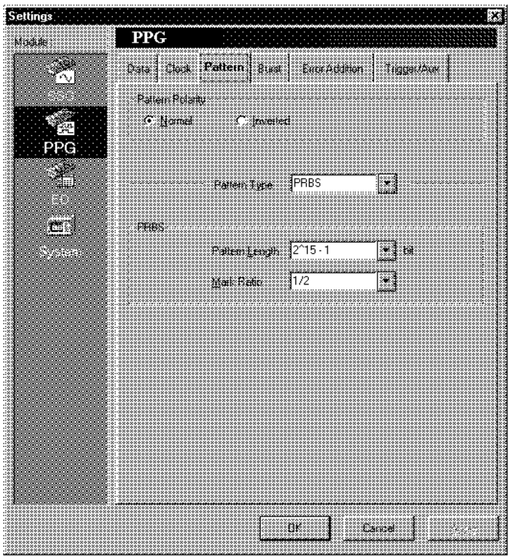


Figure 2-26 Pattern Setting Tab

Setting the pattern logic

4. Select the pattern logic by clicking the **[Pattern Polarity]** option button.
   [Normal]: Positive logic is selected.
   [Inverted]: Negative logic is selected.

Selecting a pattern

5. Click the **[Pattern Type]** drop-down list box.
   A list of the items that can be selected is displayed.
6. Select the pattern type from the list of items.
   [PRBS]: The pseudorandom (PRBS) pattern is selected.
   [ZSUB]: The zero substitute (ZSUB) pattern is selected.
   [PROG]: The programmable (PROG) pattern is selected.
   [STM]: An STM frame (STM) pattern is set (a pattern option).
   [FLEX]: A flexible (FLEX) pattern is set (a pattern option).

NOTE: ***The items displayed on the pattern tab are changed to reflect the selected pattern. Refer to the appropriate section for more information on the selected pattern.***

- ***PRBS pattern: Refer to Section 2.3.4.1, "PRBS Pattern Settings."***
- ***ZSUB pattern: Refer to Section 2.3.4.2, "ZSUB Pattern Settings."***
- ***PROG pattern: Refer to Section 2.3.4.3, "PROG Pattern Setting."***
- ***STM pattern: Refer to Section 2.3.4.4, "STM Patterns Settings."***
- ***FLEX pattern: Refer to Section 2.3.4.5, "FLEX Patterns Setting."***

Confirming the settings

7. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.
   Clicking the **[OK]** button closes the Settings window.

NOTE: ***When not using the pattern linkage function, go to step 11.***

8. Click **[ED]** on the module selection list bar.
   The ED module is selected.
9. Click the **[Pattern]** tab.
   The Pattern tab for the ED module is displayed.
10. Click the **[Use the same Pattern as PPG]** check box. To use the pattern linkage function, the check box must be selected.
    When the pattern linkage function is used, the pattern logic and pattern type of the ED module are linked with those defined for the PPG module.

NOTE:

1. ***If the [Use the same Pattern as PPG] check box is selected, and then unselected, a dialog box asking the user to confirm this is displayed. Click the [Yes] button to confirm it. Click the [No] button to cancel.***
2. ***If the pattern linkage function setting is cleared, the ED module pattern logic and pattern type settings, made before the pattern linkage function was used, cannot be restored.***

Confirming the settings

11. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

    Clicking the **[OK]** button closes the Settings window.

2.3.4.1 PRBS Pattern Settings

This section explains how to set a PRBS pattern.

The PRBS pattern can be set in the same way as the definition process for the PPG and ED modules. This section includes an example showing how to set a PRBS pattern for the PPG module.

Setting a PRBS pattern

1. Set Pattern Type to PRBS.

NOTE: ***Select the [Pattern] tab of the ED module to select a pattern type for the ED module.***

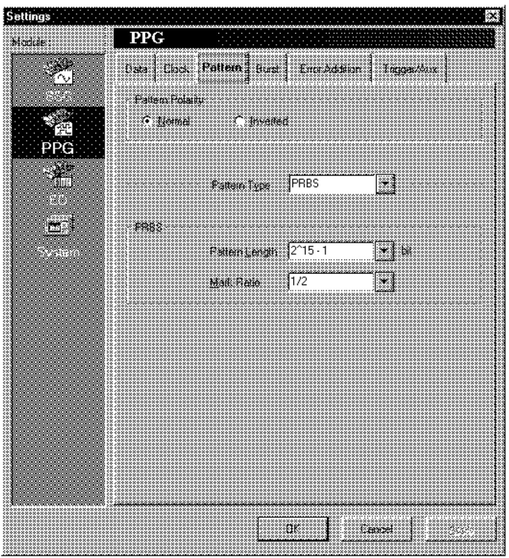


Figure 2-27 PRBS Pattern Settings Tab

Setting a pattern length

2. Click the **[Pattern Length]** drop-down list box.
   A list of the items that can be selected is displayed.
3. Select a pattern length from the list of items.

   [2^7-1]: Pattern length 2^{7}-1 bit is selected.

   [2^9-1]: Pattern length 2^{9}-1 bit is selected.

   [2^10-1]: Pattern length 2^{10}-1 bit is selected.

   [2^11-1]: Pattern length 2^{11}-1 bit is selected.

   [2^15-1]: Pattern length 2^{15}-1 bit is selected.

   [2^23-1]: Pattern length 2^{23}-1 bit is selected.

[2^31-1]: Pattern length 2^{31}-1 bit is selected.

Setting a mark ratio

4. Click the **[Mark Ratio]** drop-down list box.

   A list of the items that can be selected is displayed.

5. Select a mark ratio from the list of items.

   [0/8]: 0/8 is selected.

   [1/8]: 1/8 is selected.

   [1/4]: 1/4 is selected.

   [1/2]: 1/2 is selected.

   [3/4]: 3/4 is selected.

   [7/8]: 7/8 is selected.

   [8/8]: 8/8 is selected.

   [1/2B]: $\overline{1/2}$ is selected.

   (0/8 and 8/8, 1/8 and 7/8, 1/4 and 3/4, or 1/2 and 1/2B are logically inverted to each other.)

Confirming the settings

6. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.4.2 ZSUB Pattern Settings

This section explains how to set a ZSUB pattern.

The ZSUB pattern can be specified in the same way as the definition process for the PPG and ED modules. This section shows an example of setting a ZSUB pattern for the PPG module.

Displaying the ZSUB pattern settings

1. Set Pattern Type to ZSUB.

NOTE: ***Select the [Pattern] tab of the ED module to select a pattern type for the ED module.***

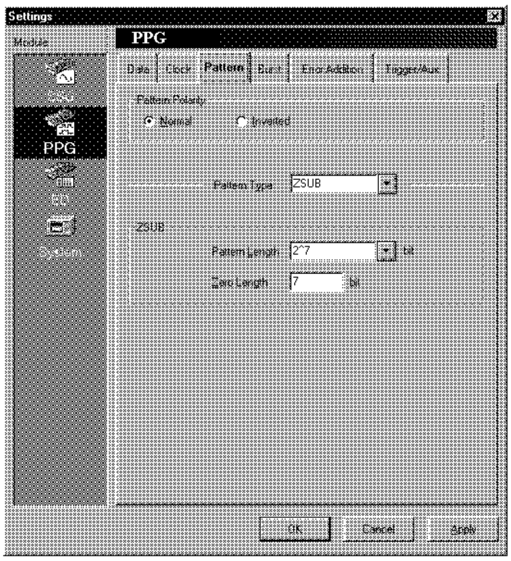


Figure 2-28 ZSUB Pattern Settings Tab

Setting a pattern length

2. Click the **[Pattern Length]** drop-down list box.
   A list of the items that can be selected is displayed.
3. Select a pattern length from the list of items.

[2^7]:	Pattern length 2^7 bit is selected.
[2^9]:	Pattern length 2^9 bit is selected.
[2^10]:	Pattern length 2^{10} bit is selected.
[2^11]:	Pattern length 2^{11} bit is selected.
[2^15]:	Pattern length 2^{15} bit is selected.

Setting the consecutive zero bit length

4. Click the **[Zero Length]** text box.
   The Virtual Keyboard is displayed.
5. Input the consecutive zero bit length through the Virtual Keyboard.

ZSUB pattern length	Consecutive zero bit length (bits)	Setting resolution (bit)
2^7	7 to 127	1
2^9	9 to 511	1
2^10	10 to 1023	1
2^11	11 to 2047	1
2^15	15 to 32767	1

Confirming the settings

6. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.
   Clicking the **[OK]** button closes the Settings window.

2.3.4.3 PROG Pattern Setting

This section explains how to set a PROG pattern.

The PROG pattern can be specified in the same way as the definition process for the PPG and ED modules. This section shows an example of setting a PROG pattern for the PPG module.

Setting a PROG pattern

1. Set Pattern Type to PROG.

NOTE: Select the PROG pattern settings tab to set a PROG pattern for the ED module.

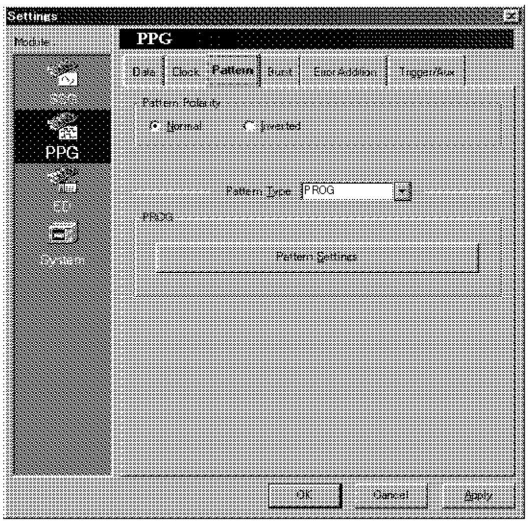


Figure 2-29 PROG Pattern Setting Tab

Editing the pattern

2. Click the **[Pattern Settings]** button.

   The Pattern Settings dialog box is displayed. Refer to Section 2.3.6, “Creating and Editing STM Patterns,” for more information.

Confirming the settings

3. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.4.4 STM Patterns Settings

This section explains how to set an STM pattern (a pattern option). Refer to 5.4, "STM Frame (STM) Patterns," a technical document, for details. STM pattern setting operations are identical for PPG modules and ED modules. This section describes PPG modules.

Selection of an STM pattern setting dialog box

1. Select the STM pattern as the Pattern Type

NOTE: ***Select the STM pattern setting window for ED modules to make settings for STM patterns for ED modules.***

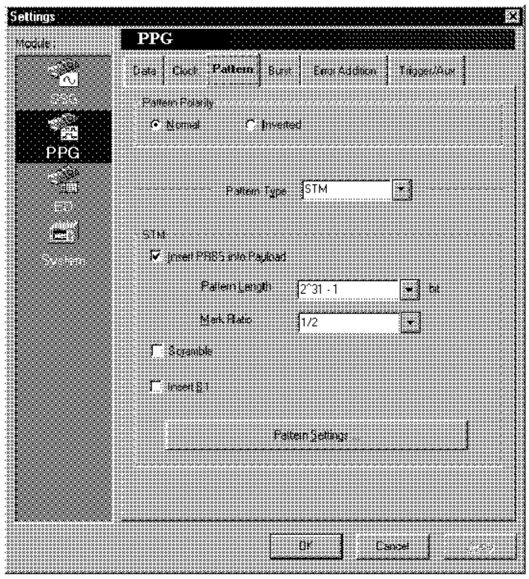


Figure 2-30 An STM Pattern Setting Dialog Box Window

How to insert a PRBS pattern into a payload

2. Make a selection by clicking the **[Insert PRBS into Payload]** check box.

   Set the check mark (✓) to insert a PRBS pattern into a payload.

   If the check is displayed, a PRBS pattern instead of a pattern set in the pattern memory is inserted into the payload. If the check is removed, a pattern set in the pattern memory is inserted into the payload.

How to provide scrambling

3. Make a selection by clicking the **[Scramble]** check box.

   Set the check mark (✓) to provide the ITU-T recommendation G.707-compliant scrambling to patterns.

   If scrambling is not provided, patterns set in **[Pattern Settings]** are output without being scrambled.

How to insert B1 bytes

4. Make a selection by clicking the **[Insert B1]** check box.

   Set the check mark (✓) to insert the ITU-T recommendation G.707-compliant B1 bytes.

   If B1 bytes are not inserted, the B1 bytes data that was set in **[Pattern Settings]** is output.

   Refer to 5.4, "STM Frame (STM) Patterns," a technical document, for details on how to insert B1 bytes.

How to edit patterns

5. Click the **[Pattern Settings]** button.

   The Pattern Settings dialog box is displayed. Refer to 2.3.7, "Creating and Editing Flex Patterns" for details.

Confirming the settings

6. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.4.5 FLEX Patterns Setting

This section explains how to set FLEX patterns (a pattern option). Refer to 5.5, "Flexible (FLEX) Patterns," a technical document, for details. FLEX pattern setting operations are identical for PPG modules and ED modules. This section describes PPG modules.

Selection of a FLEX pattern setting dialog box

1. Select the FLEX pattern as the Pattern Type

NOTE: ***Select the FLEX pattern setting window for ED modules to make settings for FLEX patterns in ED modules.***

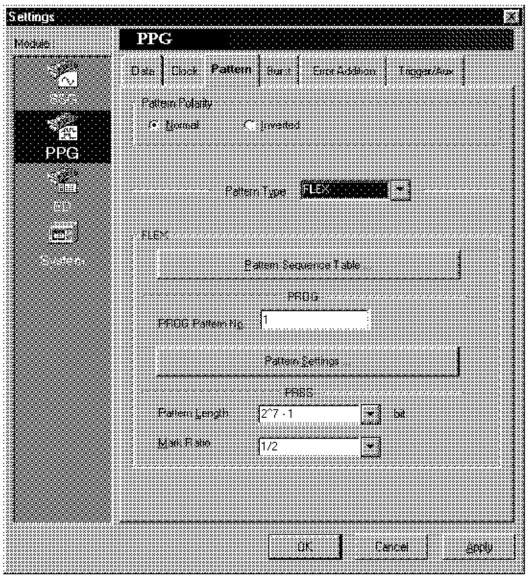


Figure 2-31 A FLEX Pattern Setting Dialog Box Window

How to edit the pattern sequence table

2. Click the **[Pattern Sequence Table...]** button.

   The Pattern Sequence Table dialog box is displayed. Refer to 2.3.7, "Creating and Editing Flex Patterns" for details.

   NOTE: ***In FLEX patterns, various types of patterns are generated consecutively. Which patterns are generated in which order is specified in the pattern sequence table.***

How to edit PROG patterns

3. Click the **[PROG Pattern No.]** text box.

   The Virtual Keyboard is displayed.

4. Input the number of the PROG pattern to be edited through the Virtual Keyboard.

   An integer of 1 to 127 is set to each PROG pattern.

5. Click the **[Pattern Settings]** button.

   The Pattern Settings dialog box is displayed. Refer to 2.3.7, "Creating and Editing Flex Patterns" for details.

Setting PRBS pattern

6. Click the **[Pattern Length]** drop-down list box.

   A list of the items that can be selected is displayed.

7. Select a pattern length from the list of items.

   [2^7-1]: Pattern length 2^7-1 bit is selected.

   [2^9-1]: Pattern length 2^9-1 bit is selected.

   [2^10-1]: Pattern length 2^{10}-1 bit is selected.

   [2^11-1]: Pattern length 2^{11}-1 bit is selected.

   [2^15-1]: Pattern length 2^{15}-1 bit is selected.

   [2^23-1]: Pattern length 2^{23}-1 bit is selected.

   [2^31-1]: Pattern length 2^{31}-1 bit is selected.

Setting a mark ratio

8. Click the **[Mark Ratio]** drop-down list box.

   A list of the items that can be selected is displayed.

9. Select a mark ratio from the list of items.

   [0/8]: 0/8 is selected.

   [1/8]: 1/8 is selected.

   [1/4]: 1/4 is selected.

   [1/2]: 1/2 is selected.

   [3/4]: 3/4 is selected.

   [7/8]: 7/8 is selected.

   [8/8]: 8/8 is selected.

   [1/2B]: $\overline{1/2}$ is selected.

   (0/8 and 8/8, 1/8 and 7/8, 1/4 and 3/4, or 1/2 and 1/2B are logically inverted to each other.)

Confirming the settings

10. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

    Clicking the **[OK]** button closes the Settings window.

2.3.5 Creating and Editing Programmable(PROG) Patterns

This section explains how to create and edit a pattern.

Use the Pattern Settings dialog box to create and edit patterns.

The settings in the Pattern Settings dialog box can be specified in the same way as the definition process for the PPG and ED modules. This section shows how to create and edit a PROG pattern for the PPG module.

NOTE:

1. ***Patterns set in the pattern memory consist of patterns generated and received by the D3371.***
   To set edited patterns as patterns to be generated or received by the D3371, click the [Set Pattern Memory] button.
2. ***Patterns to be saved on a disk by means of "pattern saving" are those set in the pattern memory. To save edited patterns, perform a saving operation after clicking the [Set Pattern Memory] button.***
3. ***If a pattern is opened, the saved pattern is set in the pattern memory as well as read to the Pattern Settings dialog box.***

Pattern creation procedure

1. Open the Pattern Settings dialog box.
2. To use a saved pattern, open the pattern.
3. Set the pattern length to generate a new pattern or alter the pattern length.
4. Set an input format.
5. Input a pattern.
   The jump and fill pattern functions can be used to edit the pattern.
6. Save the pattern in pattern memory.
7. Save the created pattern.
8. Close the Pattern Settings dialog box.

2.3.5.1 Opening the Pattern Settings Dialog Box

This section explains how to open the Pattern Settings dialog box for PROG patterns.

1. Select PROG as the Pattern Type.
   The Pattern Settings button is displayed.

NOTE: ***To make settings for PROG patterns in ED modules, select the PROG pattern setting window for ED modules.***

---

2. Click the **[Pattern Settings]** button.
   The Pattern Settings dialog box is displayed.

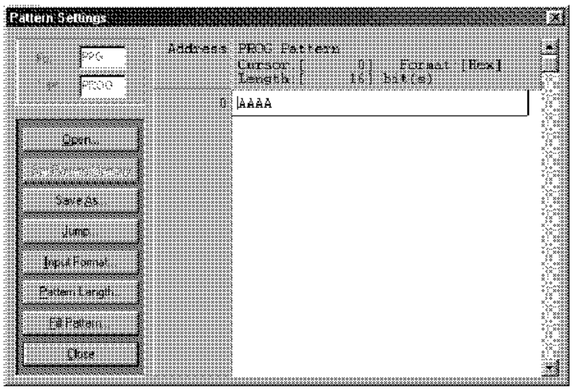


Figure 2-32 Pattern Settings Dialog Box (for PROG patterns)

2.3.5.2 Pattern Setting Dialog Box Elements

This section describes the elements of the Pattern Settings dialog box.

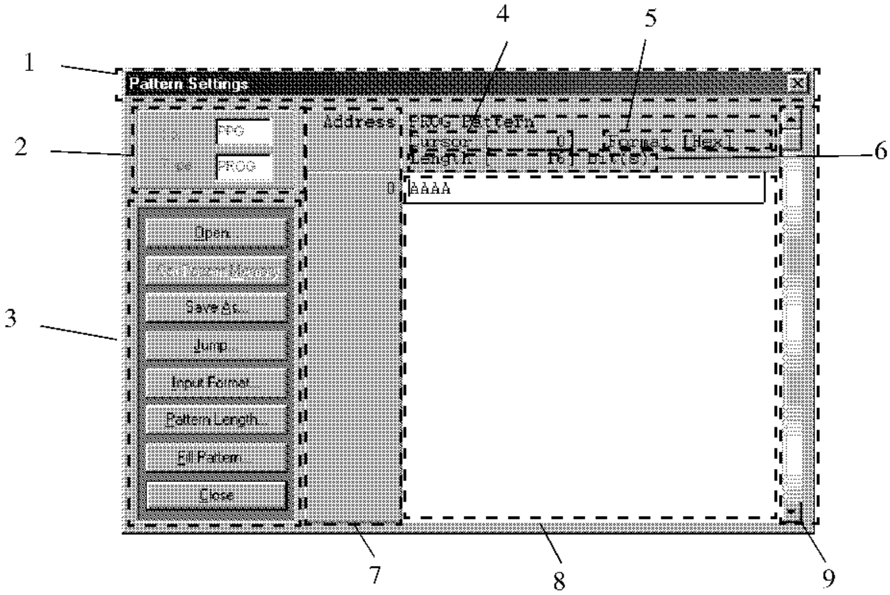


Figure 2-33 Elements Dialog Box Window (for PROG patterns)

1.	Title bar	Displays the title of the dialog box.
2.	Pattern attribute	Displays the pattern type and module type.
3.	Operation buttons	Selects the edit functions and others.
4.	Cursor position	Displays the current cursor position.
5.	Input format	Displays the pattern input format.
6.	Pattern length	Displays the pattern length.
7.	Address display area	Displays the address indicating the position of the pattern being edited. The heading address of each line is displayed.
8.	Pattern edit area	The pattern is edited here. Displays the pattern data being edited.
9.	Scroll bar	Used to scroll through data not currently displayed (when the amount of data exceeds the display area).

2.3.5.3 Opening Patterns

This section explains how to open patterns.

Opening a pattern

1. Click the **[Open]** button.

   A confirmation dialog box displays the following message: "The contents of Pattern Memory may be lost. Do you wish to continue?"

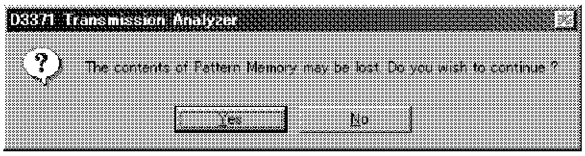


Figure 2-34 Confirmation Dialog Box

> ***NOTE:*** ***If a pattern is opened, the pattern is set in the pattern memory as well as read to the Pattern Settings dialog box.***

2. Click the **[Yes]** button to continue. Click the **[No]** button to stop.

   The Open dialog box is displayed.

Figure 2-35 Open Dialog Box

3. Select the drive and the directory path of a file to be opened from the **[Look in]** drop-down list box or list.
4. If pattern files are available, they are displayed in a list.

   Select a file from the list. The panal keys or keyboard can also be used to input the file name in the **[File name]** text box.

   When a file name has been selected from the list, it is displayed in the **[File name]** text box.
5. Click the **[Open]** button to open the pattern file (clicking the **[Cancel]** button cancels this operation).

   The PROG pattern is loaded.

2.3.5.4 Pattern Length Settings

This section explains how to set a pattern length.

Setting a pattern length

1. Click the **[Pattern Length]** button.
   The Pattern Length dialog box is displayed.

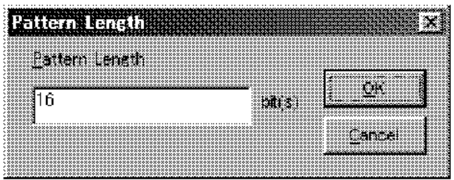


Figure 2-36 Pattern Length Dialog Box (for PROG patterns)

NOTE: ***If pattern contents have been changed but not saved in pattern memory, a confirmation dialog box containing the following message is displayed: "The Pattern may be lost. Do you wish to save the changes in Pattern Memory?" Click the [Yes] button to save the changed contents. Click the [No] button to continue without saving the changes. Click the [Cancel] button to cancel the operation.***

2. Click the **[Pattern Length]** text box.
   The Virtual Keyboard is displayed.
3. Input a pattern length through the Virtual Keyboard.

Pattern length [bit(s)]	Setup resolution [bit(s)]
1 to 262,144	1
262,146 to 524,288	2
524,292 to 1,048,576	4
1,048,584 to 2,097,152	8
2,097,168 to 4,194,304	16
4,194,336 to 8,388,608	32

CAUTION: ***If the new pattern length is larger than the previous pattern length, the contents of the pattern memory will fill the extra space.***
If the new pattern length is smaller than the previous pattern length, the new pattern will be truncated.

4. Click the **[OK]** or **[Cancel]** button.
   The Pattern Length dialog box is closed.

2.3.5.5 Input Format Settings

This section explains how to set a pattern input format.

NOTE: ***If the input format is changed during editing, the pattern data in the pattern edit area is displayed in the updated input format.***

Selecting a pattern input format

1. Click the **[Input Format]** button.
   The Input Format dialog box is displayed.

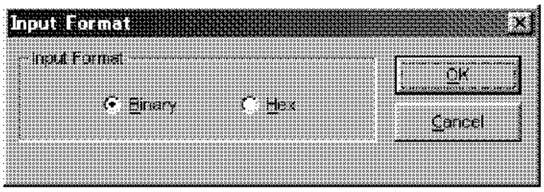


Figure 2-37 Input Format Dialog Box

2. Select an input format by clicking the **[Input Format]** option button.
   [Binary]: The pattern is input in binary.
   [Hex]: The pattern is input in hexadecimal.
3. Click the **[OK]** or **[Cancel]** button.
   The Input Format dialog box is closed.

2.3.5.6 Pattern Input

This section explains how to input a pattern.

How to input a pattern

1. Click the pattern edit area.

   The cursor is displayed at that location.

2. Move the cursor to the location and input the pattern.
   - Use the cursor keys to move the cursor.
   - The cursor location can be specified directly using the jump function (refer to Section 2.3.5.7, "Jump," for more information).
   - If pattern data is not displayed in the pattern edit area, click the [▲] or [▼] button on the scroll bar to scroll through the data.

3. Input new data using the panel keys.

   The new data overwrites the old data, and the cursor moves to the next address.
   - If the input format is binary:
     Use keys **0** and **1**.
   - If the input format is hexadecimal:
     Use keys **0** to **9** and **A** to **F**.
   - Pressing **BS** will overwrite the character to the left of the cursor with a 0, and move the cursor to the left one space.

NOTE:

1. ***If hexadecimal is selected as the pattern input format and the pattern length is not an integer multiple of a hexadecimal number, the length rounded up to the nearest hexadecimal number is used. (For example, if 1,025 bits is specified for the pattern length, the length of 1,028 bits is used.) Bits longer than the pattern length are ignored if the pattern length is specified in the D3371.***
2. ***Inputting a pattern does not change the pattern length. Refer to Section 2.3.5.4, "Pattern Length Settings," for more information on creating a pattern or changing the pattern length.***

2.3.5.7 Jump

This section describes the cursor jump function. The jump function enables you to move the cursor to a specified address.

Setting a jump address

1. Click the **[Jump]** button.
   The Jump dialog box is displayed.

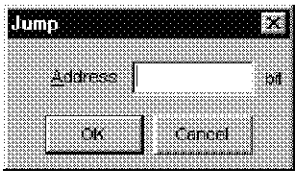


Figure 2-38 Jump Dialog Box (for PROG patterns)

2. Click the **[Address]** text box.
   The Virtual Keyboard is displayed.
3. Input a jump address through the Virtual Keyboard.
   - Address range: 0 to pattern length - 1 bit
4. Click the **[OK]** or **[Cancel]** button.
   The Jump dialog box is closed.
   The cursor moves to the specified address. Pattern data at that location is displayed in the pattern edit area.

2.3.5.8 Fill Pattern

This section describes the fill pattern function. The fill pattern function enables you to input the same repetition pattern.

Setting the starting address

1. Move the cursor in the pattern-editing area to the address where pattern replacement starts. The jump function (refer to Section 2.3.5.7, "Jump,") can be used to set the address.

Setting a fill pattern

2. Click the **[Fill Pattern]** button.
   The Fill Pattern dialog box is displayed.

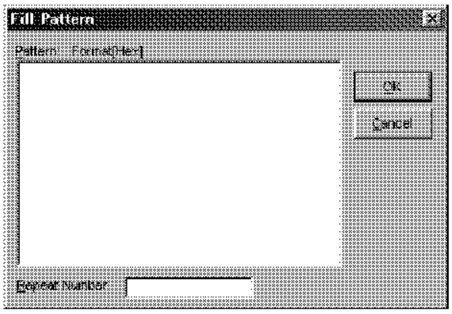


Figure 2-39   Fill Pattern Dialog Box

3. Click the **[Pattern]** text box.
4. Input the required pattern using the panel keys.
   - If the input format is binary:
     Use keys **0** and **1**.
   - If the input format is hexadecimal:
     Use keys **0** to **9** and **A** to **F**.
   - Press **BS** will delete the character to the left of the cursor.
   - Press **DEL (SHIFT-BS)** will delete the character to the right of the cursor.
5. Click the **[Repeat Number]** text box.

   The Virtual Keyboard is displayed.
6. Input the repetition number through the Virtual Keyboard.
7. Click the **[OK]** or **[Cancel]** button.

   The Fill Pattern dialog box is closed.

   Beginning from the cursor position in the pattern edit area, the pattern data specified in the **[Pattern]** text box is entered the number of times specified in the **[Repeat Number]** text box.

2.3.5.9 Pattern Saving

This section explains how to save patterns.

Saving a pattern

1. Click the **[Save As]** button.

   The Save As dialog box is displayed.

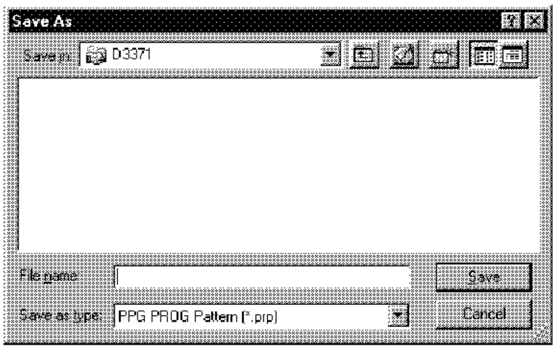


Figure 2-40 Save As Dialog Box (for PROG patterns)

2. Select the drive and directory path for the file from the **[Save in]** drop-down list box or list.

CAUTION:	***Do not save patterns to C drive. C drive is reserved for system files. Select D drive, or insert a formatted floppy disk to save patterns to a floppy. For more information, refer to Section 2.7.3 "Formatting Floppy Disks."***

3. Input a file name in the **[File name]** text box. The numeric keypad on the panel (**0** to **9** and **A** to **F**) can be used to input the file name. Any alphanumeric characters can be input if a keyboard is connected to the D3371.

4. Click the **[Save]** button to save the pattern (clicking the **[Cancel]** button cancels this operation).

   The PROG pattern is saved.

2.3.5.10 Saving Patterns to Pattern Memory

This section explains how to save the patterns created from the Pattern Settings dialog box in the pattern memory of the D3371.

CAUTION:

1. ***When the pattern contents have been changed, save the new pattern contents to the pattern memory. If the changes are not saved, the pattern cannot be used. The [Set Pattern Memory] button is selectable when the pattern contents have been changed.***
2. ***Patterns set in the pattern memory consist of patterns generated or received by the D3371. To set edited patterns as patterns to be generated or received by the D3371, click the [Set Pattern Memory] button.***

Saving a pattern in pattern memory

1. Click the **[Set Pattern Memory]** button.
   Edited patterns are set to the pattern memory.

2.3.5.11 Exiting the Dialog Box

This section explains how to exit the Pattern Settings dialog box.

Closing the dialog box

1. Click the **[Close]** button.
   The Pattern Settings dialog box is closed.

NOTE: ***If the pattern contents have been changed but not saved to the pattern memory, a confirmation dialog box containing the following message is displayed: "Do you wish to save the changes in Pattern Memory?" Click the [Yes] button to saved the changed contents. Click the [No] button to not to update pattern memory. Click the [Cancel] button to cancel the operation.***

2.3.6 Creating and Editing STM Patterns

This section explains how to generate and edit STM patterns (a pattern option).

The generation and editing of STM patterns are performed with the Pattern Settings dialog box. Refer to 5.4, "STM Frame (STM) Patterns," a technical document, for details of STM patterns.

Pattern Settings dialog box setting operations are identical for PPG modules and ED modules. This section describes PPG module STM patterns.

CAUTION:

1. ***Patterns set in the pattern memory consist of patterns generated or received by the D3371. To set edited patterns as patterns to be generated or received by the D3371, click the [Set Pattern Memory] button.***
2. ***Patterns set in the pattern memory are saved on a disk when a pattern-saving operation is performed. To save edited patterns, click the [Set Pattern Memory] button before performing a pattern-saving operation.***
3. ***The pattern-opening operation sets saved patterns to the pattern memory together with reading them to the Pattern Settings dialog box.***

Pattern generation procedures

1. Open the Pattern Settings dialog box.
2. To use saved patterns, open the patterns.
3. Set the pattern length to generate new patterns or alter pattern lengths.
4. Set input formats.
5. Input patterns.
6. To edit patterns, jump functions and fill-pattern functions can be used.
7. Set the patterns to the pattern memory.
8. To save generated patterns, perform a pattern-saving operation.
9. Close the Pattern Settings dialog box.

2.3.6.1 Opening the Pattern Settings Dialog Box

This section explains how to open the Pattern Setting Dialog Box for STM patterns.

1. Select STM as the Pattern Type.
   The Pattern Settings button is displayed.

NOTE: ***To set STM patterns of ED modules, select the STM pattern setting window for ED modules.***

---

2. Click the **[Pattern Settings]** button.
   The Pattern Settings dialog box is displayed.

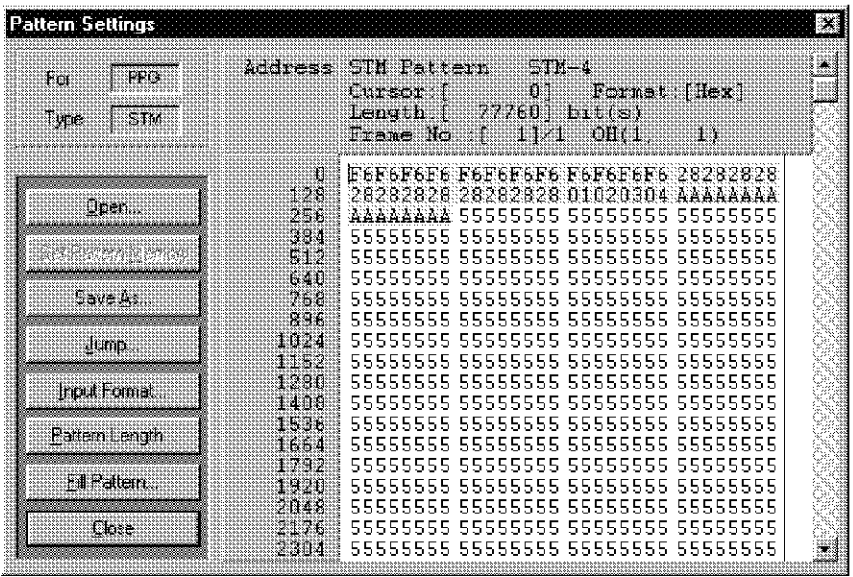


Figure 2-41 Pattern Settings Dialog Box Window (for STM patterns)

2.3.6.2 Pattern Settings Dialog Box Elements

This section describes the elements of the Pattern Settings dialog box.

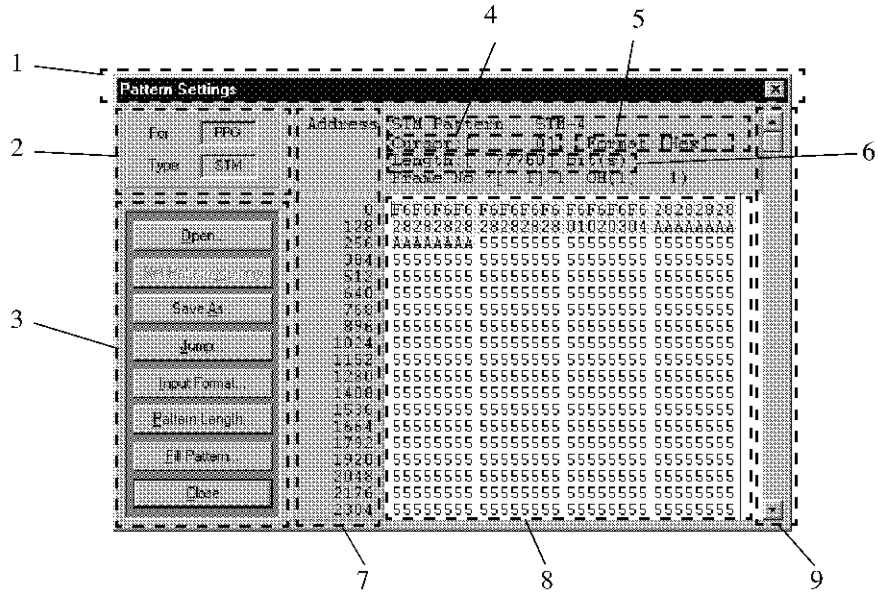


Figure 2-42 Elements Dialog Box Window (for STM patterns)

1.	Title bar	Displays the title of the dialog box.
2.	Pattern attribute	Displays the pattern type and module type.
3.	Operation buttons	Select the edit functions and others.
4.	Cursor position	A current cursor position is indicated with bit addresses for all patterns, and a set of a frame number/row/column. A location within a frame is indicated with a row and a column that is specified for each OH or Payload area.
5.	Input format	Displays the pattern input format.
6.	Pattern length	Displays the pattern length.
7.	Address display area	Displays the address indicating the position of the pattern being edited. The heading address of each line is displayed.
8.	Pattern edit area	Area used to edit the pattern. Displays the pattern data being edited. OH areas are indicated with yellow color, while Payload areas are indicated with white color.
9.	Scroll bar	Used to scroll through data not currently displayed (when the amount of data exceeds the display area).

2.3.6.3 Opening Patterns

This section explains how to open patterns.

Opening of patterns

1. Click **[Open]** button.

   The confirmation message, "The contents of Pattern Memory may be lost. Do you wish to continue?" is displayed.

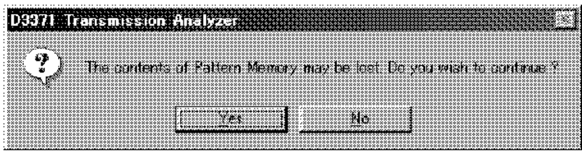


Figure 2-43 Confirmation Message Window

CAUTION: ***If a pattern-opening operation is performed, patterns are set to the pattern memory as well as read to the Pattern Settings dialog box.***

2. Click the **[Yes]** button to continue operations or **[No]** button to cancel operations.

   The Open dialog box is displayed.

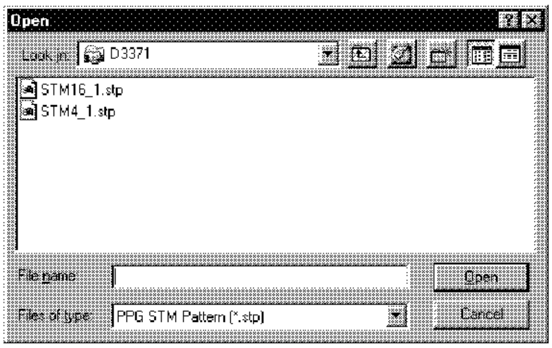


Figure 2-44 An Open Dialog Box Window (for STM patterns)

3. Select the drive and directory path of a file to be opened from the **[Look in]** drop-down list box or list.

4. The file, if it exists, is indicated in the list.

   To specify the name of a pattern file to be read, click the name on the list or directly enter the file name in the **[File name]** text box by using the panel key or keyboard.

   If a file name is selected from the list by clicking, the selected name is copied to the **[File name]** text box.

5. Click the **[Open]** button to open the pattern file (clicking the **[Cancel]** button cancels this operation).

   The STM pattern is opened and the conditions are set in the D3371.

NOTE: ***The STM pattern setting file does not contain information on the PRBS pattern length set in the payload area and the mark ratio. When a PRBS pattern is set in the payload area, check the PRBS pattern settings.***

2.3.6.4 Setting the Pattern Length

This section explains how to set a pattern length.

Setting a pattern length

1. Click the **[Pattern Length]** button.

   The Pattern Length dialog box is displayed.

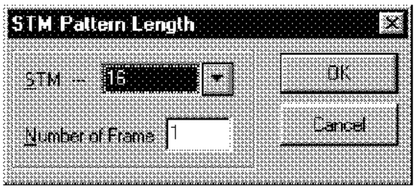


Figure 2-45 Pattern Length Dialog Box (for STM patterns)

NOTE: ***If pattern contents have been changed but not saved in pattern memory, a confirmation dialog box containing the following message is displayed: "The Pattern may be lost. Do you wish to save the changes in Pattern Memory?" Click the [Yes] button to save the changed contents. Click the [No] button to continue without saving the changes. Click the [Cancel] button to cancel the operation.***

2. Click the **[STM]** drop-down list box.

   The selectable item list is displayed.

   Select N of STM(-N) pattern (Nos. 4, 16) from the list.

3. Click the **[Number of Frame]** text box

   The Virtual Keyboard is displayed.
   Enter the number of frames through the Virtual Keyboard.

STM-N	The number of frames [frame(s)]	Setting resolution [frame]
STM-4	1 to 107	1
STM-16	1 to 26	

CAUTION: ***If the newly set pattern length is longer than that of the former patterns, the content of the pattern memory is displayed.***
If the newly set pattern length is shorter than that of the former patterns, the portions of the patterns that exceed the specified length are removed.

4. Click the **[OK]** or **[Cancel]** button.
   The Pattern Length dialog box closes.

2.3.6.5 Input Format Settings

This section explains how to set a pattern input format.

NOTE: ***If the input format is changed during editing, the pattern data in the pattern edit area is displayed in the updated input format.***

Selecting a pattern input format

1. Click the **[Input Format]** button.
   The Input Format dialog box is displayed.

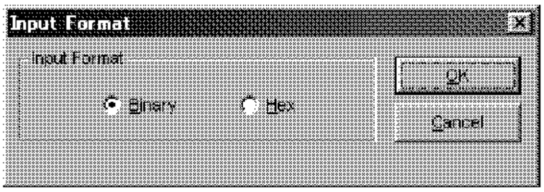


Figure 2-46 Input Format Dialog Box

2. Select an input format by clicking the **[Input Format]** option button.
   [Binary]: The pattern is input in binary.
   [Hex]: The pattern is input in hexadecimal.
3. Click the **[OK]** or **[Cancel]** button.
   The Input Format dialog box is closed.

2.3.6.6 Pattern Input

This section explains how to input a pattern.

How to input a pattern

1. Click the pattern edit area.
   The cursor is displayed at that location.
2. Move the cursor to the required location and input the pattern.
   - Use the cursor keys to move the cursor.
   - The cursor location can be specified directly using the jump function (refer to Section 2.3.6.7, "Jump," for more information).
   - If the pattern data is not displayed in the pattern edit area, click the [▲] or [▼] button on the scroll bar to scroll through the data.
3. Inputing new data using the panel keys.
   The new data overwrites the old data, and the cursor moves to the next address.
   - If the input format is binary:
     Use keys **0** and **1**.
   - If the input format is hexadecimal:
     Use keys **0** to **9** and **A** to **F**.
   - Pressing **BS** will overwrite the character to the left of the cursor with a 0, and move the cursor to the left one space.

NOTE: Inputting patterns does not alter the pattern length. To generate a new pattern or alter the pattern length, refer to 2.3.7.4, "Pattern Length Setting."

2.3.6.7 Jump

This section describes the cursor jump function. The jump function enables you to move the cursor to a specified address.

Setting a jump address

1. Click the **[Jump]** button.
   The Jump dialog box is displayed.

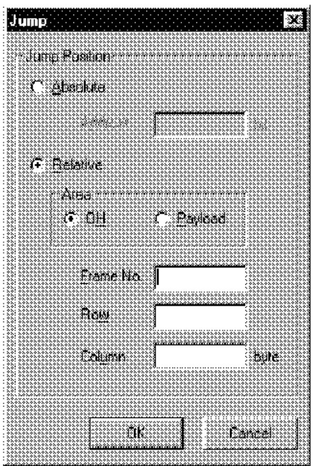


Figure 2-47 Jump Dialog Box (for STM patterns)

[Absolute]: Input a bit address for all patterns to specify a jump destination.

[Relative]: Input a frame number, row and column to specify a jump destination.

If **[Absolute]** is used for the setting:

2. Click the **[Absolute]** option button.
   Click the **[Address]** text box.
   The Virtual Keyboard is displayed.
   Enter a jump destination address through the Virtual Keyboard.
   - Destination address range: 0 bit to the pattern length -1 bit

If **[Relative]** is used for the setting:

3. Click the **[Area]** option button for selection.
   [OH]: The overhead area is selected.
   [Payload]: The payload area is selected.

4. Click the **[Frame No.]** text box.

   The Virtual Keyboard is displayed.

   Enter a jump destination frame number through the Virtual Keyboard.

   - Destination frame number range: 1 to the number of the frames

5. Click the **[Row]** text box.

   The Virtual Keyboard is displayed.

   Enter a jump destination row through the Virtual Keyboard.

   - Destination row range: 1 to 9

6. Click the **[Column]** text box.

   The Virtual Keyboard is displayed.

   Enter a jump destination column through the Virtual Keyboard.

STM-N	Column range [byte(s)]	
	OH area	Payload area
STM-4	1 to 36	1 to 1044
STM-16	1 to 144	1 to 4176

7. Click the **[OK]** or **[Cancel]** button.

   The Jump dialog box closes.

   The cursor moves to the jump destination specified and pattern data including those at the jump destination are displayed in the pattern-editing area.

2.3.6.8 Fill Pattern

This section describes the fill pattern function. The fill pattern function enables you to input the same repetition pattern.

Setting the starting address

1. Move the cursor in the pattern edit area to the required address and insert the data. The jump function (refer to Section 2.3.6.7, "Jump,") can be used to set the address.

Setting a fill pattern

2. Click the **[Fill Pattern]** button.

   The Fill Pattern dialog box is displayed.

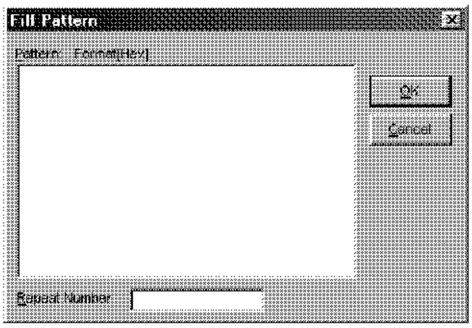


Figure 2-48 Fill Pattern Dialog Box

3. Click the **[Pattern]** text box.
4. Input the required pattern using the panel keys.
   - If the input format is binary:
     Use keys **0** and **1**.
   - If the input format is hexadecimal:
     Use keys **0** to **9** and **A** to **F**.
   - Press **BS** will delete the character to the left of the cursor.
   - Press **DEL (SHIFT-BS)** will delete the character to the right of the cursor.
5. Click the **[Repeat Number]** text box.

   The Virtual Keyboard is displayed.
6. Input the repetition number through the Virtual Keyboard.
7. Click the **[OK]** or **[Cancel]** button.

   The Fill Pattern dialog box is closed.

   Beginning from the cursor position in the pattern edit area, the pattern data specified in the **[Pattern]** text box is entered the number of times specified in the **[Repeat Number]** text box.

2.3.6.9 Saving Patterns to Pattern Memory

This section explains how to save the patterns created from the Pattern Settings dialog box to the pattern memory of the D3371.

CAUTION:

1. ***When the pattern contents have been changed, save the new pattern contents to the pattern memory. If the changes are not saved, the pattern cannot be used. The [Set Pattern Memory] button can be selected when the pattern contents have been changed.***
2. ***Patterns set in the pattern memory consist of patterns generated or received by the D3371. To set edited patterns as patterns to be generated or received by the D3371, click the [Set Pattern Memory] button.***

Saving a pattern in pattern memory

1. Click the **[Set Pattern Memory]** button.
   Edited patterns are set to the pattern memory.

2.3.6.10 Saving Patterns

This section explains how to save patterns.

NOTE: ***Patterns are stored to the pattern memory of the D3371.***
If the [Save As] button is disabled and cannot be clicked, click the [Set Pattern Memory] button to save the changed pattern to the pattern memory.

Saving a pattern

1. Click the **[Save As]** button.
   The Save As dialog box is displayed.

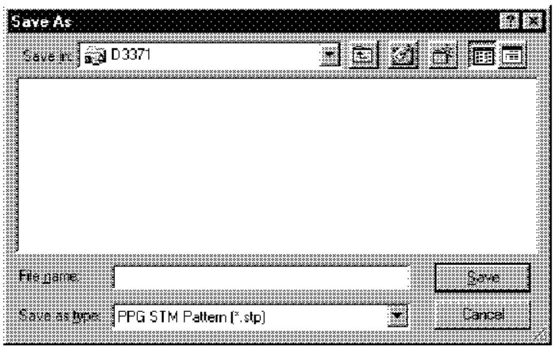


Figure 2-49 Save As Dialog Box

CAUTION: ***If the [Save As] button is disabled, click the [Save As] button after clicking the [Set Pattern Memory] button.***

2. Select the drive and directory path for the file from the **[Save in]** drop-down list box or list.

CAUTION: ***Do not save patterns to C drive. C drive is reserved for system files. Select D drive, or insert a formatted floppy disk to save patterns to a floppy. For more information, refer to Section 2.7.3 "Formatting Floppy Disks."***

3. Input a file name in the **[File name]** text box. The numeric keypad on the front panel (**0** to **9** and **A** to **F**) can be used to input the file name. Any alphanumeric characters can be input if a keyboard is connected to the D3371.
4. Click the **[Save]** button to save the pattern (clicking the **[Cancel]** button cancels this operation).

   The STM pattern is saved.

2.3.6.11 Exiting the Dialog Box

This section explains how to exit the Pattern Settings dialog box.

Closing the dialog box

1. Click the **[Close]** button.

   The Pattern Settings dialog box is closed.

NOTE: ***If the pattern contents have been changed but not saved to the pattern memory, a confirmation dialog box containing the following message is displayed: "Do you wish to save the changes in Pattern Memory?" Click the [Yes] button to saved the changed contents. Click the [No] button to not update pattern memory. Click the [Cancel] button to cancel the operation.***

2.3.7 Creating and Editing Flex Patterns

This section explains how to create and edit FLEX patterns (a pattern option)

The creating and editing of FLEX patterns are performed with the Pattern Settings dialog box. Refer to 5.5, "Flexible (FLEX) Patterns," a technical document, for details of FLEX patterns.

Pattern Settings dialog box setting operations are identical for PPG modules and ED modules. This section describes PPG module FLEX patterns.

CAUTION:

1. ***Patterns set in the pattern memory consist of patterns generated or receiveed by the D3371. To set edited patterns as patterns to be generated or received by the D3371, click the [Set Pattern Memory] button.***
2. ***The pattern sequence table set in the pattern sequence table memory controls the sequence of patterns generated by the D3371. If an edited pattern sequence table is used to control patterns generated or received by the D3371, click the [Set Seq. Memory] button.***
3. ***Patterns set in the pattern memory are saved on a disk when a pattern-saving operation is performed. To save edited patterns, click the [Set Pattern Memory] button before performing a pattern-saving operation.***
4. ***The pattern sequence table set in the pattern sequence table memory is saved on a disk when a pattern-saving operation is performed. To save an edited pattern sequence table, click the [Set Seq. Memory] button before performing a pattern-saving operation.***
5. ***The pattern-opening operation sets saved patterns to the pattern memory and the pattern sequence table memory together with reading them to the Pattern Settings dialog box.***

FLEX patterns require **[Pattern Settings]** for setting programmable patterns and the **[Pattern Sequence Table]** for setting pattern creation sequences.

Programmable pattern creation procedures

1. Set the PROG Pattern No..
2. Open the Pattern Settings dialog box.
3. To use saved patterns, open the patterns.
4. Set the pattern length to create new patterns or alter pattern lengths.
5. Set input formats.
6. Input patterns.
   To edit patterns, jump functions and fill-pattern functions can be used.
7. Set the patterns to the pattern memory.
8. To save created patterns, perform a pattern-saving operation.
9. Close the Pattern Settings dialog box.
   Pattern sequence table generation procedures
10. Open the Pattern Sequence Table dialog box.
11. To use a saved pattern sequence table, open the saved pattern sequence table.
12. To create a new pattern sequence table, set the default if necessary.

13. To add patterns to the pattern sequence table, select patterns to be added.
14. To remove patterns in the pattern sequence table, select patterns to be removed and then perform the removal.
15. To alter patterns in the pattern sequence table, select patterns to be altered.
16. Set the pattern sequence table to the pattern sequence table memory.
17. To save settings of created FLEX patterns (programmable patterns and the pattern sequence table), save the settings of FLEX patterns.
18. Close the Pattern Sequence Table dialog box.

2.3.7.1 Opening the Pattern Settings Dialog Box

This section explains how to open the Pattern Settings dialog box for FLEX patterns.

1. Set the PROG Pattern No..
   Select FLEX as the Pattern Type.
   The Pattern Settings button is displayed.

NOTE: ***To make settings for FLEX patterns in ED modules, select the FLEX pattern setting window for ED modules.***

---

2. Click the **[Pattern Settings]** button.
   The Pattern Settings dialog box is displayed.

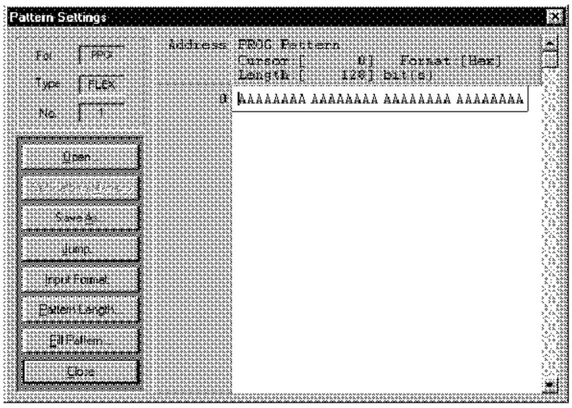


Figure 2-50 Pattern Settings Dialog Box (for FLEX patterns)

2.3.7.2 Pattern Settings Dialog Box Elements

This section describes the elements of the Pattern Settings dialog box.

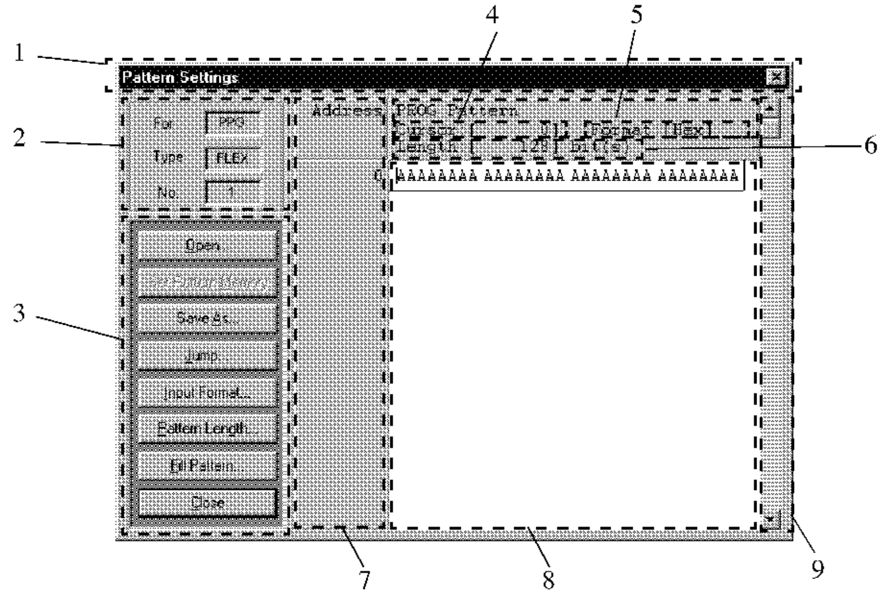


Figure 2-51 Elements Dialog Box Window (for FLEX patterns)

1.	Title bar	Displays the title of the dialog box.
2.	Pattern attribute	Displays the pattern type, module type and Pattern No.
3.	Operation buttons	Select the edit functions and others.
4.	Cursor position	Displays the current cursor position.
5.	Input format	Displays the pattern input format.
6.	Pattern length	Displays the pattern length.
7.	Address display area	Displays the address indicating the position of the pattern being edited. The heading address of each line is displayed.
8.	Pattern edit area	Used to edit the pattern. Displays the pattern data being edited.
9.	Scroll bar	Used to scroll through data not currently displayed (when the amount of data exceeds the display area).

2.3.7.3 Opening Patterns

This section explains how to open PROG patterns used in FLEX patterns. Patterns obtained by opening a PROG pattern file can be used as patterns used in FLEX patterns. However, use caution because the pattern length setting range of PROG patterns used in FLEX patterns is shorter than that of the opened patterns. Refer to 2.7.1, "Settings/data Files" for details of files of the D3371.

Opening a pattern

1. Click the **[Open]** button.

   A confirmation dialog box displays the following message: "The contents of Pattern Memory may be lost. Do you wish to continue?"

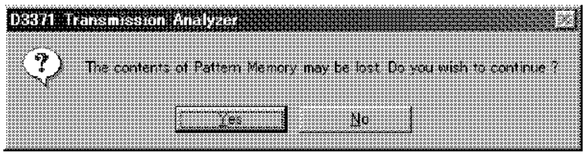


Figure 2-52 Confirmation Dialog Box

CAUTION:	***If a pattern-opening operation is performed, patterns are set to the pattern memory as well as read to the Pattern Settings dialog box.***

2. Click the **[Yes]** button to continue. Click the **[No]** button to stop.

   The Open dialog box is displayed.

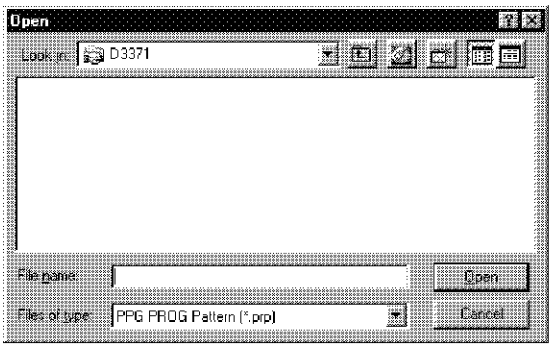


Figure 2-53 Open Dialog Box

3. Select the drive and directory path of the pattern file from the **[Look in]** drop-down list box or list.

4. If pattern files are available, they are displayed in a list.

   Select a file from the list. The panel keys and keyboard can also be used to input the file name in the **[File name]** text box.

   When a file name has been selected from the list, it is displayed in the **[File name]** text box.

5. Click the **[Open]** button to open the pattern file (clicking the **[Cancel]** button cancels this operation).

   PROG patterns are read, and set to the D3371 as PROG patterns used in FLEX patterns.

2.3.7.4 Pattern Length Setting

This section explains how to set a pattern length.

Setting a pattern length

1. Click the **[Pattern Length]** button.

   The Pattern Length dialog box is displayed.

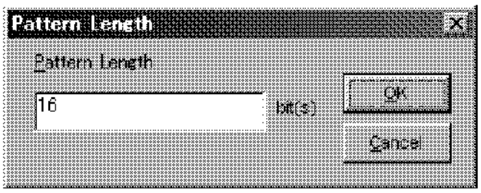


Figure 2-54 Pattern Length Dialog Box (for FLEX patterns)

NOTE: ***If pattern contents have been changed but not saved in pattern memory, a confirmation dialog box containing the following message is displayed: "The Pattern may be lost. Do you wish to save the changes in Pattern Memory?" Click the [Yes] button to save the changed contents. Click the [No] button to continue without saving the changes. Click the [Cancel] button to cancel the operation.***

2. Click the **[Pattern Length]** text box.

   The Virtual Keyboard is displayed.

3. Input a pattern length through the Virtual Keyboard.

Pattern length [bit(s)]	Setting resolution [bit(s)]
128 to 65,536	64

CAUTION:

1. ***If the new pattern length is larger than the previous pattern length, the contents of the pattern memory will fill the extra space.***
2. ***If the new pattern length is smaller than the previous pattern length, the new pattern will be truncated.***

4. Click the **[OK]** or **[Cancel]** button.

   The Pattern Length dialog box is closed.

2.3.7.5 Input Format Settings

This section explains how to set a pattern input format.

NOTE: ***If the input format is changed during editing, the pattern data in the pattern edit area is displayed in the updated input format.***

Selecting a pattern input format

1. Click the **[Input Format]** button.
   The Input Format dialog box is displayed.

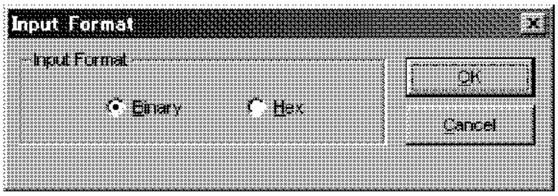


Figure 2-55 Input Format Dialog Box

2. Select an input format by clicking the **[Input Format]** option button.
   [Binary]: The pattern is input in binary.
   [Hex]: The pattern is input in hexadecimal.
3. Click the **[OK]** or **[Cancel]** button.
   The Input Format dialog box is closed.

2.3.7.6 Pattern Input

This section explains how to input a pattern.

Inputting a pattern

1. Click the pattern edit area.
   The cursor is displayed at that location.
2. Move the cursor to the required location and input the pattern.
   - Use the cursor keys to move the cursor.
   - The cursor location can be specified directly using the jump function (refer to Section 2.3.5.7, "Jump," for more information).
   - If pattern data is not displayed in the pattern edit area, click the [▲] or [▼] button on the scroll bar to scroll through the data.
3. Input new data using the panel keys.
   The new data overwrites the old data, and the cursor moves to the next address.
   - If the input format is binary:
     Use keys **0** and **1**.
   - If the input format is hexadecimal:
     Use keys **0** to **9** and **A** to **F**.
   - Pressing **BS** will overwrite the character to the left of the cursor with a 0, and move the cursor to the left one space.

NOTE: ***Inputting a pattern does not change the pattern length. Refer to Section 2.3.7.4, "Pattern Length Setting," for more information on creating a pattern or changing the pattern length.***

2.3.7.7 Jump

This section describes the cursor jump function. The jump function enables you to move the cursor to a specified address.

Setting a jump address

1. Click the **[Jump]** button.

   The Jump dialog box is displayed.

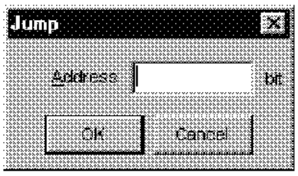
   

   Figure 2-56 Jump Dialog Box (for FLEX patterns)

2. Click the **[Address]** text box.

   The Virtual Keyboard is displayed.

3. Input a jump address through the Virtual Keyboard.
   - Address range: 0 to pattern length - 1 bit

4. Click the **[OK]** or **[Cancel]** button.

   The Jump dialog box is closed.

   The cursor moves to the specified address. Pattern data at that location is displayed in the pattern edit area.

2.3.7.8 Fill Pattern

This section describes the fill pattern function. The fill pattern function enables you to input the same repetition pattern.

Setting the start address

1. Move the cursor in the pattern edit area to the required address and insert the data. The jump function (refer to Section 2.3.5.7, "Jump,") can be used to set the address.

Setting a fill pattern

2. Click the **[Fill Pattern]** button.

   The Fill Pattern dialog box is displayed.

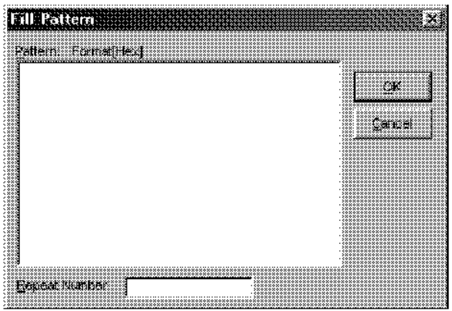


Figure 2-57 Fill Pattern Dialog Box

3. Click the **[Pattern]** text box.
4. Input the required pattern want to use using the panel keys.
   - If the input format is binary:
     Use keys **0** and **1**.
   - If the input format is hexadecimal:
     Use keys **0** to **9** and **A** to **F**.
   - Press **BS** will delete the character to the left of the cursor.
   - Press **DEL (SHIFT-BS)** will delete the character to the right of the cursor.
5. Click the **[Repeat Number]** text box.

   The Virtual Keyboard is displayed.
6. Input the repetition number through the Virtual Keyboard.
7. Click the **[OK]** or **[Cancel]** button.

   The Fill Pattern dialog box is closed.

   Beginning from the cursor position in the pattern edit area, the pattern data specified in the **[Pattern]** text box is entered the number of times specified in the **[Repeat Number]** text box.

2.3.7.9 Saving Patterns to Pattern Memory

This section explains how to save the patterns created from the Pattern Settings dialog box to the pattern memory of the D3371.

CAUTION:

1. ***When the pattern contents have been changed, save the new pattern contents to the pattern memory. If the changes are not saved, the pattern cannot be used. The [Set Pattern Memory] button can be selected when the pattern contents have been changed.***
2. ***Patterns set in the pattern memory consist of patterns generated or received by the D3371. To set edited patterns as patterns to be generated or received by the D3371, click the [Set Pattern Memory] button.***

Saving a pattern to pattern memory

1. Click the **[Set Pattern Memory]** button.
   Edited patterns are set to the pattern memory.

2.3.7.10 Saving Patterns

This section explains how to save patterns.

NOTE: ***Patterns are saved in the pattern memory of the D3371.***
If the [Save As] button is disabled and cannot be clicked, click the [Set Pattern Memory] button to save the changed pattern to the pattern memory.

Saving a pattern

1. Click the **[Save As]** button.
   The Save As dialog box is displayed.

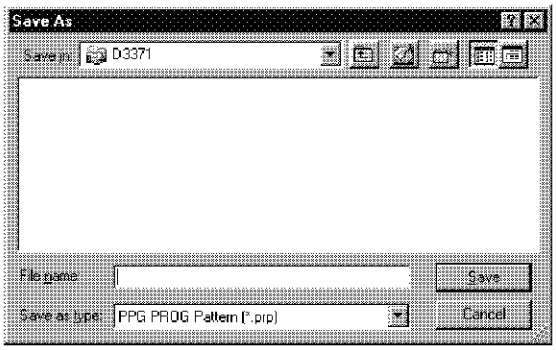


Figure 2-58 Save As Dialog Box

CAUTION: ***Patterns are saved in the pattern memory of the D3371. If the [Save As] button is disabled and cannot be clicked, click the [Set Pattern Memory] button to save the changed pattern to the pattern memory.***

2. Select the drive and directory path for the file from the **[Save in]** drop-down list box or list.

CAUTION: ***Do not save patterns to C drive. C drive is reserved for system files. Select D drive, or insert a formatted floppy disk to save patterns to a floppy. For more information, refer to Section 2.7.3 "Formatting Floppy Disks."***

3. Input a file name in the **[File name]** text box. The numeric keypad on the front panel (**0** to **9** and **A** to **F**) can be used to input the file name. Any alphanumeric characters can be input if a keyboard is connected to the D3371.

4. Click the **[Save]** button to save the pattern (clicking the **[Cancel]** button cancels this operation).

   The FLEX pattern is saved.

2.3.7.11 Exiting the Dialog Box

This section explains how to exit the Pattern Settings dialog box.

Closing the dialog box

1. Click the **[Close]** button.

   The Pattern Settings dialog box is closed.

NOTE: ***If the pattern contents have been changed but not saved to the pattern memory, a confirmation dialog box containing the following message is displayed: "Do you wish to save the changes in Pattern Memory?" Click the [Yes] button to saved the changed contents. Click the [No] button to not update pattern memory. Click the [Cancel] button to cancel the operation.***

2.3.7.12 Opening the Pattern Sequence Table Dialog Box

This section explains how to open the Pattern Sequence Table dialog box.

Opening the Pattern Sequence Table dialog box

1. Click the **[Pattern Sequence Table]** button on the FLEX PATTERN SETTINGS window.

   The Pattern Sequence Table dialog box is displayed.

NOTE: To make settings for FLEX patterns in ED modules, select the FLEX pattern setting window for ED modules.

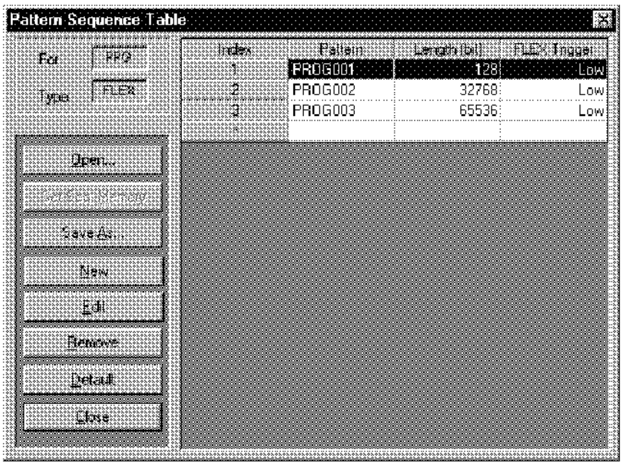


Figure 2-59 Pattern Sequence Table Dialog Box

2.3.7.13 Pattern Sequence Table Dialog Box Elements

This section describes the elements of the Pattern Sequence Table Dialog Box.

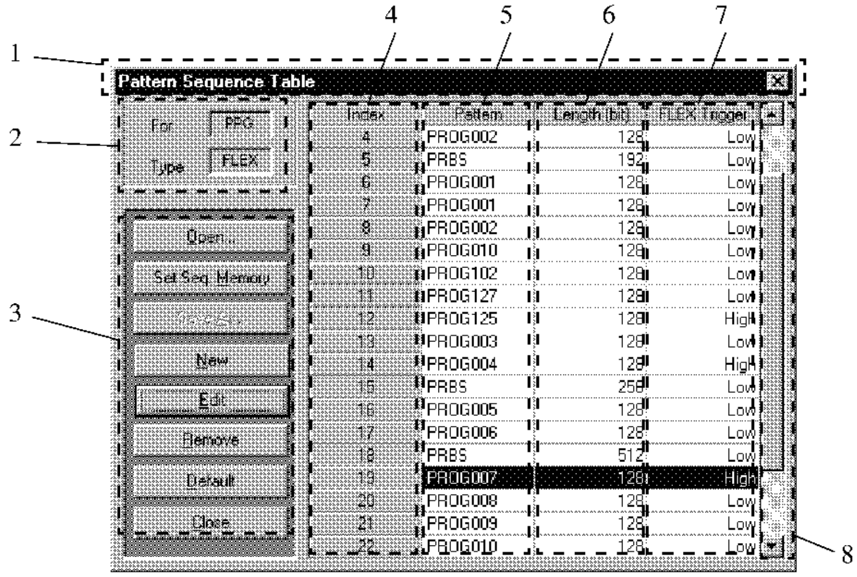


Figure 2-60 Elements Dialog Box Window

1.	Title bar	Displays the title of the dialog box.
2.	Pattern attribute	Displays the pattern type and module type.
3.	Operation buttons	Selects the edit and other functions.
4.	Index-indicating area	The order number of a pattern is indicated.
5.	Pattern-indicating area	A set pattern is indicated.
6.	Pattern length-indicating area	A pattern length is indicated.
7.	FLEX Trigger-indicating area	A FLEX Trigger level at pattern generation or reception is indicated.
8.	Scroll bar	Used to scroll through data not currently displayed (when the amount of data exceeds the display area).

2.3.7.14 Opening the Pattern Sequence Table

This section explains how to open the pattern sequence table saved. To open the pattern sequence table, open the FLEX pattern setting file. The FLEX pattern setting file contains the pattern sequence table, PROG patterns used in FLEX patterns, and data on pattern lengths and mark ratios of PRBS patterns.

Opening the pattern sequence table

1. Click the **[Open]** button.

   A confirmation dialog box displays the following message: "The contents of Sequence Table Memory may be lost. Do you wish to continue?"

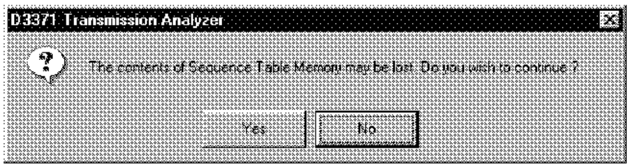


Figure 2-61 Confirmation Dialog Box

CAUTION: ***If the pattern sequence table is opened, the data in the pattern sequence table memory is changed. At that time, the PROG pattern used in the FLEX pattern is also opened, the data in the pattern memory is changed.***

---

2. Click the **[Yes]** button to continue. Click the **[No]** button to stop.

   The Open dialog box is displayed.

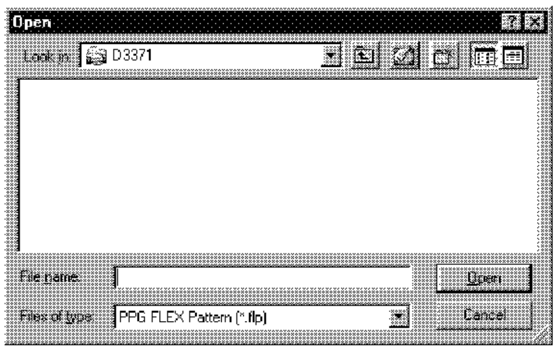


Figure 2-62 Open Dialog Box (for FLEX patterns)

3. Select the drive and directory path of the pattern file from the **[Look in]** drop-down list box or list.

4. If pattern files are available, they are displayed in a list.

   Select a file from the list. The panel keys and keyboard can also be used to input the file name in the **[File name]** text box.

   When a file name has been selected from the list, it is displayed in the **[File name]** text box.

5. Click the **[Open]** button to open the pattern file (clicking the **[Cancel]** button cancels this operation).

   The pattern sequence table is opened, and the conditions are set in the D3371.

2.3.7.15 Patterns Addition

This section explains how to add patterns to the pattern sequence table.

How to add patterns

NOTE: ***No PRBS pattern is set as the first pattern in the pattern sequence table.***

1. Click a row where an addition is made to specify where a pattern is to be added.
2. Click the **[New]** button.

   The Pattern dialog box is displayed.

NOTE: ***The maximum number of patterns in the pattern sequence table is 1024. If the table contains 1024 patterns, no pattern can be added.***

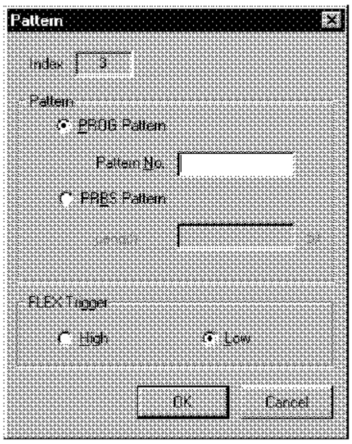


Figure 2-63 Pattern Dialog Box Window

3. Click the **[Pattern]** option button to select a pattern.

   [PROG Pattern]:
   Set to PROG pattern

   [PRBS Pattern]:
   Set to PRBS pattern

If PROG pattern is selected:

4. Click the **[Pattern No.]** text box.

   The Virtual Keyboard is displayed.

5. Enter a pattern number through the Virtual Keyboard.
   - Pattern number setting range: 1 to 127

NOTE: ***All PROG patterns are provided in advance and initially set to the 128-bit pattern length, AAAA AAAA AAAA AAAA AAAA AAAA AAAA AAAA.***

If PRBS pattern is selected:

6. Click the **[Length]** text box.

   The Virtual Keyboard is displayed.

   Generate a pattern or enter a receive length using the Virtual Keyboard.

Pattern length [bits]	Setting resolution [bits]
128 to 2,097,152	64

CAUTION: ***The length to be set here is not 2^n-1 that is used for a PRBS pattern cycle length.***

7. Click the **[FLEX Trigger]** option button.

   Set the FLEX Trigger level for the pattern generation, or pattern reception.

   [High]: The high level is set.

   [Low]: The low level is set.

8. Click the **[OK]** or **[Cancel]** button.

   The Pattern dialog box closes, and the pattern is inserted into a specified position in the pattern sequence table.

2.3.7.16 Pattern Edition

This section explains how to edit patterns in the pattern sequence table.

NOTE: ***No PRBS pattern is set as the first pattern in the pattern sequence table.***

How to edit patterns

1. Click a row of the pattern sequence table where the edition of a pattern is to be made.

2. Click the **[Edit]** button.

   The Pattern dialog box is displayed.

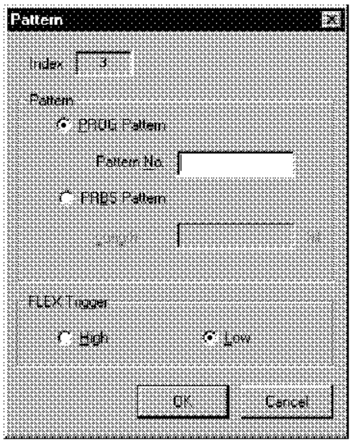


Figure 2-64 Pattern Dialog Box Window

3. Click the **[Pattern]** option button to select a pattern.

   [PROG Pattern]:
   Set to PROG pattern

   [PRBS Pattern]:
   Set to PRBS pattern

If PROG pattern is selected:

4. Click the **[Pattern No.]** text box.

   The Virtual Keyboard is displayed.

5. Input a pattern number through the Virtual Keyboard.
   - Pattern number setting range: 1 to 127

NOTE: All PROG patterns are provided in advance and initially set to the 128-bit pattern length, AAAA AAAA AAAA AAAA AAAA AAAA AAAA AAAA.

If PRBS pattern is selected:

6. Click the **[Length]** text box.

   The Virtual Keyboard is displayed.

   Enter a pattern length for the pattern generation or pattern reception.

Pattern length [bits]	Setting resolution [bits]
128 to 2,097,152	64

CAUTION: ***The length to be set here is not 2^n-1 which is used for a PRBS pattern cycle length.***

7. Click the **[FLEX Trigger]** option button.

   Set the FLEX Trigger level for the pattern generation or pattern reception.

   [High]: The high level is set.

   [Low]: The low level is set.

8. Click the **[OK]** or **[Cancel]** button.

   The pattern dialog box closes, and the pattern is inserted into a specified position in the pattern sequence table.

2.3.7.17 Pattern Removal

This section explains how to remove patterns from the pattern sequence table.

How to remove patterns

1. Click a row in the pattern sequence table that contains data to be removed.
2. Click the **[Remove]** button.

   The pattern is removed. If there is a pattern following the removed pattern, the pattern is moved forward by one pattern position.

NOTE:

1. ***If there is only one pattern in the pattern sequence table, the pattern cannot be removed.***
2. ***If index-2 patterns are PRBS patterns, index-1 patterns cannot be removed.***

2.3.7.18 Initializing the Pattern Sequence Table

This section explains how to initialize the pattern sequence table.

Initialization of the pattern sequence table

1. Click the **[Default]** button.

   The pattern sequence table is initialized.

   The default of the pattern sequence table is set to the pattern number: 1, PROG001 pattern, and the FLEX Trigger: Low.

2.3.7.19 Setting the Pattern Sequence Table

This section explains how to set pattern sequence tables created with the Pattern Sequence Table dialog box to the pattern sequence table memory D3371.

CAUTION: ***If the pattern sequence table is edited, be sure to set the contents to the pattern sequence table memory. Unless the setting is made, the modifications are not reflected in the patterns generated or received by this D3371. If the pattern sequence table is edited, the [Set Seq. Memory] button is enabled.***

Settings for the pattern sequence table memory

1. Click the **[Set Seq. Memory]** button.
   The edited pattern sequence table is set to the pattern sequence table memory.

2.3.7.20 Saving the Pattern Sequence Table

This section explains how to save the created or edited pattern sequence table.

Saving a pattern sequence table

1. Click the **[Save As]** button.
   The Save As dialog box is displayed.

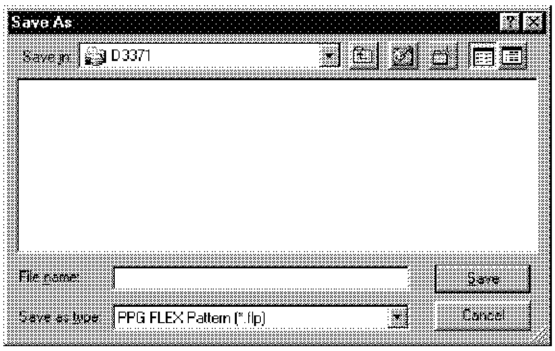


Figure 2-65 Save As Dialog Box (for FLEX patterns)

CAUTION: ***If the [Save As] button is disabled and cannot be clicked, click the [Set Seq. Memory] button to save the created pattern to the pattern memory.***

2. Select the drive and directory path for the file from the **[Save in]** drop-down list box or list.

CAUTION: ***Do not save patterns to C drive. C drive is reserved for system files. Select D drive, or insert a formatted floppy disk to save patterns to a floppy. For more information, refer to Section 2.7.3 "Formatting Floppy Disks."***

3. Input a file name in the **[File name]** text box. The numeric keypad on the front panel (**0** to **9** and **A** to **F**) can be used to input the file name. Any alphanumeric characters can be input if a keyboard is connected to the D3371.
4. Click the **[Save]** button to save the pattern (clicking the **[Cancel]** button cancels this operation).

   The Pattern Sequence Table is saved.

CAUTION: ***Files saved here are FLEX pattern setting files. If the pattern sequence table is saved, PROG patterns used in FLEX patterns and data of PRBS patterns are saved simultaneously.***

2.3.7.21 Exiting the Dialog Box

This section explains how to exit the Pattern Sequence Table dialog box.

Closing the dialog box

1. Click the **[Close]** button.

   The Pattern Settings dialog box is closed.

NOTE: ***If the pattern contents have been changed but not saved to the Pattern Sequence Table memory, a confirmation dialog box containing the following message is displayed: "Do you wish to save the changes in Pattern Sequence Table memory?" Click the [Yes] button to saved the changed contents. Click the [No] button not to update Pattern Sequence Table memory. Click the [Cancel] button to cancel the operation.***

2.3.8 Measurements in Specific Fields

This section explains how to set specific fields. Refer to 5.6, "Measurement in Specific Fields," a technical document, for details on measurement in specific fields. For measurement in specific fields, bit error rates in specific pattern fields are measured. Measurement items depend on the pattern types set to ED modules.

NOTE:

1. ***Measurement in specific fields is performed only for patterns meeting the following conditions.***
   Patterns: PROG, ZSUB, STM, FLEX
   Pattern lengths: 256 bits or longer and an integral multiple of 32 bits
2. ***To perform measurement in specific fields, the error detection mode must be set to [Specific/Other/Total]. Refer to 2.4.1, "Setting Up Measurement Conditions" for how to set [Specific/Other/Total].***

Selection of the measurement condition setting window

1. Click the **[Settings]** button on the standard tool bar.
   The Setting window is displayed.
2. Click **[ED]** on the module selection list bar.
   The ED module is selected.
3. Click the **[Condition]** tab.
   The measurement condition setting window is displayed.

Setting of an error detection mode

4. Click the **[Detection Mode]** option button, and then make a selection.
   Select **[Specific/Other/Total]**.

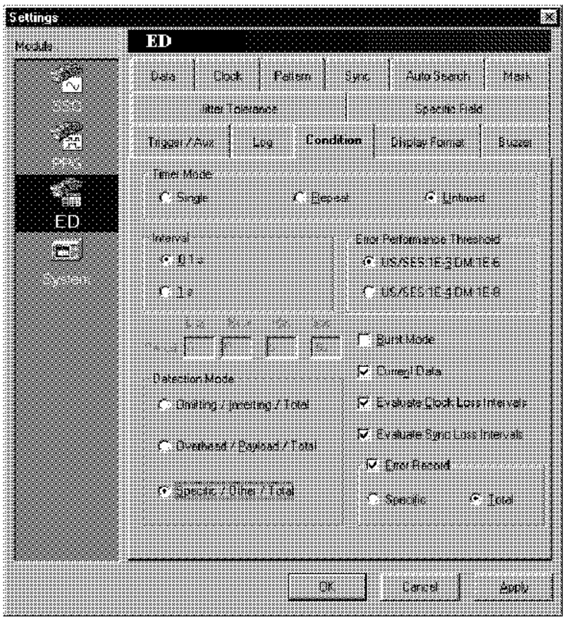


Figure 2-66 Error Detection Mode Setting Window

Selection of the specific field setting window

5. Click the **[Specific Field]** tab.

   The specific field setting window is displayed.

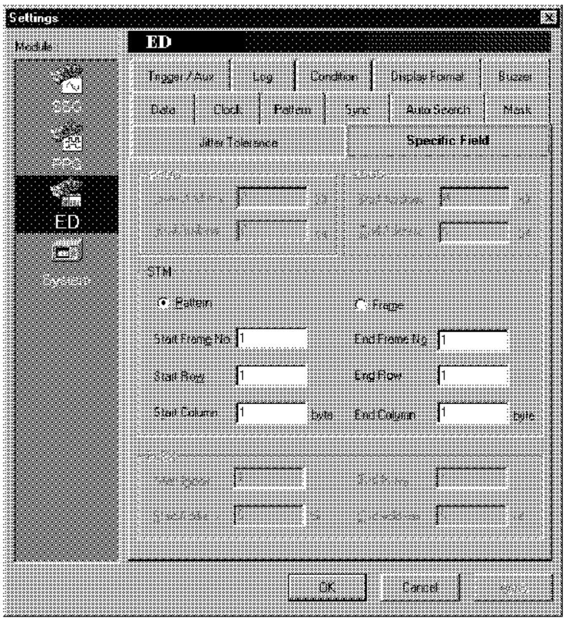


Figure 2-67 Specific field Setting Window

For PROG patterns or ZSUB patterns:

6. Click the **[Start Address]**, and **[End Address]** text box. Then, enter addresses through the Virtual Keyboard.

   [Start Address]:
   The start address of a specific field is set.
   - Range: 0 to pattern-length - 1 bit
   - Setting resolution: 1 bit

   [End Address]:
   The end address of a specific field is set.
   - Range: 0 to pattern-length - 1 bit
   - Setting resolution: 1 bit

For STM patterns:

7. Click the **[Pattern]** option button or the **[Frame]** option button.

   [Pattern]: A specific field is set for the entire STM pattern. Click the text box. Then, enter a frame number, column and row through the Virtual Keyboard.

   [Start Frame No.]:
   The start frame of a specific field is set.
   - Range: 1 to the number of frames
   - Setting resolution: 1

   [End Frame No.]:
   The end frame of a specific field is set.
   - Range: 1 to the number of frames
   - Setting resolution: 1

   [Start Row]:
   The start row of a specific field is set.
   - Range: 1 to 9
   - Setting resolution: 1

   [End Row]:
   The end row of a specific field is set.
   - Range: 1 to 9
   - Setting resolution: 1

   [Start Column]:
   The start column of a specific field is set.
   - Setting range for STM-4: 1 to 1080 bytes
   - Setting range for STM-16: 1 to 4320 bytes
   - Setting resolution: 1 byte

   [End Column]:
   The end column of a specific field is set.
   - Setting range for STM-4: 1 to 1080 bytes
   - Setting range for STM-16: 1 to 4320 bytes
   - Setting resolution: 1 byte

   [Frame]: A specific field is set for each frame. Click the text box. Then, enter a column and row through the Virtual Keyboard.

[Start Row]:
The start row of a specific field is set.
- Range: 1 to 9
- Setting resolution: 1

[End Row]:
The end row of a specific field is set.
- Range: 1 to 9
- Setting resolution: 1

[Start Column]:
The start column of a specific field is set.
- Setting range for STM-4: 1 to 1080 bytes
- Setting range for STM-16: 1 to 4320 bytes
- Setting resolution: 1 byte

[End Column]:
The end column of a specific field is set.
- Setting range for STM-4: 1 to 1080 bytes
- Setting range for STM-16: 1 to 4320 bytes
- Setting resolution: 1 byte

For STM patterns:

8. Click the following text box. Then, enter an index and address through the Virtual Keyboard.

[Start Index]: The start index of a specific field is set.
- Setting range: 1 to the number of the set last index
- Setting resolution: 1

[End Index]: The end index of a specific field is set.
- Setting range: 1 to the number of the set last index
- Setting resolution: 1

[Start Address]:
The start address of the pattern specified with **[Start Index]** is set.
- Range: 0 to pattern-length - 1 bit
- Setting resolution: 1 bit

[End Address]:
The start address of the pattern specified with **[End Index]** is set.
- Range: 0 to pattern-length - 1 bit
- Setting resolution: 1 bit

Confirming the entered settings

9. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

Clicking the **[OK]** button closes the Settings window.

2.3.9 Buzzer

This section explains how to set up the alarm buzzer.

The buzzer function causes a buzzer to sound when a bit error or alarm (sync loss or clock loss) occurs.

NOTE: ***The buzzer function can be set to ON or OFF by clicking the [Buzzer] button on the standard tool bar, or by selecting [Measurement]-[Buzzer] from the menu bar. If the button is selected, the buzzer function is turned on and the occurrence of a bit error or alarm (sync loss or clock loss) triggers the buzzer.***

Displaying the Buzzer tab

1. Click the **[Settings]** button on the standard tool bar.
   The Settings dialog box is displayed.
2. Click **[ED]** on the module selection list bar.
   The ED module is selected.
3. Click the **[Buzzer]** tab.
   The Buzzer tab for the ED module is displayed.

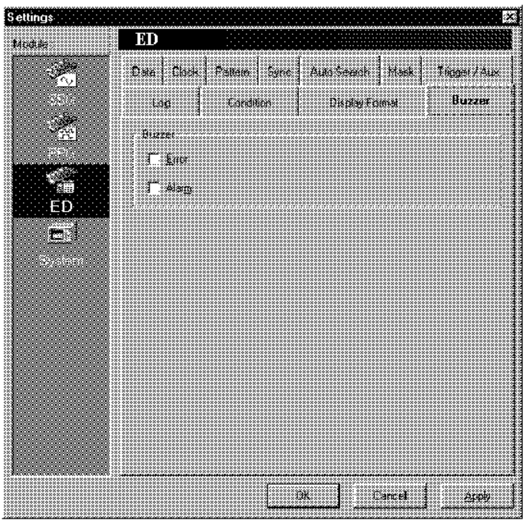


Figure 2-68 Buzzer Sounding Function Setup Settings Tab

Setting up a buzzer to sound at the occurrence of a bit error

4. Click the **[Error]** check box to select it.
   The buzzer will sound for bit errors when a check mark is displayed in the check box.

Setting up a buzzer to sound at the occurrence of an alarm (sync loss or clock loss)

5. Click the **[Alarm]** check box to select it.

   The buzzer will sound for alarms when a check mark is displayed in the check box.

Confirming the entered settings

6. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.10 Auto Search

This section explains how to set the Auto Search function. The Auto Search function automatically adjusts the delay amount and polarity of clock input, and the threshold voltage of data input, which are used for the ED module, to the optimum measurement values.

The Auto Search function can also be used to automatically set the mark ratio and the pattern length for the PRBS pattern, and the pattern logic for the PROG and ZSUB patterns.

CAUTION: ***If STM patterns or FLEX patterns include a PRBS pattern, perform an auto-search function after setting the pattern length and mark ratio of the PRBS pattern.***

NOTE: ***Conditions for performing the auto-search function.***

- ***Pattern types of ED module patterns and receiving patterns are identical.***
- ***For PROG patterns, ZSUB patterns, STM patterns or FLEX patterns, contents of patterns are identical.***
- ***Input data to ED modules satisfy the following conditions.***

Termination voltage	*Low level*	*High level*	*Amplitude range*
to GND(0V)	*-2.04V or higher*	*+2.04V or lower*	*$0.30V_{P-P}$ to $2.00V_{P-P}$*
ECL(-2V)	*-1.85V or higher*	*-0.75V or lower*	*$0.30V_{P-P}$ to $1.00V_{P-P}$*
PECL(+3V)	*+3.15V or higher*	*+4.25V or lower*	*$0.30V_{P-P}$ to $1.00V_{P-P}$*
LVPECL(+1.3V)	*+1.45V or higher*	*+2.55V or lower*	*$0.30V_{P-P}$ to $1.00V_{P-P}$*
CML	*Vcc*-1.10V or higher*	*Vcc*+0.10V or lower*	*$0.30V_{P-P}$ to $1.00V_{P-P}$*

**: Vcc indicates the CML termination voltage.*

2.3.10.1 Search Condition Settings

This section explains how to set auto-search conditions.

Displaying the Auto Search settings

1. Click the **[Settings]** button on the standard tool bar.

   The Settings window is displayed.

2. Click **[ED]** on the module selection list bar.

   The ED module is selected.

3. Click the **[Auto Search]** tab.

   The Auto Search tab of the ED module is displayed.

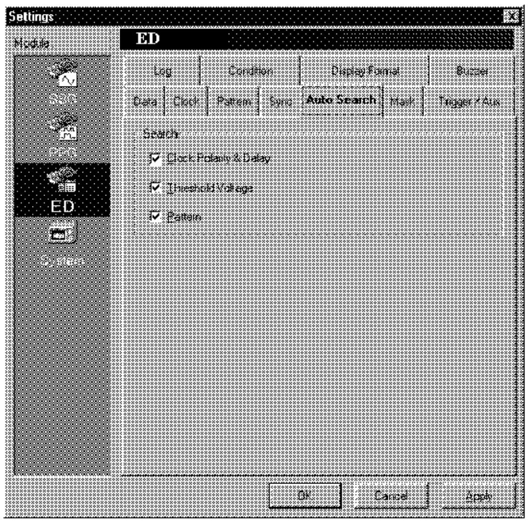


Figure 2-69 Auto Search Settings Tab

Setting Auto Search conditions

1. Click the **[Clock Polarity & Delay]** check box.

   To automatically set the delay amount and clock polarity for clock input, the check box must be selected.

2. Click the **[Threshold Voltage]** check box.

   To automatically set the threshold voltage for data input, the check box must be selected.

3. Click the **[Pattern]** check box.

   To automatically set a pattern, the check box must be selected.

   - The mark ratio and pattern length are automatically specified for the PRBS pattern.
   - The pattern polarity is automatically specified for the PROG and ZSUB patterns.

CAUTION: ***If STM patterns or FLEX patterns include a PRBS pattern, set the PRBS pattern manually in advance. Refer to 2.3.4.4, "STM Patterns Settings" for details.***

Confirming the settings

4. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.10.2 Performing Auto Search

1. Before performing Auto Search, confirm that the Auto Search performing conditions are satisfied.
2. To perform Auto Search, select **[Measurement]-[Auto Search...]** from the menu bar or click the **[A-Search]** button on the standard tool bar.

   The Auto Search dialog box displays the performing status.

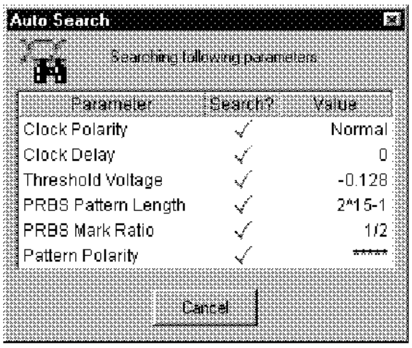


Figure 2-70 Auto Search Dialog Box

Stopping Auto Search

1. Click the **[Cancel]** button.

   Auto search is interrupted.

NOTE: ***If Auto Search is interrupted or the optimum value cannot be found, the following values are returned to the status before Auto Search was performed: delay amount, input polarity, threshold voltage, mark ratio and pattern length for the PRBS pattern; and pattern polarity for the PROG and ZSUB patterns.***

2.3.11 Error Addition

This section explains how to set the error addition function. The error addition function is used to add a bit error to the output pattern of the PPG module. Select the single mode, repeat mode, or external mode for the error addition function.

Displaying the error addition settings

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click **[PPG]** on the module selection list bar.
   The PPG module is selected.
3. Click the **[Error Addition]** tab.
   The Error Addition tab for the PPG module is displayed.

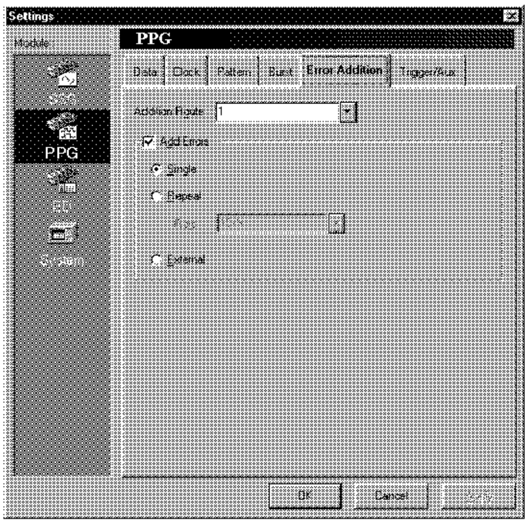
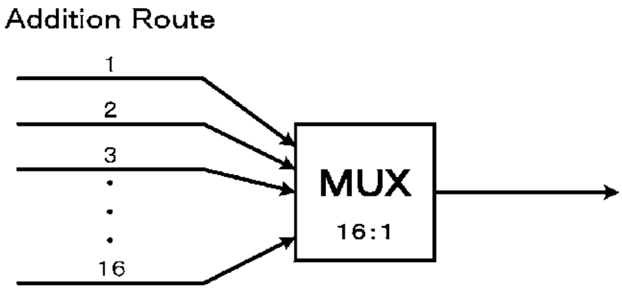


Figure 2-71 Error Addition Settings Tab

Setting the error addition route

1. Click the **[Addition Route]** drop-down list box.
   A list of the items that can be selected is displayed.
2. Select an error addition route from the list of items.
   - Range: 1 to 16



Error addition to ON or OFF

3. Click the **[Add Errors]** check box to turn error addition on or off.

   To turn error addition on, the check box must be selected.

Selecting an error addition mode

4. Select the error addition mode by clicking the **[Add Errors]** option button.

   [Single]: Single mode is selected.

   > ***NOTE:*** ***A 1-bit error is added in single mode if [Measurement]-[Single Error Addition] from the menu bar is selected or the [Error] button on the standard tool bar is clicked after the setting is saved using the Error Addition tab.***

   [Repeat]: Repeat mode is selected. An error having the interval specified in **[Rate]** is added.

   • Range of **[Rate]**: 1E-2, 1E-3, 1E-4, 1E-5, 1E-6, 1E-7, 1E-8, and 1E-9

   [External]: External mode is selected. Input a control signal from the external terminal to the ERROR INPUT connector on the rear panel of the PPG module. A 1-bit error is added for each falling edge of the control signal pulse.

   • Input pulse cycle: 128 times the clock cycle or greater

   • Input pulse width: 64 times the clock cycle or greater

   • Input level: 0 V or -1 V

   • Input impedance: 50 Ω (nominal value) to 0 V

Confirming the settings

5. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.12 Trigger and Auxiliary Outputs

This section explains how to set trigger output and auxiliary output. Trigger output and auxiliary output are used for monitoring waveform using oscilloscopes or other purposes. Trigger outputs and auxiliary outputs are provided in PPG modules and ED modules of the D3371.

Trigger output from a PPG module is output through the TRIGGER OUTPUT connector on the front panel of the PPG module. Trigger output from an ED module is output through the TRIGGER OUTPUT connector on the front panel of the ED module. The output level at the TRIGGER OUTPUT connector is 0/-1 V, and the output impedance is 50 Ω to 0 V.

2.3.12.1 PPG Module Trigger and Auxiliary Outputs

This section explains how to set trigger/auxiliary outputs from PPG modules.

NOTE: ***There is no setting for data types output from the rear AUX OUTPUT connector of a PPG module. As a data type, the High level is output when PRBS patterns are generated, while the Low level is output when PROG patterns are generated.***

Selection of the trigger/auxiliary output setting window

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click the module selection list bar **[PPG]**.
   The PPG module is selected.
3. Click the **[Trigger/Aux]** tab.
   The trigger output setting window for the PPG module is displayed.

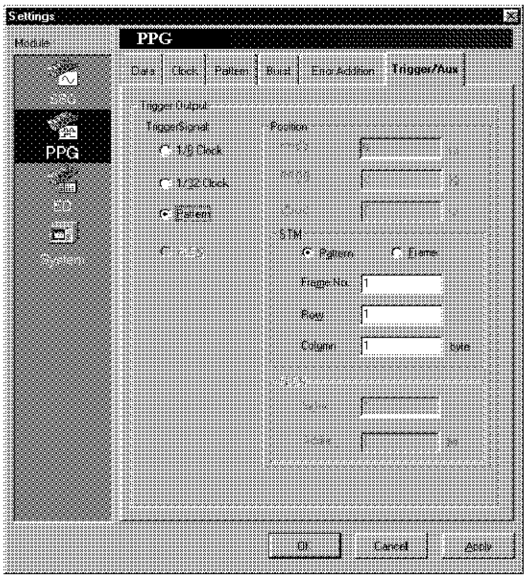


Figure 2-72 Trigger/auxiliary Output Setting Window (for PPG modules)

Setting of trigger outputs

4. Click the one of **[Trigger Signal]** option buttons below.

[1/8 Clock]: 1/8 of clock frequency is output.

[1/32 Clock]: 1/32 of clock frequency is output.

[Pattern]: Trigger signal synchronized with patterns is output. A trigger position data is set in **[Position]**. Refer to "Setting of trigger positions" for details.

[FLEX]: Selection is enabled if FLEX patterns are set. A level set in FLEX Trigger in the pattern sequence table is output.

Setting of trigger positions

5. If the **[Pattern]** option button is selected in trigger output selection, a trigger position must be set. Items to be set vary automatically depending on patterns selected at that time.

[PRBS]: Trigger positions of PRBS patterns are specified. In a PRBS pattern with a mark ratio of 1/2, a value relative to the standard phase (0 phase), which is set to the position of "1" succeeded by the longest consecutive "0" series (whose length is the number of PRBS steps -1 bit), is set.

- Setting range: 0 to the length of the pattern -1 bit
- Setting resolution: 1 bit

[PROG]: Trigger positions of PROG patterns are specified. A value relative to the 0 phase, which is set to the first address in editing patterns, is set.

- Setting range: 0 bit to the length of a pattern -1 bit

- Setting resolution: 16 bits

[ZSUB]: Trigger positions of ZSUB patterns are specified. A value relative to the 0 phase, which is set to the first "0" succeeded by the longest consecutive "0" series, is set.

- Setting range: 0 bit to the length of a pattern -1 bit
- Setting resolution: 16 bits

[STM]: Trigger positions of STM patterns are specified. Select the [Pattern] option button or the **[Frame]** option button.

[Pattern]: Trigger is output once for the entire pattern.

[Frame No.]:
A frame number is set.

- Setting range: 1 to the number of the frames
- Setting resolution: 1

[Row]: A row is set.

- Setting range: 1 to 9
- Setting resolution: 1

[Column]:
A column is set.

- Setting range for STM-4: 1 byte to 1079 bytes
- Setting range for STM-16: 1 byte to 4319 bytes
- Setting resolution: 2 bytes

[Frame]: Trigger is output for every frame.

[Row]: A row is set.

- Setting range: 1 to 9
- Setting resolution: 1

[Column]:
A column is set.

- Setting range for STM-4: 1 byte to 1079 bytes
- Setting range for STM-16: 1 byte to 4319 bytes
- Setting resolution: 2 bytes

[FLEX]: Trigger positions of FLEX patterns are set.

[Index]: A pattern in the pattern sequence table is specified with an index.

- Setting range: 1 to the number of the set last index
- Setting resolution: 1

[Address]: An address in a pattern specified with an index is set.

- Setting range: 0 to the length of the pattern -1 bit
- Setting resolution: 16 bits.

Confirming settings

6. Click the **[OK]** button or the **[Apply]** button in the Settings window.

   Updated settings are set. If the **[OK]** button is clicked, the Settings window window closes.

2.3.12.2 ED Module Trigger and Auxiliary Outputs

This section explains how to set trigger/auxiliary outputs of ED modules.

Selection of the trigger/auxiliary output setting window

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click the module selection list bar **[ED]**
   The ED module is selected.
3. Click the **[Trigger/Aux]** tab.
   The trigger output setting window for the ED module is displayed.

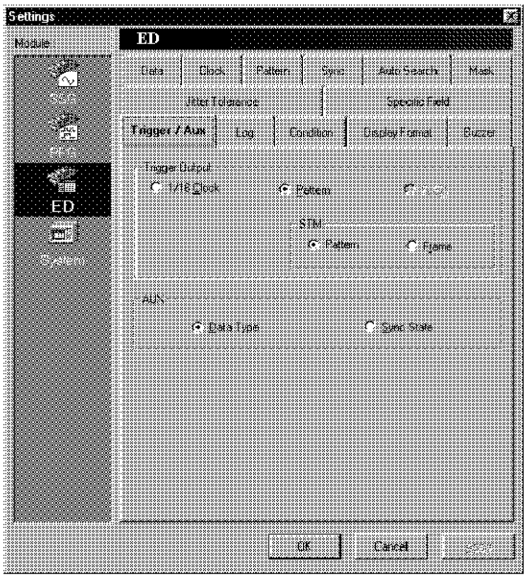


Figure 2-73 Selection of the Trigger/auxiliary Output Setting Window (for ED module)

Setting of trigger outputs

4. Click the one of **[Trigger Output]** option buttons below.

[1/16 Clock]: 1/16 of clock frequency is output.

[Pattern]: Trigger signal synchronized with patterns is output. The trigger position is fixed to the head of each pattern. However, for STM patterns, the **[Pattern]** option button or **[Frame]** option button can be set.

- **[Pattern]**: Trigger is output at the head of the entire pattern.
- **[Frame]**: Trigger is output at the head of each frame.

[FLEX]: Selection is enabled if FLEX patterns are set. The level set in FLEX Trigger in the pattern sequence table is output.

Setting of auxiliary outputs

5. Make a selection by clicking the **[AUX]** option button.

[Data Type]: A data type of a pattern is output. The High level is output when PRBS patterns are generated, while the Low level is output when PROG patterns are generated.

[Sync State]: A synchronization status is output. The High level is output when synchronization has been lost, while the Low level is output when synchronization has been established.

Confirming settings

6. Click the **[OK]** button or the **[Apply]** button in the Settings window.

   Updated settings are set. If the **[OK]** button is clicked, the Settings window window closes.

2.3.13 Burst Mode

This section explains how to set the burst mode function. The burst mode function inhibits control of the data pattern output of the PPG module to generate a burst pattern.

For the signal source to control burst pattern generation, select either the internal signal source or the external burst trigger signal.

Refer to Section 5.8, "Burst," for more information on how to use the external burst trigger signal.

NOTE:

For bit error measurements of burst patterns, apply the following settings.

1. ***Input the burst trigger signal used to control a measurement to the BURST INPUT connector on the ED module front panel. (The burst trigger signal is such a signal as the PPG module BURST OUTPUT and is output in sync with burst pattern generation.)***
2. ***Select the ED module [Condition]-[Burst Mode] check box.***
3. ***When the burst mode is used, the bit error measurement items are limited to:***
   Frequency
   Bit Count
   Error Rate
   Error Count
   Immediate Error Rate
   Immediate Error Count

Displaying the burst mode settings

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click **[PPG]** on the module selection list bar.
   The PPG module is selected.
3. Click the **[Burst]** tab.
   The Burst tab is displayed.

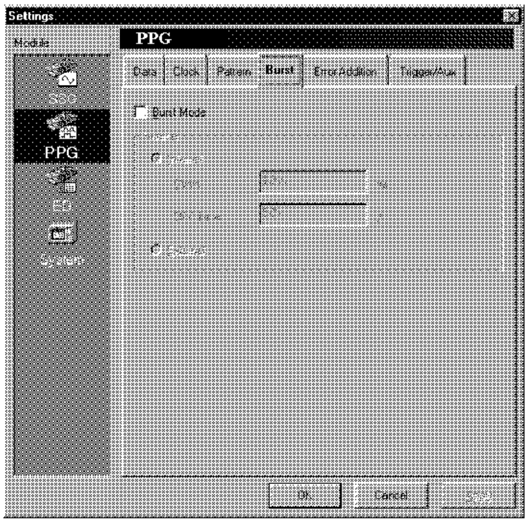


Figure 2-74 Burst Mode Setting Window

Setting burst mode to ON or OFF

4. Click the **[Burst Mode]** check box to turn the burst mode on or off.

   To turn the burst mode on, the check box must be selected.

   While the burst mode is turned on, BURST OUTPUT on the front panel of the PPG module is also valid. The output level of BURST OUTPUT is 0 V for High (if output is permitted) and -1 V for Low (if output is inhibited) (50 Ω to 0 V).

Selecting a burst signal source

5. Select a burst signal source by clicking the **[Source]** option button.

   [Internal]: The internal signal source is used.

   [Cycle]: The burst cycle of the internal signal source is selected.

   - Range: 2 μs to 50000 μs
   - Setting resolution: 1 μs

   [OFF Time]: The OFF time in the burst cycle of the internal signal source is selected.

   - Range: 1 μs to 49999 μs
   - Setting resolution: 1 μs

   NOTE: ***Make sure that the relationship between the burst cycle and the OFF time can satisfy the condition [Cycle] > [OFF Time].***

[External]: The external input signal from the BURST INPUT connector on the rear panel of the PPG module is used as the burst trigger signal. The input level of BURST INPUT is 0 V for High (if output is permitted) and -1 V for Low (if output is inhibited).

- Input level: 0 V or -1 V
- Input impedance: 50 Ω (nominal value) to 0 V

NOTE: ***Make sure that the relationship between the input pulse width and output inhibit time can satisfy the condition input-pulse-width > output-inhibit-time.***

Confirming the settings

6. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.14 Mask Route Settings

This section explains how to set up mask routes.

A mask route is used to specify input data that is excluded from measurement in routes 1 thru 16. This function can be used to localize errors in specific routes if a device under test or a unit under test has parallel circuits (such as MUX and DEMUX) related to the specific routes. Refer to Section 5.9, "Mask Routes," for more information.

NOTE: ***Routes specified for masking are excluded from all measurement types including bit error measurement and error output measurement.***

Displaying the measurement route mask setup tab

1. Click the **[Settings]** button on the standard tool bar.

   The Settings dialog box is displayed.

2. Click **[ED]** on the module selection list bar.

   The ED module is selected.

3. Click the **[Mask]** tab.

   The measurement route mask setup tab for the ED module is displayed.

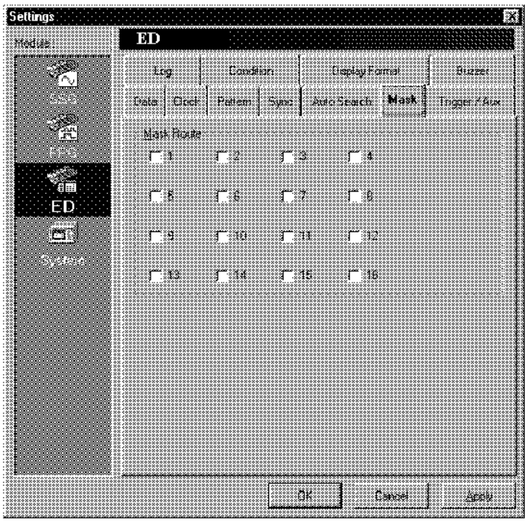


Figure 2-75 Measurement Route Mask Setup Settings Tab

Setting up measurement route masks

4. Select the required route masks by clicking the corresponding check boxes, from **[1]** to **[16]**.

   When a check mark (✓) is displayed in the check box, measurements are masked for that route.
   Measurement mask routes can be selected independently, and more than one can be selected.

Confirming the entered settings

5. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.3.15 Pattern Synchronization Settings

To measure bit errors, patterns input to ED modules must be synchronized with reference patterns in the ED modules.

This section explains how to provide settings for pattern synchronization for patterns of ED modules. Refer to 5.10, "Synchronization," a technical document, for details of synchronization.

The following settings are used for pattern synchronization.

- Automatic pattern synchronization functions: Automatic pattern re-synchronization functions
- Synchronization pattern lengths: Setting of synchronization pattern lengths
- Synchronization pattern positions: Setting of synchronization pattern positions
- Synchronization thresholds: Setting of establishment/synchronization loss thresholds.

A synchronization status is displayed in real time in **[SYN]** of the monitor tool bar. The synchronization-established status is indicated with blue, the synchronization-lost status with red, and the status is indicated with black if a synchronization status cannot be detected because of clock loss or other failures.

Displaying the pattern synchronization setup tab

1. Click the **[Settings]** button on the standard tool bar.
   The Settings dialog box is displayed.
2. Click **[ED]** on the module selection list bar.
   The ED module is selected.
3. Click the **[Sync]** tab.
   The pattern synchronization condition setting window for ED module is displayed.

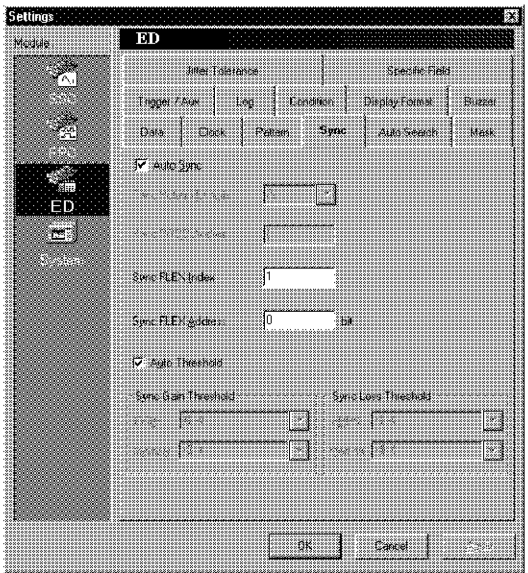


Figure 2-76 Pattern Synchronization Setup Settings Tab

Turning the automatic pattern synchronization function on or off

4. Click the **[Auto Sync]** check box to select the setting state.

   To turn the automatic pattern synchronization function on, click the check box (✓) to select it. If the automatic pattern synchronization function is turned on, synchronization is lost (sync loss) if the error rate increases, enabling detection of the phase in which the input pattern match the reception pattern functioning as a reference for measurement. If such a match occurs, synchronization is established (sync). If the function is turned off, synchronization is not automatically lost if the error rate increases, and synchronization therefore remains established until re-synchronization is attempted.

NOTE: ***Select [Measurement]-[ReSync] from the menu bar or click the [ReSync] button on the standard tool bar to attempt pattern re-synchronization.***

Specifying a synchronization pattern length used to establish PROG pattern synchronization

5. Click the **[Sync Pattern Length]** drop-down list box. A list of selectable items is displayed.

NOTE:

For synchronizatio pattern lengths of patterns other than PROG, the following value is automatically set.

- ***ZSUB pattern, STM pattern, FLEX pattern: 32 bits (fixed)***

---

6. Select a synchronization pattern length by clicking the corresponding selection on the list.
   - Selection range: 8, 16, 24, and 32 bits

Setting of synchronization pattern positions in PROG patterns

7. Click the **[Sync PROG Address]** text box.

   The Virtual Keyboard is displayed.

8. Enter the address of a sync pattern position through the Virtual Keyboard.
   - Selection range: 0 to pattern-length - 1
   - Setting resolution:
     1 bit

Setting of synchronization pattern positions in FLEX patterns

9. Click the following text boxes and enter index/address data through the Virtual Keyboard.
   - **[Sync FLEX Index]**: An index for synchronization pattern positions is set.
     - Setting range: 1 to the last index number*1
     - Setting resolution: 1

- **[Sync FLEX Address]**: An address of the synchronization pattern position specified with **[Sync FLEX Index]** is set.
    - Setting range: 0 to the pattern length -1 bit *2
    - Setting resolution: 1 bit

*1 Indices for PRBS patterns cannot be set.

*2 If a PRBS pattern is set next to a pattern set with **[Sync FLEX Index]**, the setting range of **[Sync FLEX Address]** becomes as follows.
- Setting range: 0 to the pattern length -32 bits.

NOTE: ***In STM patterns, the synchronization pattern is fixed to (32-bit) A1/A2/A1/A2 in the first frame.***

Setting of synchronization thresholds

10. Make a selection by clicking the **[Auto Threshold]** check box.

    Set the check mark (✓) to enable the automatic setting of synchronization thresholds.

    If the automatic setting of synchronization thresholds is enabled, the synchronization-establishing threshold and synchronization loss-checking threshold are automatically set. Refer to 5.10, "Synchronization" for details of synchronization thresholds in the automatic setting.

    If the automatic setting of synchronization thresholds is disabled, manual setting is enabled within the setting ranges specified in the following table. A synchronization-establishing threshold is set in **[Sync Gain Threshold]**, while a synchronization loss-checking threshold is set in **[Sync Loss Threshold]**.

CAUTION: ***The relationship between the threshold for the in-sync state and the threshold for the out-of-sync state must satisfy the condition below: [Sync Gain Threshold] ≤ [Sync Loss Threshold]***

Pattern	Synchronization threshold setting range
PRBS patterns PRBS areas in an STM pattern PRBS areas in a FLEX pattern	1E-2, 1E-3, 1E-4, 1E-5, 1E-6, 1E-7
PROG patterns, ZSUB patterns PROG areas in an STM pattern PROG areas in a FLEX pattern	1E-2, 1E-3, 1E-4, 1E-5, 1E-6, 1E-7, 1E-8, 1E-9, 1E-10

Confirming the entered settings

11. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

    Clicking the **[OK]** button closes the Settings window.

2.4 Bit Error Measurement

This section explains how to measure the bit errors of data entered through the DATA INPUT connector located on the ED module front panel of the D3371 transmission analyzer.

The bit error parameters measured by the analyzer are listed below. These parameters are measured simultaneously by the analyzer. For more information about the item, refer to Appendix A.4, "Explanation of Terms," and 5 "TECHNICAL TERMS AND INFORMATION".

NOTE: ***Current measurement results are cleared and re-measured when automatically triggered by changing or processing the settings listed in Section 4.7, "Re-measurement Conditions."***

- Frequency
- Bit Count *1
- Error Rate *1
- Error Count *1
- Immediate Error Rate *1
- Immediate Error Count *1
- Error Intervals *1
- Error Free Intervals *1
- Threshold EI *2
- Threshold EFI *2
- Error Performance *3
- Clock Loss Intervals
- Sync Loss Intervals
- B1 error (B1) *4

*1: The parameters above display results corresponding to the mode selected from three error Detection Modes listed below. Each Detection Mode contains three parameters and are measured simultaneously. The "Overhead, Payload, Total" error detection mode requires pattern options. Refer to 2.4.1, "Setting Up Measurement Conditions" for how to set an error detection mode.

- Omission errors (Omitting), Insertion errors (Inserting) and Total errors (Total)
- Errors in Overhead areas (Overhead), errors in Payload areas (Payload) and total errors (Total)
- Errors in specific fields (Specific), errors non-specific fields(Other), and total errors (Total)

*2: The seven types of thresholds listed in the table below are measured and displayed.

	Threshold						
Average error rate per second	> 10^{-3}	> 10^{-4}	> 10^{-5}	> 10^{-6}	> 10^{-7}	> 10^{-8}	≤ 10^{-8} *

*: When the error rate is 0, it is calculated as a threshold EFI.

*3: Corresponds to the following measurement parameters:
Error Seconds, Error Free Seconds, Severely Errored Seconds, Unavailable Seconds, and Degraded Minutes

*4: If pattern options are installed, B1 error measurement of STM frames is supported.

Bit error measurement procedure

1. Specify the conditions for the bit error measurement.
2. Set up the buzzer to sound when a bit error or alarm (sync loss or clock loss) occurs.
3. Set up the display format of the measurement data.
4. Set up the log function to log the measurement data.
5. Set up a mask route to mask the measurement route.
6. Set up the pattern synchronization function.
7. Establish synchronization. Perform Auto Search.
   (Refer to Section 2.3.10, "Auto Search.")
8. Start the measurement.
9. Set up the displays and functions for parameters under measurement. The transmission analyzer supports two modes: Basic Measurement (the measurement results of all bit error measurement items are displayed at the same time) and Quick Operation (measurements are carried out in the same environment as that used for conventional environment).
10. Terminate the measurement.
11. Print measurement results as required.

2.4.1 Setting Up Measurement Conditions

This section explains how to set up the conditions for bit error measurement.

Displaying the Condition tab

1. Click the **[Settings]** button on the standard tool bar.
   The Settings dialog box is displayed.
2. Click **[ED]** on the module selection list bar.
   The ED module is selected.
3. Click the **[Condition]** tab.
   The Condition tab for the ED module is displayed.

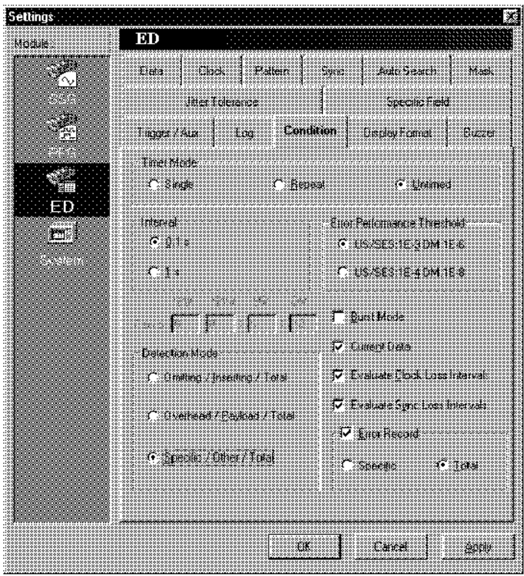


Figure 2-77 Measurement Conditions Setup Settings Tab

Selecting the measurement timer mode

4. Click one of the following **[Timer Mode]** option buttons:

[Single]: Single mode is selected. Measurements are performed once per measurement period specified in **[Period]**.

[Repeat]: Repeat mode is selected. Measurements are repeated continuously during the measurement period specified in **[Period]**. To terminate measurement, select **[Measurement]-[Stop]** from the menu bar or click the **[Stop]** button on the standard tool bar.

[Untimed]: The untimed mode is selected. Measurements are repeated continuously regardless of the specified measurement period. To terminate measurement, select **[Measurement]-[Stop]** from the menu bar or click the **[Stop]** button on the standard tool bar.

Selecting the measurement interval

5. Select one of the following **[Interval]** option buttons.

The measurement interval is the interval displayed between the current result, **[Current Data]** and the recording interval of the log record.

[0.1 s]: Set measurement interval to 0.1 second.

[1 s]: Set measurement interval to 1 second.

Selecting the error performance threshold

6. Click one of the **[Error Performance Threshold]** options listed below to select the error rate threshold for the period included in the calculation of Unavailable Seconds (US), Severely Errored Seconds (SES), or Degraded Minutes (DM).

[US/SES:1E-3 DM:1E-6]:
The US and SES thresholds are set to 1E-3, and the DM threshold is set to 1E-6.

[US/SES:1E-4 DM:1E-8]:
The US and SES thresholds are set to 1E-4, and the DM threshold is set to 1E-8.

Specifying the measurement period

7. Specify the measurement period in the **[Period]** text box.
   The Virtual Keyboard is displayed. Set the day, hour, minutes, and seconds individually. The range is 1 second to 99 days, 23 hours, 59 minutes, and 59 seconds.

   [Day]: Sets the days of the measurement period. Range: 0 to 99 days.

   [Hour]: Sets the hours of the measurement period. Range: 0 to 23 hours.

   [Min]: Sets the minutes of the measurement period. Range: 0 to 59 minutes.

   [Sec]: Sets the seconds of the measurement period. Range: 0 to 59 seconds.

Setting the error detection mode

8. Click one of the following **[Detection Mode]** option button to select

   [Omitting/Inserting/Total]:
   Omission errors (Omitting), Insertion errors (Inserting) and Total errors (Total) are displayed in parallel.

   [Overhead/Payload/Total]:
   Errors in Overhead areas (Overhead), errors in Payload areas (Payload), Total error (Total) are displayed in parallel. This mode is selectable when STM patterns are set.

   [Specific/Other/Total]:
   Errors in specific field (Specific), errors in non-specific fields (Other), and total errors (Total) are displayed in parallel. Refer to 2.3.8, "Measurements in Specific Fields" for how to set measurement areas for measurement in specific fields.

Turning the burst mode on or off

9. Click the **[Burst Mode]** check box to select it.

   When the burst mode is selected, a check mark is displayed in the check box. Refer to Section 2.3.13, "Burst Mode."

Turning the current results display on or off

10. Click the **[Current Data]** check box to select it.

    When the **[Current Data]** display is turned on, a check mark is displayed in the check box.

Specifying whether to include clock loss intervals in measurement

11. Click the **[Evaluate Clock Loss Intervals]** check box to select it. When clock loss intervals are set for error performance measurements, a check mark is displayed in the check box. Refer to Section 5.11, "Clock Loss and Sync Loss."

Specifying whether to include sync loss intervals in measurement

12. Click the **[Evaluate Sync Loss Intervals]** check box to select it. When sync loss intervals are set for error performance measurements, a check mark is displayed in the check box. Refer to Section 5.11, "Clock Loss and Sync Loss."

Setting error recording

13. Make a selection by clicking the **[Error Record]** check box.

    To enable error recording for the error phase analysis option, spot the check mark (✓). (Refer to 2.5, "Error Phase Analysis Measurement" and 5.13, "Error Phase Analysis", a technical document.) If the error detection mode is set to **[Specific/Other/Total]**, it is possible to limit only the errors in the specific field to be recorded. A selection is made by clicking one of the the following option buttons. (In error detection modes other than **[Specific/Other/Total]**, all errors are recorded.)

    [Specific]: Errors in the specific field are recorded.

    [Total]: Errors in the entire field are recorded.

    NOTE: ***Error recording is performed only for patterns meeting the following conditions.***
    Patterns: PROG, ZSUB, STM, FLEX
    Pattern lengths: 256 bits or longer and an integral multiple of 32 bits

Confirmation the setting contents

14. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

    Clicking the **[OK]** button closes the Settings window.

2.4.2 Specifying the Display Format

This section expains how to specify the measurement data display format.

The display format can be changed during and after measurements. (Note that starting a measurement clears the results of the previous measurement.)

Displaying the display format setup tab

1. Click the **[Settings]** button on the standard tool bar.
   The Settings dialog box is displayed.
2. Click **[ED]** on the module selection list bar.
   The ED module is selected.
3. Click the **[Display Format]** tab.
   The ED module Display Format tab is displayed.

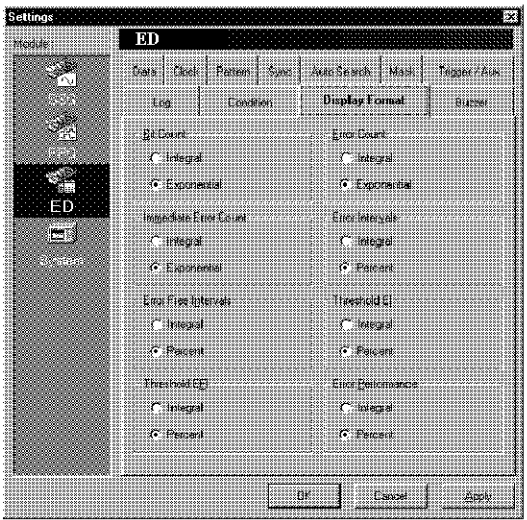


Figure 2-78 Display Format Settings Tab

Specifying the display format

4. Select the bit count display format by clicking one of the **[Bit Count]** option buttons.
   [Integral]: Set the display format to an integral format.
   [Exponential]:Set the display format to an exponential format.
5. Select the error count display format by clicking one of the **[Error Count]** option buttons.
   [Integral]: Set the display format to an integral format.
   [Exponential]:Set the display format to an exponential format.

6. Select an immediate error count display format by clicking one of the **[Immediate Error Count]** option buttons.

   [Integral]: Set the display format to an integral format.

   [Exponential]: Set the display format to an exponential format.

7. Select an error interval display format by clicking one of the **[Error Intervals]** option buttons.

   [Integral]: Set the display format to an integral format.

   [Percent]: Set the display format to a percentage format.

8. Select an error-free interval display format by clicking one of the **[Error Free Intervals]** option buttons.

   [Integral]: Set the display format to an integral format.

   [Percent]: Set the display format to a percentage format.

9. Select a Threshold EI display format by clicking one of the **[Threshold EI]** option buttons.

   [Integral]: Set the display format to an integral format.

   [Percent]: Set the display format to a percentage format.

10. Select a Threshold EFI display format by clicking one of the **[Threshold EFI]** option buttons.

    [Integral]: Set the display format to an integral format.

    [Percent]: Set the display format to a percentage format.

11. Select an Error Performance display format by clicking one of the **[Error Performance]** option buttons.

    [Integral]: Set the display format to an integral format.

    [Percent]: Set the display format to a percentage format.

Confirming the entered specifications

12. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

    Clicking the **[OK]** button closes the Settings window.

2.4.3 Log Function

This section explains how to set up the log function for measurement data.

The log function records the data measured on a specified item (refer to Appendix A.6, "Data Files," for more information).

The log function records measurement data in intervals (0.1 or 1 second) specified by **[Condition]-[Interval]** in the ED module **[Settings]** dialog box. It uses the specified display format (refer to Section 2.4.2, "Specifying the Display Format," for more information). If the display format is changed while data is being logged, the data measured before the change is logged using the previous format, and the data measured after the change is logged using the new format.

The logged data can be saved to a file after the completion of the measurement. Refer to Section 2.7.1, "Settings/data Files," for an explanation of how to save data to a file. To view log files stored in the D3371, use applications such as "WordPad" after the measurement has been completed.

NOTE: ******** is recorded for items not subject to measurement.***
If the measurement value is undefined (no valid data for some reason), ----- is displayed.
If the measurement value overflows, ##### is recorded.

Displaying the Log tab

1. Click the **[Settings]** button on the standard tool bar.
   The Settings dialog box is displayed.
2. Click **[ED]** on the module selection list bar.
   The ED module is selected.
3. Click the **[Log]** tab.
   The ED module log function settings tab is displayed.

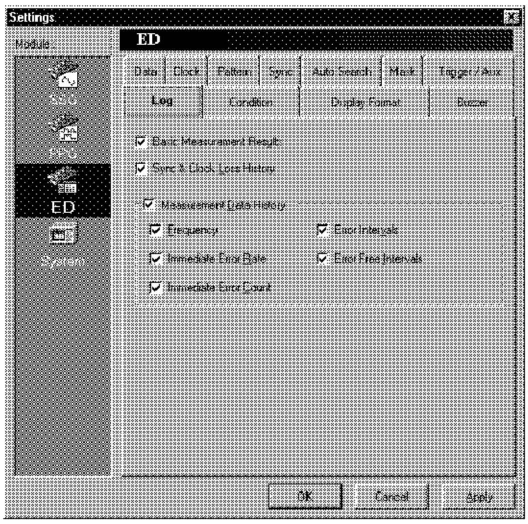


Figure 2-79 Log Function Settings Tab

Turning bit error measurement results Logging on or off

4. Click the **[Basic Measurement Results]** check box to change it's setting. When a check mark (✓) is displayed in the check box, the measurement results for all bit error measurement items are logged. Only the latest measurement results remain in the log area.

Turning the sync loss and clock loss history logging on or off

5. Click the **[Sync & Clock Loss History]** check box to change it's setting. When a check mark (✓) is displayed in the check box, the time the sync loss and clock loss occurred are recorded. Records for up to 1024 data items remain in the log area.

Turning measured-data history logging on or off

6. Click the **[Measurement Data History]** check box to change it's setting. When a check mark (✓) is displayed in the check box, the measurement data history is logged. More than one type of measurement data can be selected for history logging. Only the 25,000 most recent records for the data items of all selected measurement data types remain in the log area.

   [Frequency]: Logs the frequency values when selected.

   [Immediate Error Rate]:
   Logs the immediate error rate values when selected.

   [Immediate Error Count]:
   Logs the immediate error count values when selected.

   [Error Intervals]:
   Logs the error interval values when selected.

   [Error Free Intervals]:
   Logs the error free interval values when selected.

Confirming the setting contents

7. Click the **[OK]** or **[Apply]** button in the Settings window to save the new settings.

   Clicking the **[OK]** button closes the Settings window.

2.4.4 Starting Bit Error Measurements

This section explains how to start bit error measurement.

Starting bit error measurement also starts error recording. Error recording is set in the error phase analysis option and begins with recording error counts, error rates and error performances. However, jitter tolerance measurement set in the jitter tolerance option does not. Refer to 2.6, "Jitter Tolerance Measurement" for details of jitter tolerance measurement.

NOTE:

1. ***Synchronization must be established before measurement can start. To establish synchronization, perform Auto Search (refer to Section 2.3.10, "Auto Search.").***
2. ***Bit error measurement is not performed during the jitter tolerance measurement. Complete the jitter tolerance measurement before starting the error measurement.***

Starting measurement

1. From the function bar (Functions), select Basic Measurement, Quick Operation or Error Phase Analysis button and click.
2. Click the **[Start]** button in the basic tool bar.

   Bit error measurements starts.

   Measurements can also be started using panel keys. Press **START(SHIFT-B)**key (however, measurements cannot be started if a Settings window or another dialog box is open).

2.4.5 Terminating Bit Error Measurements

This section explains how to terminate bit error measurement.
If the current measurement timer mode is set to single mode, the measurement is automatically terminated when the measurement time exceeds the value previously set. If the repeat or untime mode is set, the measurement is terminated manually.

NOTE: ***IF the amount of recorded error data in the error phase analysis option reaches the maximum recording capacity, error recording is automatically terminated.***

Terminating measurements

1. Click the **[Stop]** button in the basic tool bar.

   Bit error measurement stops.

   Measurements can also be stopped using the panel keys. Press **STOP (SHIFT-E)** (however, this cannot be done if the Settings window or another dialog box is open).

2.4.6 Bit Error Measurement Windows

This section describes window configurations and elements used during bit error measurement.

The analysers's bit error measurement screens include Basic Measurement, in which measurement data for major bit error measurement items is displayed in parallel, Quick Operation, where measurement is performed in environments similar to previous products, and Error Phase Analysis, an error phase analysis option.

NOTE: ***Switching the display screens between Basic Measurement, Quick Operation and Error Phase Analysis is done through the function bar. Switching is possible anytime during the bit error measurement. During jitter tolerance measurement, no screens can be displayed. Please make the display after the jitter tolerance measurement has been completed.***

2.4.6.1 Basic Measurement

This section describes the Basic measurement window and elements.

NOTE: ******** is displayed for items that are not subject to measurement.***
If the measurement value is undefined (no valid data for some reason), ----- is displayed.
If the measurement value overflows, ###### is displayed.

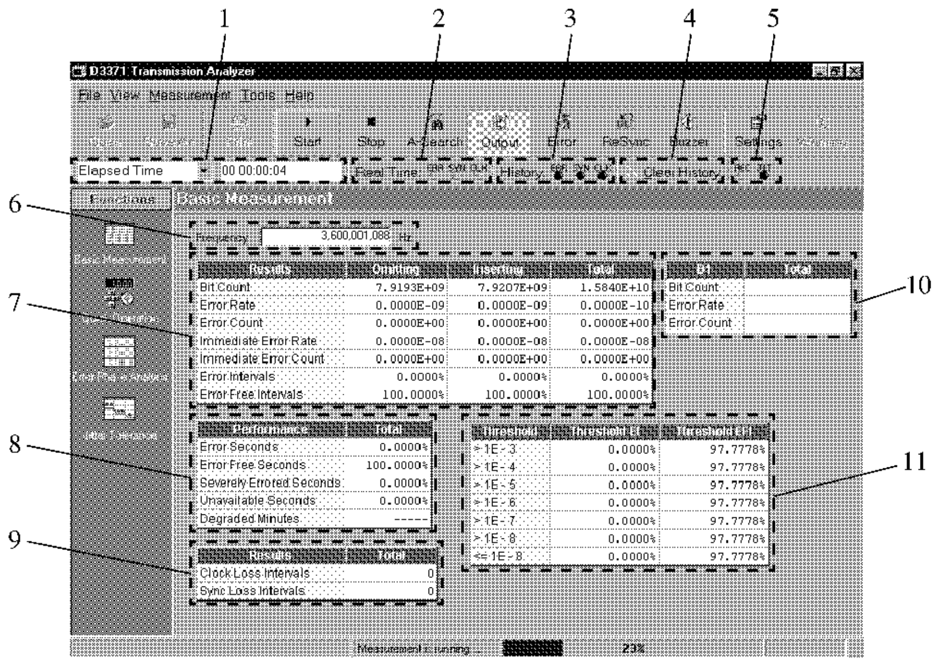


Figure 2-80 Basic Measurement Window

Monitor tool bar

1. Time display

Select the time display from the drop-down list box. The time is displayed in the text box at the right of the drop-down list box.

[Elapsed Time]:	Displays the elapsed measurement time.
[Timed]:	Displays the remaining measurement time.
[Start Time]:	Displays the measurement start time.
[Real Time]:	Displays the current date and time.

2. Real time statuses

Current time statuses are indicated with colors in real time.

NOTE: ***When error information changes rapidly, not all the information can be displayed.***

[ERR]	Bit error detected:	Red
	Bit error not generated:	Light blue
	Bit error cannot be detected (When synchronization loss or clock loss is detected.):	Black
[SYN]	Synchronization loss detected:	Red
	Synchronized:	Light blue
	Synchronization status cannot be detected (When clock loss is detected.):	Black
[CLK]	Clock loss detected:	Red
	Clock entered normally:	Light blue

3. History information

History information (displayed in black) is cleared at the beginning of each measurement. The detected information is stored until another measurement begins or it is cleared using the **[Clear History]** button.

[ERR]	Bit error detected:	Red
[SYN]	Synchronization loss detected:	Red
[CLK]	Clock loss detected:	Red

4. **[Clear History]** button

This button is used to clear the stored history information.

5. Measurement statuses

The error recording status in the error phase analysis option and the jitter modulation status in the jitter tolerance option are indicated with colors.

[REC]	An error recording operation is being performed:	Blue
	An error recording operation cannot be performed: (Synchronization loss or clock loss is detected)	Red
	Error recording has been completed or disabled:	Black
[JIT]	Jitter modulation is enabled:	Blue
	Jitter modulation is disabled:	Black

Basic Measurement area

6. Frequency measurement — The measured frequency of an input clock is displayed.

7. Bit error measurement — Bit Count *1

   Error Rate *1

   Error Count *1

   Immediate Error Rate *1

   Immediate Error Count *1

   Error Intervals *1

   Error Free Intervals *1

   *1 These measurement items display results dependant on a detection mode selected from the following three detection modes. Three Selected mode dependent measurement items are measured simultaneously. The "Overhead, Payload, Total" error detection mode requires pattern options.
   Refer to 2.4.1, "Setting Up Measurement Conditions" for how to set an error detection mode.

   - Omitting errors (Omitting), Insertion errors (Inserting) and Total errors (Total)
   - Errors in Overhead areas (Overhead), errors in Payload areas (payload) and total errors (Total)
   - Errors in specific fields (Specific), errors in non-specific fields (Other), and total errors (Total)

8. Error performance measurement — Error Seconds

   Error Free Seconds

   Severely Errored Seconds

   Unavailable Seconds

   Degraded Minutes

9. Loss measurement — Clock Loss Intervals

   Sync Loss Intervals

10. B1 error measurement — Displayed when pattern option is mounted.

   When measuring STM patterns, the B1 byte error measurement results are displayed. For more information, refer to 5.4.2, "B1 Error Measurement."

11. Threshold measurement — Threshold EI *2

   Threshold EFI *2

   *2: The seven types of thresholds listed in the table below are measured and displayed.

	Threshold						
Average error rate per second	> 10^{-3}	> 10^{-4}	> 10^{-5}	> 10^{-6}	> 10^{-7}	> 10^{-8}	≤ 10^{-8} *

*: When the error rate is 0, it is calculated as a threshold EFI.

2.4.6.2 Error Phase Analysis

The "measurement for error phase analysis" results are displayed in the Error Phase Analysis window.

Click **[Error Phase Analysis]** on the function bar. The Error Phase Analysis window is displayed.

Refer to 2.5, "Error Phase Analysis Measurement" for details of Error Phase Analysis.

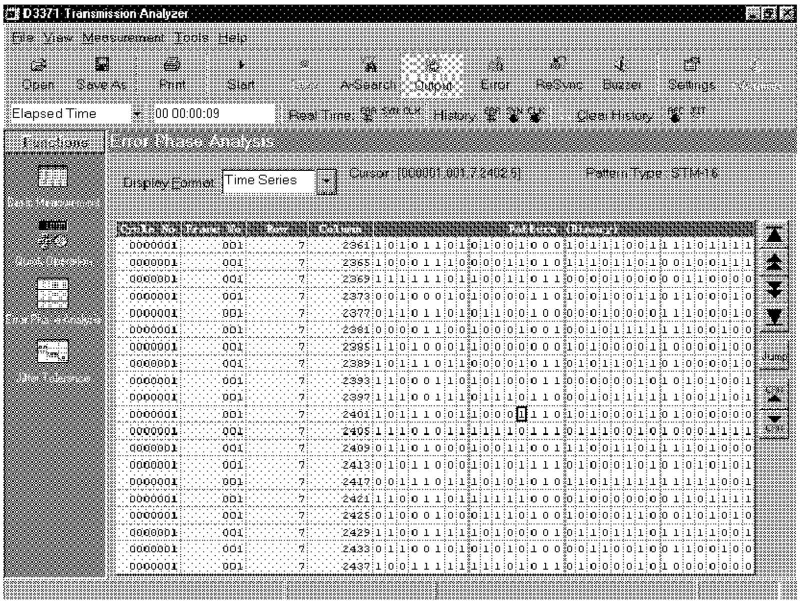


Figure 2-81 Error Phase Analysis Window

2.4.6.3 Quick Operation

This section describes the Quick Operation window configuration and it's elements.

Measurement condition changes made to the Quick Operation window are applied to the analyzer in real time.

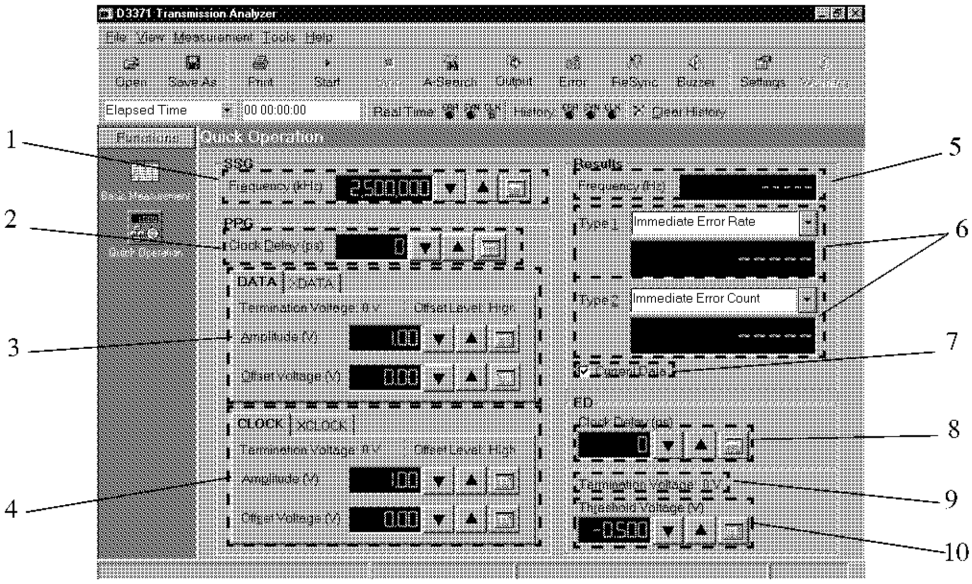


Figure 2-82 Quick Operation Window

SSG module area	This area is used to specify the SSG module.
1. Frequency Setting area	A frequency can be set in **[Frequency]**. If the transmission analyzer is connected to the PPG module, the setting frequency functions as the pattern generation frequency.
PPG module area	This area is used to set up the PPG module.
2. Clock delay amount	The clock delay can be set in **[Clock Delay]**.
3. **[DATA]** and **[XDATA]** tabs	These tabs are used to select the items to be set in DATA OUTPUT and $\overline{\text{DATA}}$ OUTPUT.

- The current settings of termination voltage and offset reference voltage are displayed.
- The output amplitude can be set in **[Amplitude]**.
- The offset voltage can be set in **[Offset Voltage]**.

4. **[CLOCK]** and **[XCLOCK]** tabs	These tabs are used to select the items to be set in CLOCK OUTPUT and $\overline{\text{CLOCK}}$ OUTPUT.

- The current settings of termination voltage and offset reference voltage are displayed.

- The output amplitude can be set in **[Amplitude]**.
- The offset voltage can be set in **[Offset Voltage]**.

Measurement results display area — Up to two bit error measurement items can be selected. Measurement results are displayed in the **[Type1]** and **[Type2]** display fields.

> ***NOTE:*** ******** is displayed for items that are not subject to measurement.***
> ***If the measurement value is undefined (no valid data for some reason), ----- is displayed.***
> ***If the measurement value overflows, ##### is displayed.***

5. Frequency — The measured frequency of an input clock is displayed.
6. **[Type1]** and **[Type2]** drop-down list boxes
   - **[Error Rate]**: Select an error rate value.
   - **[Error Count]**: Select an error count value.
   - **[Immediate Error Rate]**: Select an immediate error rate value.
   - **[Immediate Error Count]**: Select an immediate error count value.
7. Turning the current results display on or off
   Click the **[Current Data]** check box to select the setting status. In order to turn the current results display on, click the check box (✓) to select it.

ED module area — This area is used to set up the ED module.

8. Clock delay amount — The clock delay can be specified in **[Clock Delay]**.
9. Termination voltage — The current settings of termination voltage for DATA INPUT is displayed.
10. Threshold voltage — The threshold voltage of DATA INPUT can be set in **[Threshold Voltage]**.

2.5 Error Phase Analysis Measurement

This section explains how to make settings for "Error phase analysis Measurement (error phase analysis option)". Refer to 5.13, "Error Phase Analysis" for details or error phase analysis.

In error phase analysis measurement, recording starts as soon as the bit error measurement starts. Up to 128-k error bit position data points can be recorded.

Analyzing the error bit position data after a measurement completion makes error bit-generating situation/ factor identification easier. By setting the error detection mode to [Specific/Other/Total], the errors recorded can be limited to those in fields specified in [Specific Field]. Refer to 2.4.1, "Setting Up Measurement Conditions" for details of the settings for error recording.

NOTE: ***Errors are recorded only for the patterns meeting the following conditions.***
Patterns: PROG, ZSUB, STM, FLEX
Pattern lengths: 256 bits or longer and an integral multiple of 32 bits

Error phase analysis measurement procedures

1. Make settings for error recording.
2. Open the Error Phase Analysis window.
3. perform error phase analysis measurement.
4. Select a display format after measurement has been completed.
5. perform error phase analysis in the window by using scrolling and jumping operations.
6. To save the results, select a data format and then perform a saving operation.

2.5.1 Settings for Error Phase Analysis measurement

This section explains how to make error phase analysis measurement settings.

Settings for error recording

1. Make settings for error recording. Refer to 2.4.1, "Setting Up Measurement Conditions" for how to provide the settings.

2.5.2 Execution of Error Phase Analysis Measurement

This section explains how to perform error phase analysis measurements.

Open the Error Phase Analysis window

2. Click **[Error Phase Analysis]** on the function bar.

   The Error Phase Analysis window is displayed.

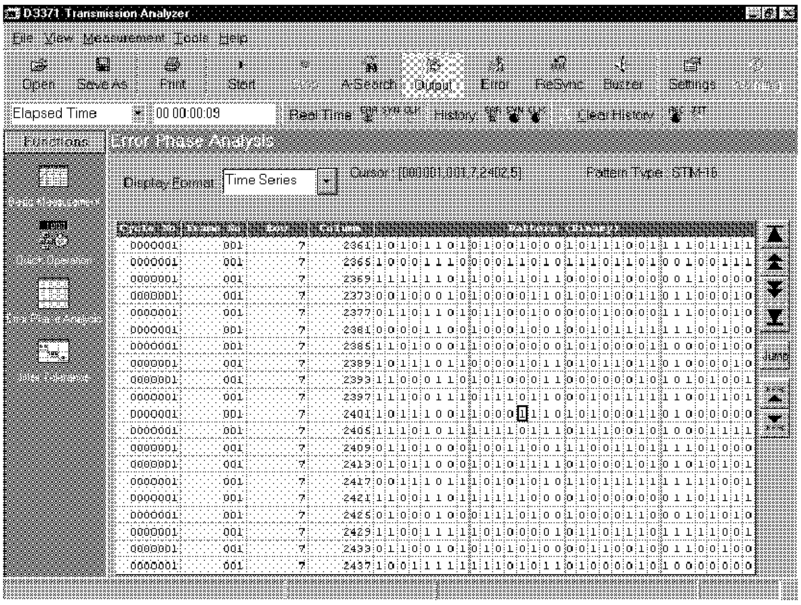


Figure 2-83 Error Phase Analysis Window

Execution of error phase analysis measurement

Starting error phase analysis measurement

3. Click the **[Start]** button on the standard tool bar.

   Error recording begins with the start of the bit error measurement.

   When error recording starts, **[REC]** indicating measurement status on the monitor tool bar turns light blue.

NOTE:

1. ***If the [Unavailable Pattern] message is displayed at the start of error recording, errors in set patterns cannot be recorded. Perform measurement with patterns meeting the following conditions.***
   Patterns: PROG, ZSUB, STM, FLEX
   Pattern lengths: 256 bits or longer and an integral multiple of 32 bits
2. ***If error recording cannot be performed due to synchronization loss or clock loss, the [REC] indicating measurement status on the monitor tool bar turns red.***

Termination of error recording

4. Click **[Stop]** button on the standard tool bar.

   The bit error measurement is terminated.

   When error recording is terminated, measurement results are indicated in the Error Phase Analysis window.

NOTE:

1. ***Up to 128-k error bit position data points can be recorded. If 128-k data points are recorded, the error-recording operation is terminated automatically. However, bit error measurement continues. The termination of error recording can be confirmed by checking that the [REC] indicating measurement status on the monitor tool bar has turned black.***
2. ***If no bit error is detected in measurement, no measurement result is indicated in the Error Phase Analysis window. In this situation, the message, [No Data Available], is displayed when the measurement is completed.***

2.5.3 Displaying the Error Phase Analysis Measurement Results

This section explains how to display the results of error phase analysis measurement.

2.5.3.1 Elements in Error Phase Analysis Window

Results of error phase analysis measurement are displayed on the Error Phase Analysis window.

Thsi section describes the Error Phase Analysis window configration and elements.

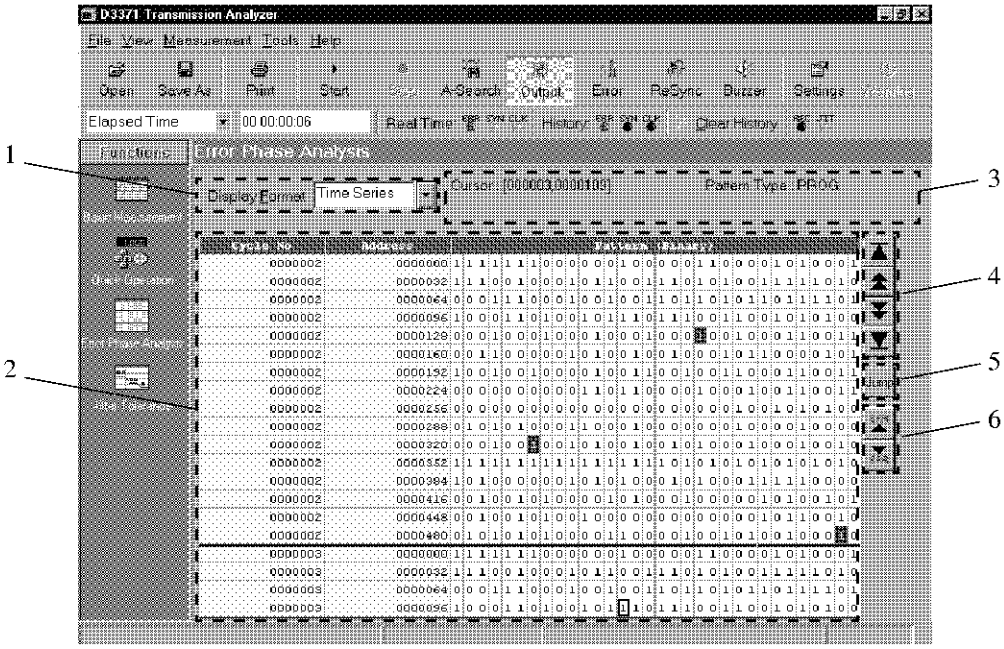


Figure 2-84 Error Phase Analysis Window

1. Display format area

   Set the error phase analysis data display format.
   Make a selection by clicking the **[Display Format]** drop-down list box.

   [Time Series]:
   Data is indicated with a time-series format.
   Data is shown in the order that error bits are recorded.

   [Statistics]:
   Data is indicated with a statistical format.
   Bit data in each pattern are aggregated for display.

2. Error phase analysis data display area

   Used to display error phase analysis data.

   The error phase analysis data display area consists of a pattern and error bits display (white), and a pattern phase display (yellow). The following table specifies relationships between pattern types and pattern phase indication items. Refer to 2.5.3.2, "Displaying Time-series Data" for details of time-series indication and 2.5.3.3, "Displaying Statistics Data" for statistics indication.

Pattern type	Pattern phase-indicating items	Description
PROG patterns ZSUB patterns	Cycle No. *	Pattern Cycle number
	Address	Address
STM patterns	Cycle No. *	Pattern Cycle number
	Frame No.	Frame number
	Row	Row in a frame
	Column	Column in a frame
FLEX patterns	Cycle No. *	Pattern Cycle number
	Index	Index
	Address	Address

*: The cycle number is a serial number that is given to each pattern with the No.1 being the number of the pattern where the first error was recorded. The cycle number is only displayed in time-series format.

3. Status-displaying area

   Pattern type, cursor position and bit error count are displayed.

4. Page-switching buttons

   Switches the page displays of the error phase analysis data.

   button — The first page is displayed.

   button — The preceding page is displayed.

   button — The next page is displayed.

   button — The last page is displayed.

NOTE: ***Use the data knob or the cursor keys ▲ ▼ to scroll up and down the window by rows.***

5. Jump buttons

Click the **[Jump]** button.

The jump dialog box is displayed.

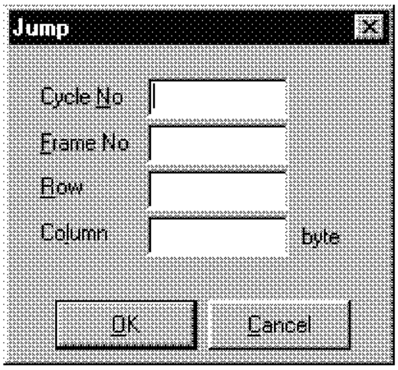


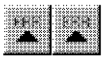
Figure 2-85 Jump Dialog Box Window

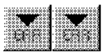
A jump destination is specified with a parameter. A different input parameter is used depending on pattern types.

Input parameters from the following table if the time-series display format is to be used. If the statistics display format is used, input parameters from the following table excluding the Cycle No.

Pattern type	Parameter	Parameter Type Permissible range	Setting resolution
PROG patterns ZSUB patterns	Cycle No.	1 to the cycle where the last error occurred	1
	Address	0 to pattern length -1 bit	1 bit
STM patterns	Cycle No.	1 to the cycle where the last error occurred	1
	Frame No.	1 to the number of frames	1
	Row	1 to 9	1
	Column	STM-1: 1 to 1080 bytes STM-16: 1 to 4320 bytes	1 byte
FLEX patterns	Cycle No.	1 to the cycle where the last error occurred	1
	Index	1 to the number of indices	1
	Address	0 to pattern length - 1 bit	1 bit

6. Error jump buttons — Used to move to an error position.

 button — Used to move the cursor to the preceding error position.

 button — Used to move the cursor to the next error position.

2.5.3.2 Displaying Time-series Data

This section describes the time-series data display window.

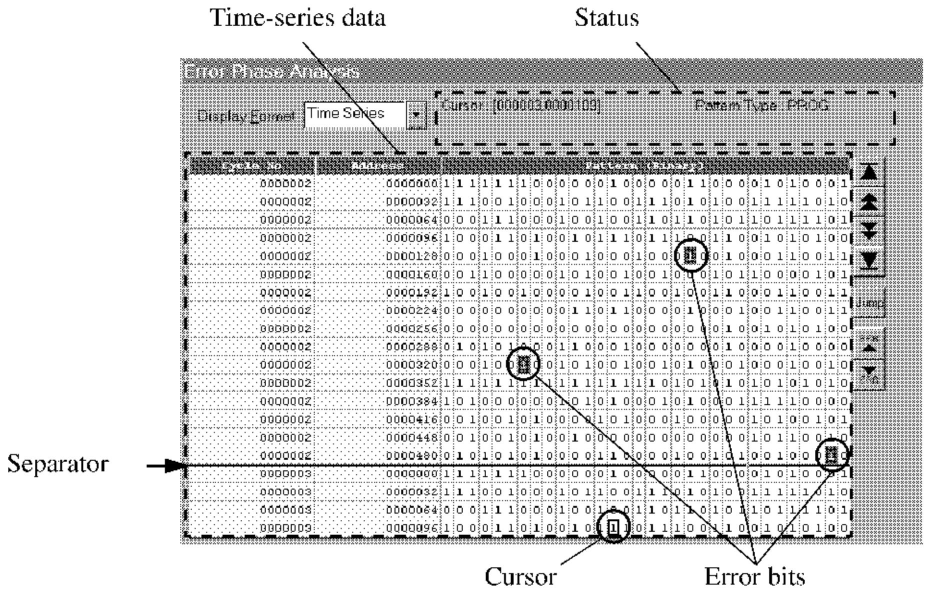


Figure 2-86 Time-series Data-displaying Window

Time-series data

Time-series data is displayed together with patterns in recorded error bit order. Error bits are shown in brown.

Time-series data consists of the pattern and error bits display (white), and the pattern phase display (yellow). Items listed in the pattern phase display (yellow) depend on the pattern types. The relationships between the pattern types and pattern phase indication items are shown in the following table.

Pattern type	Pattern phase items	Description
PROG patterns ZSUB patterns	Cycle No. *	Cycle number of a pattern
	Address	Address
STM patterns	Cycle No. *	Cycle number of a pattern
	Frame No.	Frame number
	Row	Row in a frame
	Column	Column in a frame
FLEX patterns	Cycle No. *	Cycle number of a pattern
	Index	Index
	Address	Address

*: The cycle number is a serial number that specifies the pattern position in the pattern cycle. The pattern having the first error occurance is set as cycle No.1.

NOTE:

1. ***An error free pattern is not displayed and a separator (blue line) will appear instead. Patterns immediately before and after a separator are out of sequence.***
2. ***The time-series data displays the PRBS pattern values included in the STM or FLEX patterns.***
3. ***Error free data patterns are inserted before the first error bit containing pattern cycle and after the last recorded error bit containing pattern cycle. In case B1 bytes are inserted, the pattern will not be displayed. B1-byte bits will be indicated with the * mark.***

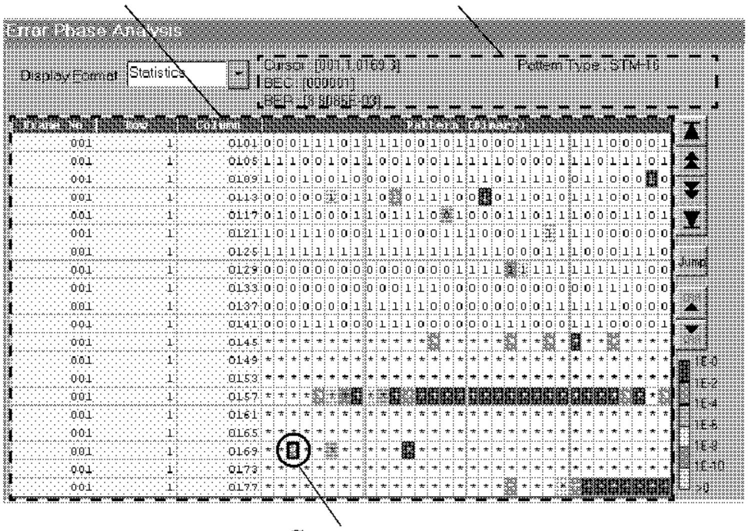
Statuses

In "status," The cursor position and pattern type are indicated.

2.5.3.3 Displaying Statistics Data

This section describes the contents of the statistics display window.

Statistics data Status



Cursor

Figure 2-87 Statistics Display Window

Statistics data

The data displays the bit error count in each pattern and bit error rates.

The data consists of the pattern and error bits display (white) and the pattern phase display (yellow). Items listed in the pattern phase display (yellow) depend on pattern types. The following table shows the relationship between pattern types and pattern phase items.

Pattern type	Pattern phase items	Description
PROG patterns ZSUB patterns	Address	Address
STM patterns	Frame No.	Frame number
	Row	Row in a frame
	Column	Column in a frame
FLEX patterns	Index	Index
	Address	Address

Error bits are color coded by the bit error rate and their relationships are shown in the following table.

Bit error rate	Color used in display
$10^{-0} \geq BER > 10^{-2}$	Brown
$10^{-2} \geq BER > 10^{-4}$	Orange
$10^{-4} \geq BER > 10^{-6}$	Ocher
$10^{-6} \geq BER > 10^{-8}$	Yellow
$10^{-8} \geq BER > 10^{-10}$	Light Green
$10^{-10} \geq BER > 0$	Light Blue

NOTE: ***If STM patterns or FLEX patterns include a PRBS pattern, the value of the PRBS pattern is not displayed. The mark,* is indicated for bits in the PRBS pattern area. Patterns where B1 bytes are inserted are not displayed. B1-byte bits are indicated with the * mark.***

Status

In "status," cursor position data, bit error count, bit error rate and pattern type at the cursorposition are indicated.

2.5.3.4 Saving Data Files

This section explains how to save or open data files.

Saving data

1. Click the **[Save As]** button on the standard toolbar.
   The Save As dialog box is displayed.

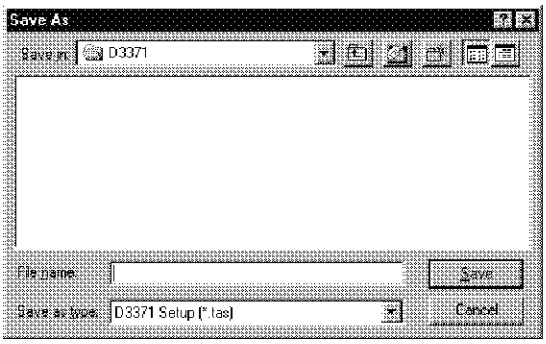


Figure 2-88 Save As Dialog Box

Save As dialog box operations

2. From the list or **[Save in]** drop-down list box, select a drive and directory path for the file.

   Clicking the **[Up One Level]** button moves to a higher level directory.

   Clicking the **[Create New Folder]** button creates a new folder.

3. Enter a file name for the file in the **[File Name]** text box.

   The numeric keypad on the front panel (**0** to **9** and **A** to **F**) can be used to enter the file name. Any alphanumeric character may be entered if a keyboard is connected.

Saved file settings

4. Select the saved file type from the **[Save as type]** drop-down list box.

   [Error Phase Analysis Time Series (*.txt)]:
   Time-series error phase analysis data

   [Error Phase Analysis Statistics (*.txt)]:
   Statistics error phase analysis data

5. Click the **[Save]** button to save the file.

   • Saving **[Error Phase Analysis Time Series (*.txt)]** (time-series data)
   The time-series data-Saving dialog box is displayed.

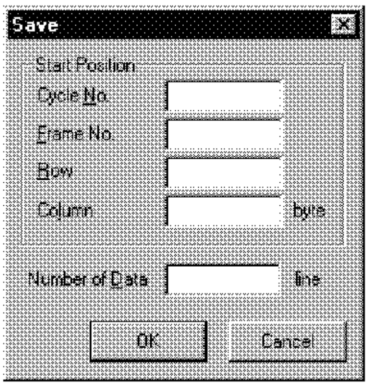


Figure 2-89 Time-series Data-saving Dialog Box Window

Set the save starting position of the time-series data in Start Position, and the number of row data entries be saved in Number of Data.

Items set in Start Position vary depending on pattern types. The following table indicates relationships between items set in Start Position and pattern types.

Pattern type	Parameter	Parameter Type Permissible range	Setting resolution
PROG patterns ZSUB patterns	Cycle No.	1 to the cycle where the last error occurred	1
	Address	0 to pattern length -1 bit	32 bits
STM patterns	Cycle No.	1 to the cycle where the last error occurred	1
	Frame No.	1 to the number of frames	1
	Row	1 to 9	1
	Column	STM-1: 1 to 1080 bytes STM-16: 1 to 4320 bytes	4 bytes
FLEX patterns	Cycle No.	1 to the cycle where the last error occurred	1
	Index	1 to the number of indices	1
	Address	0 to pattern length -1 bit	32 bits

Click the **[OK]** button in the Time-series data save dialogue box. The file is saved.
(Clicking the **[Cancel]** button cancels the saving operation.)

- **[Error Phase Analysis Statistics (*.txt)]** Save dialogue box for statistics data is displayed.

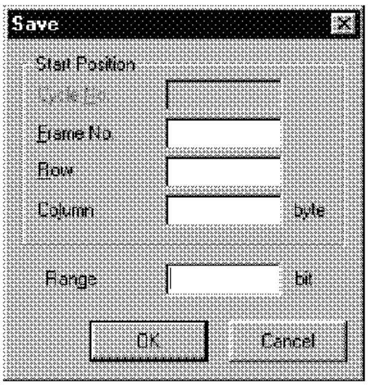


Figure 2-90 Statistics Data-saving Dialog Box Window

Set the save starting position of the statistics data in Start Position, and the range of data to be saved in Range. The "Range" indicates the range over which patterns are saved starting with the position indicated in the Start Position.

Items set in Start Position vary depending on pattern types. The following table indicates relationships between items set in Start Position and pattern types.

Pattern type	Parameter	Parameter Type Permissible range	Setting resolution
PROG patterns ZSUB patterns	Address	0 to pattern length -1 bit	32 bits
STM patterns	Frame No.	1 to the number of frames	1
	Row	1 to 9	1
	Column	STM-1: 1 to 1080 bytes STM-16: 1 to 4320 bytes	4 bytes
FLEX patterns	Index	1 to the number of indices	1
	Address	0 to pattern length 1 bit	32 bits

Click the **[OK]** button in the Statistics data save dialogue box. The file is saved. (Clicking the **[Cancel]** button cancels the saving operation.)

2.6 Jitter Tolerance Measurement

This section explains how to make settings for jitter tolerance measurement (jitter tolerance option). Refer to 5.12, "Jitter Tolerance Measurement," a technical document, for details of jitter tolerance measurement.

In jitter tolerance measurement, a jitter-added signal is input to the UUT or DUT, and the jitter tolerance is measured based on the resultant bit error data.

Jitter tolerance measurement includes the following two modes.

Search mode

In search mode, the maximum jitter amplitude is searched using the jitter frequency and error threshold conditions given in the jitter tolerance parameter table. The error threshold must be less than the value set in the parameter. The jitter amplitudes are searched for between the maximum and minimum values specified in the jitter tolerance parameter table. If an evaluation template is set, a pass or failure check is made using the template conditions.

Sweep mode

In sweep mode, bit errors are measured at all jitter frequencies and jitter amplitudes set in the jitter tolerance parameter table. An evaluation to decide success or failure is made based on comparisons with set error thresholds.

Jitter tolerance measurement procedures

1. Open the Jitter Tolerance window
2. Open the jitter tolerance measurement setting window.
3. Select a measurement mode.
4. Set a clock frequency.
5. Set a settling time or the time to wait before starting measurement for each measurement point.
6. Set a measurement time per measurement point.
7. Set error thresholds giving a basis to evaluate jitter tolerance measurement data.
8. Specify whether the measurement result list is indicated in the result-indicating window.
9. Create new templates, if necessary.
10. Edit saved templates, if necessary.
11. Specify templates to be displayed in the result-indication window.
12. Specify measurement points (edit the jitter tolerance parameter table).
13. Specify auto-search execution at the start of a jitter tolerance measurement.
14. Save the ED module setting files.
15. Start measurement.
16. Terminate the measurement.

17. Save jitter tolerance measurement data.

2.6.1 Jitter Tolerance Measurement Settings

This section explains how to set jitter tolerance measurement conditions.

Jitter Tolerance window selection

1. Click **[Jitter Tolerance]** on the function bar.
   The Jitter Tolerance window is displayed.

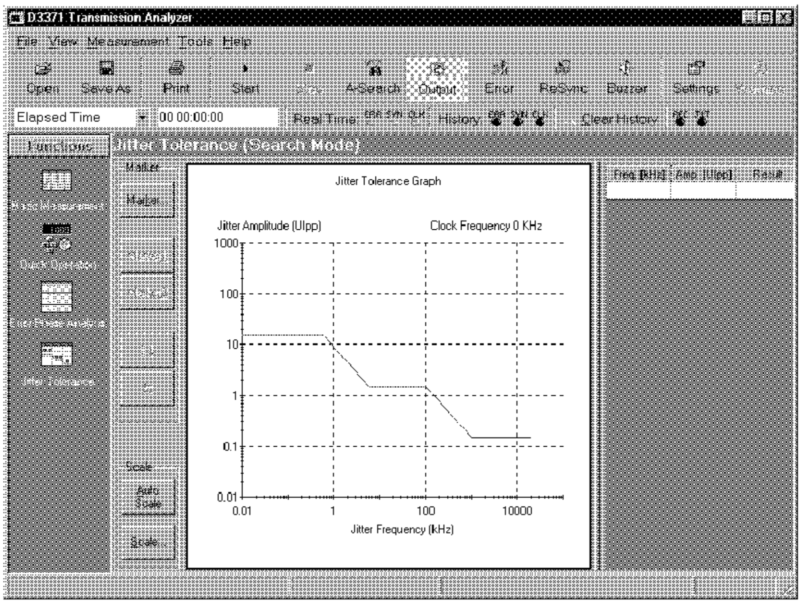


Figure 2-91 Jitter Tolerance Window

Selection of the jitter tolerance measurement setting window

2. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
3. Click the module selection list bar **[ED]**.
   The ED module is selected.
4. Click the **[Jitter Tolerance]** tab.
   The jitter tolerance measurement setting window is displayed.

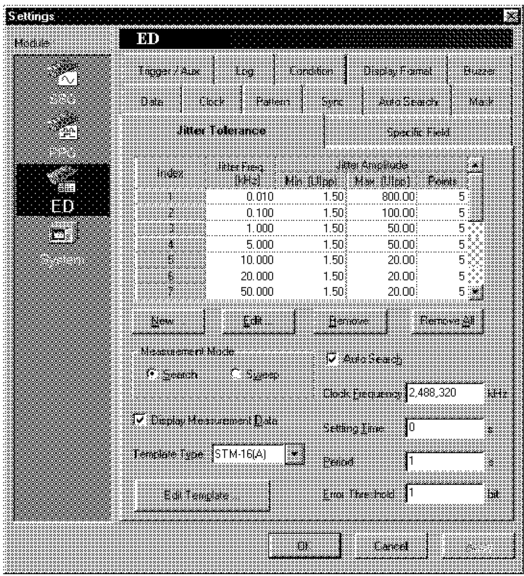


Figure 2-92 Jitter Tolerance Measurement Setting Dialog Box Window

Measurement mode selection

5. Select a measurement mode from the **[Measurement Mode]** option buttons.

   [Search]: The search mode is selected.

   [Sweep]: The sweep mode is selected.

Setting clock frequencies

6. Click the **[Clock Frequency]** text box.

   The Virtual Keyboard is displayed. Input a frequency through the Virtual Keyboard.

   - Setting range: 10 MHz to 3.2 GHz
   - Setting resolution: 1 kHz

Setting a settling time

7. Click the **[Settling Time]** text box.

   The Virtual Keyboard is displayed.

   Input a settling time through the Virtual Keyboard.

   The settling time indicates the stand-by time between measurements.

   - Setting range: 0 to 100 sec
   - Setting resolution: 0.1 sec

Setting the measurement time

8. Click the **[Period]** text box.

   The Virtual Keyboard is displayed. Input the measurement time per measurement point through the Virtual Keyboard.

   - Setting range: 0 to 1000 sec
   - Setting resolution: 1 sec

Setting error thresholds

9. Click the **[Error Threshold]** text box.

   The Virtual Keyboard is displayed. Input error threshold data through the Virtual Keyboard.

   If an error count measured in the measurement time specified in **[Period]** is less than the set error threshold, the result is evaluated "OK," while "NG" is indicated if the count is equal to or more than the error threshold.

   - Setting range: 1 to 1,000, 000 bits
   - Setting resolution: 1 bit

Turning On/Off of the measurement result list display

10. Make a selection by clicking the **[Display Measurement Data]** check box.

    Set the check mark (✓) to turn-on the displaying of the measurement result list. In On state, the measurement result list is displayed in the Jitter Tolerance window.

How to edit templates

11. Click the **[Edit Template...]** button. The Jitter Tolerance Template dialog box is displayed. Refer to 2.6.1.1, "Template Edition" for details.

Template type selection

12. Click the **[Template Type]** drop-down list box.

    The template list is displayed. Select a template from the list. The selected template is displayed in the graph of the Jitter Tolerance window. If NONE is selected, no template is displayed.

    The following templates are provided as default. Edited templates can be registered

Template	Jitter frequency (kHz)						Jitter amplitude (UI_{P-P})		
	f_0	f_1	f_2	f_3	f_4	f_5	A1	A2	A3
OC/STS-1 *1	0.01	0.03	0.3	2	20	400	0.15	1.5	15
OC/STS-3 *1	0.01	0.03	0.3	6.5	65	1,300	0.15	1.5	15
OC/STS-12 *1	0.01	0.03	0.3	25	250	5,000	0.15	1.5	15
OC/STS-48 *1	0.01	0.6	6	100	1,000	20,000	0.15	1.5	15
STM-1 (A) *2	-	-	0.5	6.5	65	1,300	0.15	1.5	-
STM-4 (A) *2	-	-	1	25	250	5,000	0.15	1.5	-
STM-16 (A) *2	-	-	5	100	1,000	20,000	0.15	1.5	-
STM-1 (B) *2	-	-	0.01	1.2	12	1,300	0.15	1.5	-
STM-4 (B) *2	-	-	0.01	1.2	12	5,000	0.15	1.5	-
STM-16 (B) *2	-	-	0.01	1.2	12	20,000	0.15	1.5	-

*1: A reference specification: Bellcore GR-253
*2: A reference specification: ITU-T G. 958

Setting the jitter tolerance parameter table

13. Set the parameters (jitter frequencies and jitter amplitudes) for jitter tolerance measurement in the jitter tolerance parameter table. Refer to 2.6.1.2, "Measurement Points Setting" for details.

Setting auto-search

14. Make a selection by clicking the **[Auto Search]** check box. Set the check mark (✓) to perform auto-search at the start of a jitter tolerance measurement. If the auto-search is performed, the phase of input clock in jitter tolerance measurement and the threshold voltage for input data are automatically set to the optimal values. Refer to 2.3.10, "Auto Search" for details of auto-search.

Confirming settings

15. Click the **[OK]** button or **[Apply]** button in the Settings window.

    The updated contents are set. If the **[OK]** button is clicked, the Settings window closes.

How to save settings for jitter tolerance measurement

16. Save the setting file for ED modules. Refer to 2.7.1, "Settings/data Files" for details.

2.6.1.1 Template Edition

This section explains how to edit templates used in jitter tolerance measurement.

Template-editing window selection

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click the module selection list bar **[ED]**.
   The ED module is selected.
3. Click the **[Jitter Tolerance]** tab.
   The measurement condition setting window for ED modules is displayed.
4. Click the **[Edit Template…]** button
   The Jitter Tolerance Template dialog box is displayed.

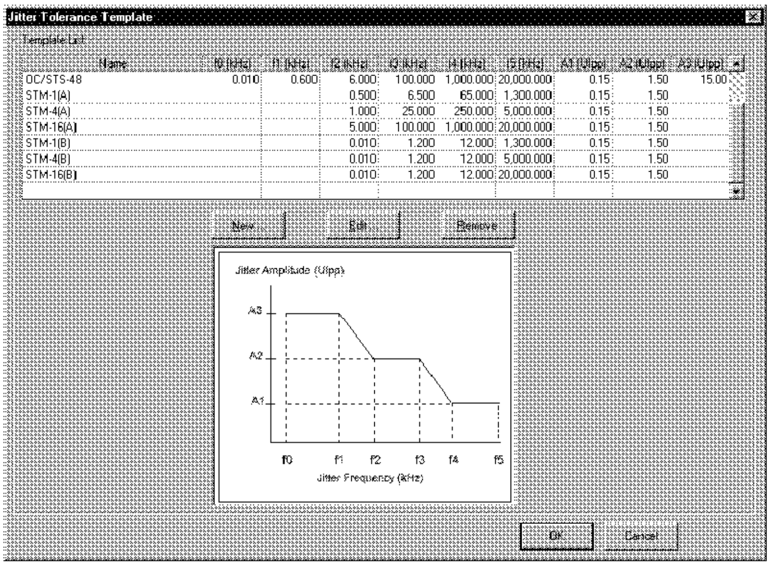


Figure 2-93 Template-editing Window

How to create a new template

Specifying an insertion position

5. Click the row in the template list on the template-editing window where an insertion is made.
6. Click the **[New…]** button.
   The Template dialog box is displayed.

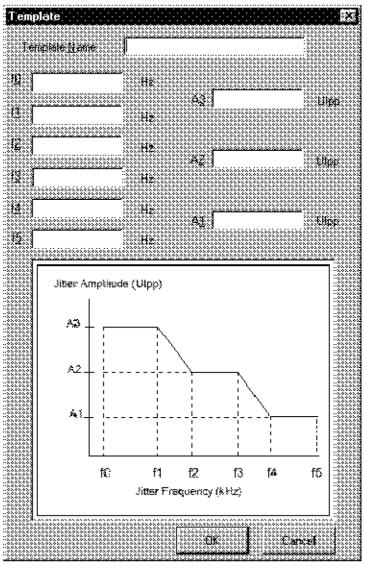


Figure 2-94 Template Dialog Box Window

NOTE: The maximum number of templates able to be registered is 20.

Setting a template name

7. Click the **[Template Name]** text box.

   The Virtual Keyboard is displayed. Enter a template name through the Virtual Keyboard.

Setting a jitter frequency

8. Click the text boxes for jitter frequencies, **[f0]** to **[f5]**, to be set.

   The Virtual Keyboard is displayed. Enter jitter frequencies through the Virtual Keyboard.

Setting amplitudes

9. Click the text boxes for jitter amplitudes, **[A1]** to **[A3]**, to be set.

   The Virtual Keyboard is displayed. Enter jitter amplitudes through the Virtual Keyboard.

   The following are relationships between the jitter frequencies, **[f0]** to **[f5]**, and the amplitudes, **[A1]** to **[A3]**.

   - Jitter amplitude A1:
     Used for jitter frequencies between f4 and f5.
   - Jitter amplitude A2:
     Used for jitter frequencies between f2 and f3.

- Jitter amplitude A3:
  Used for jitter frequencies between f0 and f1.

There are restrictions on template creation. Refer to "CAUTION" described for details below.

CAUTION:

Jitter frequencies and jitter amplitudes must satisfy the following conditions.:

- ***Jitter frequencies (f0, f1, f2, f3, f4, and f5) are 10 [Hz] or higher and 20 [MHz] or lower.***
- ***Jitter frequencies satisfy the relationships of f0≤f1≤f2≤f3≤f4≤f5.***
- ***Jitter amplitudes (A1, A2 and A3) are 0.01 [UI_{P-P}] or larger and 800 [UI_{P-P}] or smaller.***
- ***The jitter amplitudes satisfy the relationships of A1≤A2≤A3.***
- ***Jitter frequencies and jitter amplitudes to be set satisfy the relationships described in "Setting of jitter amplitudes"***
- ***Two or more jitter frequencies are specified.***
- ***The numbers of frequencies set to f0 to f5 (or the underlined numbers) are consecutive.***

Ending Template dialog box operations

10. Click the **[OK]** button to add a template. The new template is added to the template-editing window.

    Or, click the **[Cancel]** button. The template is cancelled.

How to edit saved templates

Specifying a template edition

11. Select a template from the template list. Then, click the template.

    The clicked template is selected.

Opening the template-setting window

12. Click the **[Edit...]** button.

    The Template dialog box is displayed.

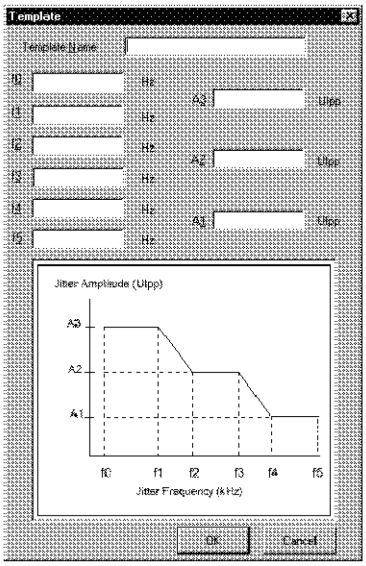


Figure 2-95 Template Dialog Box Window

Setting a template name

13. Click the **[Template Name]** text box.

    The Virtual Keyboard is displayed. Enter a template name through the Virtual Keyboard.

Setting the jitter frequency

14. Click text boxes for jitter frequencies, **[f0]** to **[f5]**, to be set.

    The Virtual Keyboard is displayed. Enter jitter frequencies through the Virtual Keyboard.

    There are restrictions on template creation. Refer to cautions described later on jitter frequency and jitter amplitude for details.

Setting jitter amplitudes

15. Click text boxes for jitter amplitudes, **[A1]** to **[A3]**, to be set.

    The Virtual Keyboard is displayed. Enter jitter amplitudes through the Virtual Keyboard.

    The following are relationships between the jitter frequencies, **[f0]** to **[f5]**, and the amplitudes, **[A1]** to **[A3]**.

    - Jitter amplitude A1:
      Used as jitter amplitude for jitter frequencies between f4 and f5.
    - Jitter amplitude A2:
      Used as jitter amplitude for jitter frequencies between f2 and f3.

- Jitter amplitude A3:
  Used as jitter amplitude for jitter frequencies between f0 and f1.

There are restrictions on template creation. Refer to "CAUTION" described for details below.

CAUTION:

Jitter frequencies and jitter amplitudes must satisfy the following conditions.

- ***Jitter frequencies (f0, f1, f2, f3, f4, and f5) are 10 [Hz] or higher and 20 [MHz] or lower.***
- ***The jitter frequencies satisfy the relationships of $f0 \leq f1 \leq f2 \leq f3 \leq f4 \leq f5$.***
- ***Jitter amplitudes (A1, A2 and A3) are 0.01 [UI_{P-P}] or larger and 800 [UI_{P-P}] or smaller.***
- ***The jitter amplitudes satisfy the relationships of $A1 \leq A2 \leq A3$.***
- ***Jitter frequencies and jitter amplitudes to be set satisfy the relationships described in "Setting of jitter amplitudes"***
- ***Two or more jitter frequencies are specified.***
- ***The numbers of frequencies set to f0 to f5 (or the underlined numbers) are consecutive.***

Ending Template dialog box operations

16. Click the **[OK]** button to edit a template. The template is edited in the template-editing window.

    Or click the **[Cancel]** button. Then, template edition is cancelled.

Template removal

Specifying a template.

17. Click a template to be removed from the template list on the template-editing window. The clicked template is selected.

Removing the template

18. Click the **[Remove]** button.

    The selected template is removed.

Confirming settings

19. Click the **[OK]** button in the Jitter Tolerance Template window. The template list is changed.

2.6.1.2 Measurement Points Setting

This section explains how to set measurement points.

Measurement points are set in the jitter tolerance parameter table. The jitter tolerance parameter table contains the jitter tolerance parameters of jitter frequency, the maximum jitter amplitude, the minimum jitter amplitude and the number of measurement points. The jitter tolerance parameter data are set for each jitter frequency.

Selection of the jitter tolerance measurement setting window

1. Click the **[Settings]** button on the standard tool bar.
   The Settings window is displayed.
2. Click **[ED]** on the module selection list bar.
   The ED module is selected.
3. Click the **[Jitter Tolerance]** tab.
   The jitter tolerance measurement setting window is displayed.

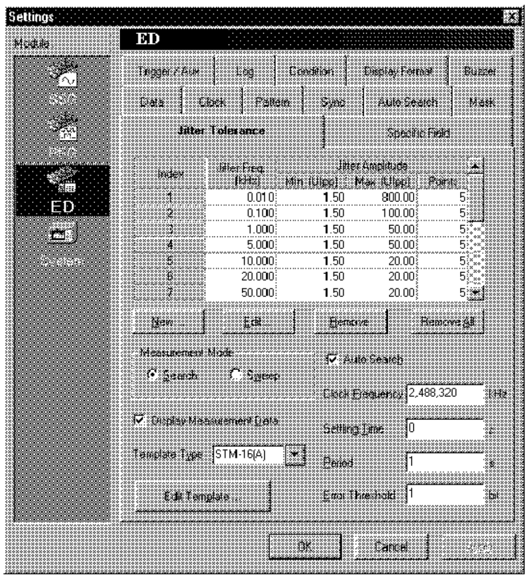


Figure 2-96 Jitter Tolerance Measurement Setting Dialog Box Window

How to remove all of the jitter tolerance parameter data

Complete removal of jitter tolerance parameter data

4. Click the **[Remove All]** button.
   All the jitter tolerance parameter data is removed.

How to add jitter tolerance parameter data

Insertion point specification

5. Select the insertion position and click.

   Opening of the Jitter Tolerance Parameters dialog box window

6. Click the **[New...]** button.

   The Jitter Tolerance Parameters dialog box is displayed.

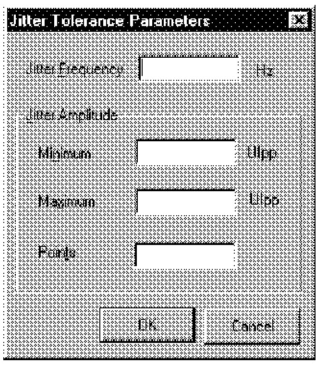


Figure 2-97 Jitter Tolerance Parameters Dialog Box Window

NOTE: The maximum number of jitter tolerance parameters is 20.

Setting jitter frequencies

7. Click the **[Jitter Frequency]** text box.

   The Virtual Keyboard is displayed. Input jitter frequencies through the Virtual Keyboard.

Clock frequency	Jitter frequency specification	Setting resolution
10 MHz ≤ clock frequency < 175 MHz	10 Hz to 2 MHz	10 Hz
175 MHz ≤ clock frequency < 800 MHz	10 Hz to 5 MHz	
800 MHz ≤ clock frequency ≤ 3.2 GHz	10 Hz to 20 MHz	

Setting jitter amplitudes

8. Click the **[Minimum]** text box.

   The Virtual Keyboard is displayed. Input the minimum jitter amplitude through the Virtual Keyboard.

9. Click the **[Maximum]** text box.

   The Virtual Keyboard is displayed. Input the maximum jitter amplitude through the Virtual Keyboard. Ensure the condition, maximum jitter amplitude ≥ minimum jitter amplitude, is satisfied.

The relationship between the jitter frequency range and jitter amplitude range is shown below:

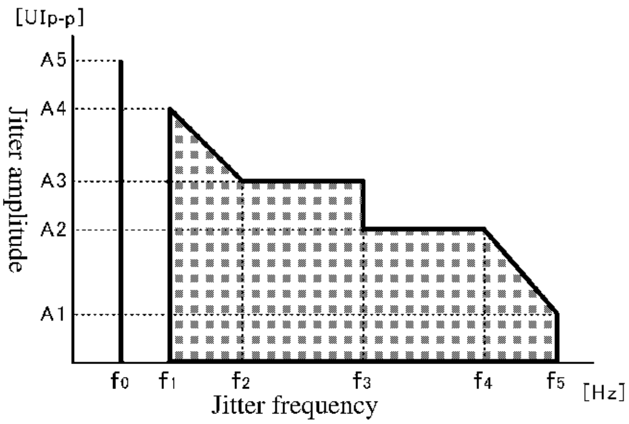


Figure 2-98 Jitter Setting Ranges

Band1 (800MHz ≤ clock frequency ≤ 3200MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 300k	20M
Maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	800	500	50	20	0.3
Band2 (175MHz ≤ clock frequency < 800MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2~f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 125k	5M
Maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	800	500	50	20	0.5
Band3 (10MHz ≤ clock frequency < 175MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3~f_4	f_5
	10	20	200 to 5k	5k to 200k	2M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	200	120	12	5	0.5

	Jitter amplitude setting range [UI_{P-P}]	Setting resolution [UI_{P-P}]
Band1 Band2	0.01 to 5	0.01
	5 to 50	0.1
	50 to 500	1
	500 to 800	2
Band3	0.01 to 1	0.01
	1 to 10	0.1
	10 to 100	1
	100 to 200	2

Setting the number of measurement points

10. Click the **[Points]** text box.

    The Virtual Keyboard is displayed. Input the number of jitter frequency measurement points through the Virtual Keyboard.

    - Setting range: 1 to 40
    - Setting resolution: 1

NOTE: ***If "1" is set for the number of measurement points, the maximum jitter amplitude is selected for the jitter amplitude.***
If "2" or a larger number is specified for the number of measurement points, specified points are placed between the maximum and the minimum jitter amplitudes at logarithmically equal distances.
The jitter amplitudes are specified starting with the maximum jitter amplitude, followed by amplitudes calculated by the following equation.

$$A_i = A_{i-1} \bullet 10^{((\log A_{min} - \log A_{max}) / (N_m - 1))}$$

A_i: ***A jitter amplitude to be set***
A_{i-1}: ***The jitter amplitude set for the preceding point***
A_{max}: ***The maximum jitter amplitude***
A_{min}: ***The minimum jitter amplitude***
N_m: ***The number of measurement points***

Addition of jitter tolerance parameters

11. Click the **[OK]** button to add a jitter tolerance parameter.

    Click the **[Cancel]** button to cancel the addition.

How to edit jitter tolerance parameters

Jitter tolerance parameter specification

12. Click the jitter tolerance parameter.

    Opening the Jitter Tolerance Parameters dialog box window

13. Click the **[Edit...]** button.

    The Jitter Tolerance Parameters dialog box window is displayed.

14. Perform operations 7 through 10 to add a jitter tolerance parameter.

    Editing jitter tolerance parameters

15. Click the **[OK]** button to edit the jitter tolerance parameter.

    Click the **[Cancel]** button to cancel the editing operations.

How to remove jitter tolerance parameters

Jitter tolerance parameter specification

16. Click the jitter tolerance parameter to be removed.

Jitter tolerance parameter removal

17. Click the **[Remove]** button.

    The selected setting is removed.

Updating settings

18. To update the settings, click the **[OK]** button on the jitter tolerance measurement setting window.

    The jitter tolerance parameter table is updated.

    Click the **[Cancel]** button to cancel the updating of settings.

2.6.2 Performing Jitter Tolerance Measurement

This section explains how to perform jitter tolerance measurement.

Starting jitter tolerance measurement

1. Click the **[Start]** button on the standard tool bar.

   Jitter tolerance measurement starts.

   The Jitter Tolerance dialog box is displayed in the lower left corner of the screen.

   NOTE: ***To start jitter tolerance measurement, click the [Start] button when the Jitter Tolerance window is displayed. If another function on the functions bar is selected, a bit error measurement starts.***

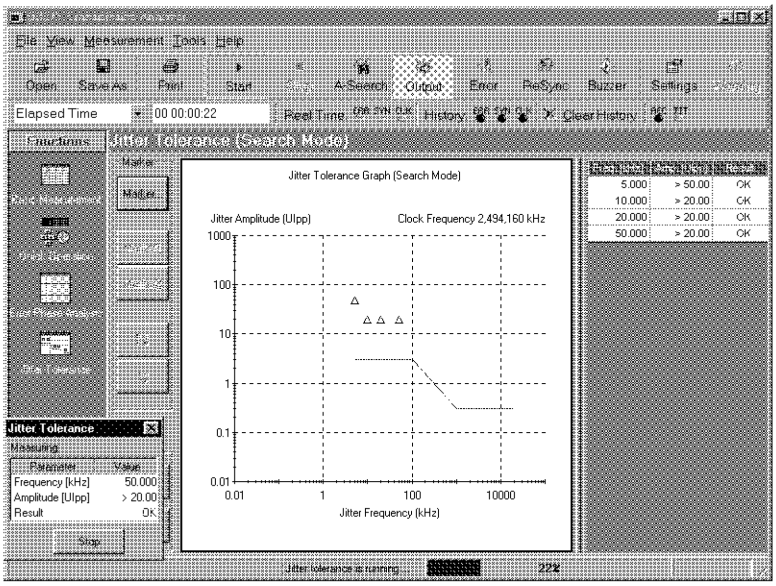


Figure 2-99 Jitter Tolerance Window (during measurement)

Termination of jitter tolerance measurement

2. If measurement for all parameters in the jitter tolerance parameter table is completed, the measurement is terminated automatically.

   Click the Jitter Tolerance window **[Stop]** button to terminate measurement before completion.

   How to save jitter tolerance measurement data

3. Refer to 2.7.1.1, "Saving Files" for how to save jitter tolerance measurement data.

2.6.3 Displaying Jitter Tolerance Measurement Data

This section explains how to display jitter tolerance measurement data. Data is displayed in the Jitter Tolerance window.

2.6.3.1 Jitter Tolerance Window Information

Thsi section describes the Jitter Tolerance window structure and elements.

Jitter Tolerance window Elements

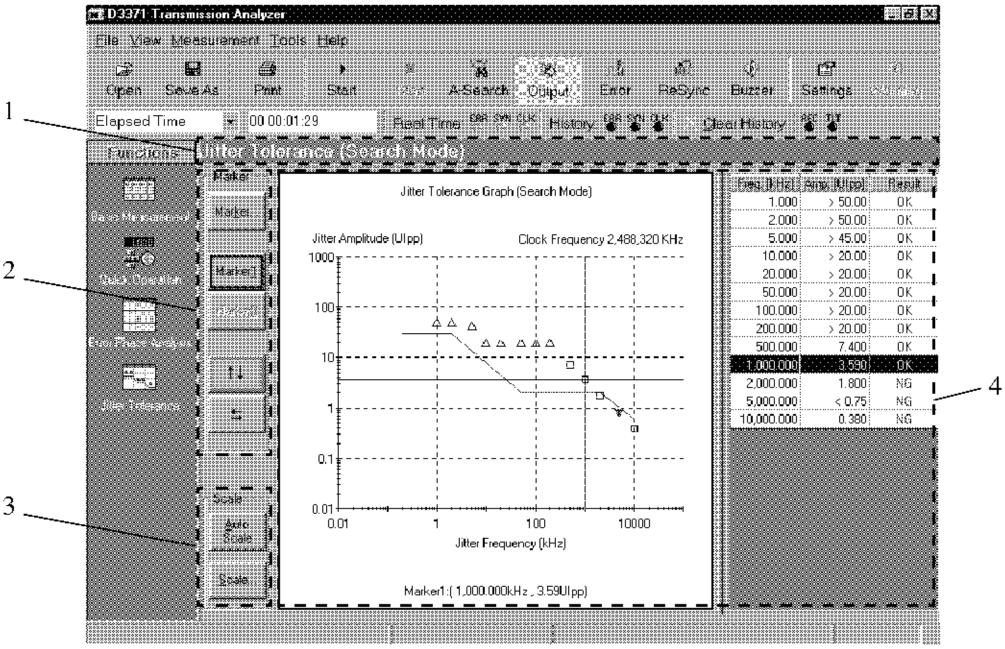


Figure 2-100 Jitter Tolerance Window

1.	Title bar	A title is indicated. Displayed in "Jitter Tolerance (a measurement mode) (a file name)."
2.	Marker section	Where marker-related buttons are contained.
3.	Scale section	Where scale-related buttons are contained.
4.	Result-display area	Where measurement results are displayed in graphs and tables.

2.6.3.2 Markers

This section explains how to set and handle markers. Markers are placed under the graph, using logarithmic scales for both axes, in the result-display area.

Setting markers

1. Click the **[Marker...]** button.

   The Marker dialog box window is displayed.

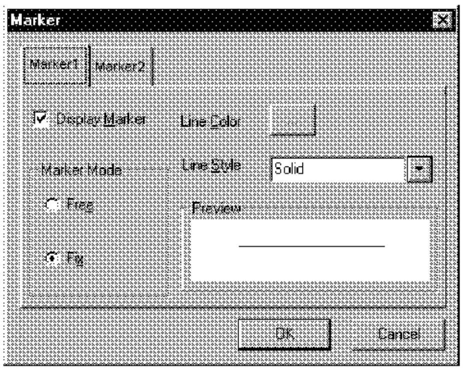


Figure 2-101 Marker Dialog Box Window

Selection of a marker to be set

2. Click the **[Marker 1]** or **[Marker 2]** tab.

   The window to set the marker is displayed.

Turning On/Off marker indication

3. Make a selection by clicking the **[Display Marker]** check box.

   Set the check mark (✓) to display markers.

Marker mode selection

4. Make a selection by clicking one of the **[Marker Mode]** option buttons.

   [Free]: The free mode is selected. The marker moves regardless of measurement points.

   [Fix]: The fixed mode is selected. The marker moves on measurement points.

Setting line colors

5. Click the **[...]** button.
   The Color dialog box is displayed. Select a line color.
   Click the **[OK]** button to set the selected line color. The line color is set.
   Click the **[Cancel]** button to cancel the updated line color.

Setting line styles

6. Make a selection by clicking the **[Line Style]** drop-down box.
   Select a line style from the list.
   [Solid]: A solid line is set.
   [LongDash]: A dashed line is set.
   [Dotted]: A dotted line is set.
   [DashDot]: A dash/dot-alternating line is set.

Confirming settings

7. Click the **[OK]** button to update the marker setting. The marker setting is updated.
   Click the **[Cancel]** button to cancel the marker setting.
   Moving markers
   Selecting a marker
8. Make a selection by clicking the **[Marker 1]** or the **[Marker 2]** button.
   The selected marker becomes free of movement.
   [Marker 1]: Marker 1 becomes free of movement.
   [Marker 2]: Marker 2 becomes free of movement.

Selecting a direction for the marker ro move in using the data knob (cursor keys ▲ ▼)

9. Make a selection by clicking the [↑↓] button or the [⇆] button.
   In the **[Free]** marker mode, the marker moves in the selected direction when the data knob is rotated.
   - [↑↓]: Movement is upwards or downwards.
   - [⇆]: Movement is to the right or to the left.

CAUTION: ***In the D3371, the data knob and the cursor keys ▲ ▼ provide the same functions.***
If the [⇆] button is selected, the cursor keys ▲ ▼ move the cursor to the right or to the left.

Moving a marker

10. A marker is moved by the following operations.
    - Clicking of the mouse.
    - Clicking of the touch panel.
    - Actuating an arrow key of the keyboard.
    - Operation of the D3371's cursor keys.
    - Manipulating the data knob.

2.6.3.3 Scale Settings

This section explains how to set scales.

How to set scales automatically

1. Click the **[Auto Scale]** button.
   Scales are set automatically.

How to set scales manually

2. Click the **[Scale...]** button.
   The Scale dialog box is displayed.

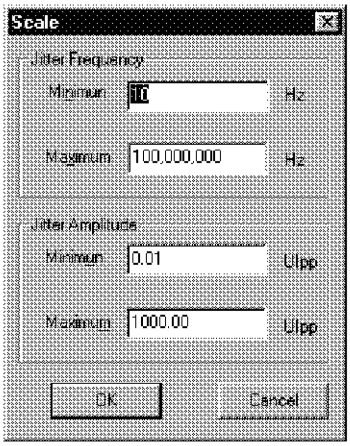


Figure 2-102 Scale Dialog Box Window

Setting of jitter frequencies

3. Click the **[Minimum]** text box.

   The Virtual Keyboard is displayed.

   Enter the minimum jitter frequency through the Virtual Keyboard.

   - Setting range: 0.01, 0.1, 1, 10, 100, 1000, 10000 [kHz]

4. Click the **[Maximum]** text box.

   The Virtual Keyboard is displayed.

   Enter the maximum jitter frequency through the Virtual Keyboard.

   Ensure that the condition, maximum jitter frequency > the minimum jitter frequency, is satisfied.

   - Setting range: 0.1, 1, 10, 100, 1000, 10000, 100000 [kHz]

Setting jitter amplitudes

5. Click the **[Minimum]** text box.

   The Virtual Keyboard is displayed.

   Enter the minimum jitter amplitude through the Virtual Keyboard.

   - Setting range: 0.01, 0.1, 1, 10, 100 [UI_{P-P}]

6. Click the **[Maximum]** text box.

   The Virtual Keyboard is displayed.

   Enter the maximum jitter amplitude through the Virtual Keyboard.

   Ensure that the condition, the maximum jitter amplitude > the minimum jitter amplitude, is satisfied.

   - Setting range: 0.1, 1, 10, 100, 1,000 [UI_{P-P}]

Confirming settings

7. Click the **[OK]** button. The dialog box closes and the scale is set.

   Click the **[Cancel]** button to cancel the scale settings.

2.6.3.4 Result Display Area Elements

This section explains how to display jitter tolerance measurement results.

Jitter tolerance measurement results are displayed in the Jitter Tolerance window. The Jitter Tolerance screens consist of the Search Mode and sweep mode Jitter Tolerance windows. In either mode, the results are indicated in a graph, using a logarithmic scale for each axis, and a table placed in the measurement-result-indicating area of the Jitter Tolerance window.

This section describes the search mode and the sweep mode screen elements.

The display format in the search mode

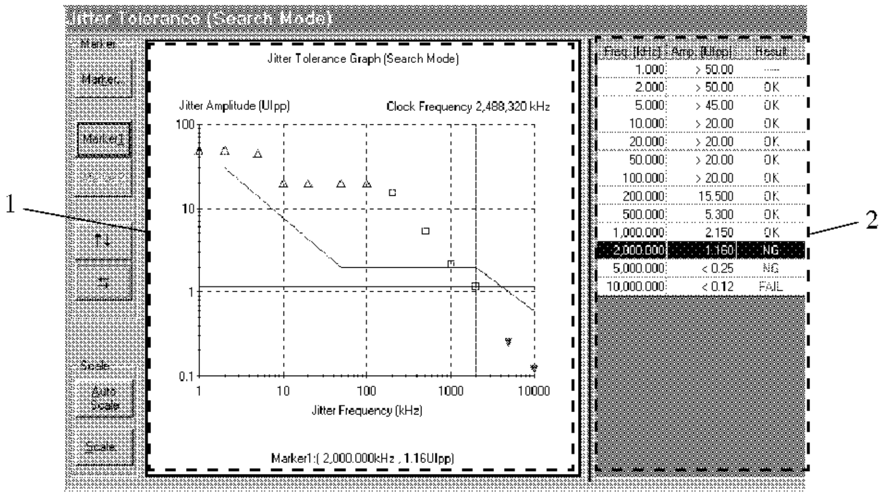


Figure 2-103 Jitter Tolerance (Search Mode)

1. Graphics areas

The X axis and the Y axis indicate jitter frequencies and jitter amplitudes, respectively. Logarithmic scales are used for both axes.
Each measurement data is plotted at the corresponding measurement point on the graphs with a symbol. Symbols used and their meanings are as follows.

Symbol	Description
△ (blue)	Indicates that the number of errors for the maximum jitter amplitude is less than the error threshold. (Detection is impossible, because the jitter amplitude for the jitter tolerance point exceeds the maximum jitter amplitude.)
□ (blue)	Indicates that the jitter tolerance point is detected.

Symbol	Description
▼ (red)	Indicates that the number of errors at the minimum jitter amplitude is equal to or larger than the error threshold. (Detection is impossible, because the jitter amplitude for the jitter tolerance point is less than the minimum jitter amplitude or, a synchronizatin-loss or clock-loss status has occurred.)

2. Table areas

Tables for jitter frequencies, jitter amplitudes and evaluation results are provided.
Inequality signs for jitter amplitudes are given in the following conditions.

Symbol	Description
>	Indicates that the number of errors at the maximum jitter amplitude is less than the error threshold. (Detection is impossible, because the jitter amplitude for the jitter tolerance point exceeds the maximum jitter amplitude.)
<	Indicates that the number of errors at the minimum jitter amplitude is equal to or larger than the error threshold. (Detection is impossible, because the jitter amplitude for the jitter tolerance point is less than the minimum jitter amplitude or a synchronization loss or clock-loss status has occurred.)

In addition, evaluation results are indicated with the following.

Indication	Description
OK (blue)	Jitter amplitude at the jitter tolerance point is larger than that in the template.
NG (red)	Jitter amplitude at the jitter tolerance point is equal to or less than that in the template.
FAIL (red)	Measurement is impossible. (A synchronization loss or clock-loss status has occurred.)
------ (red)	The template is not set or the results are out of the template coverage.

The display format in the sweep mode

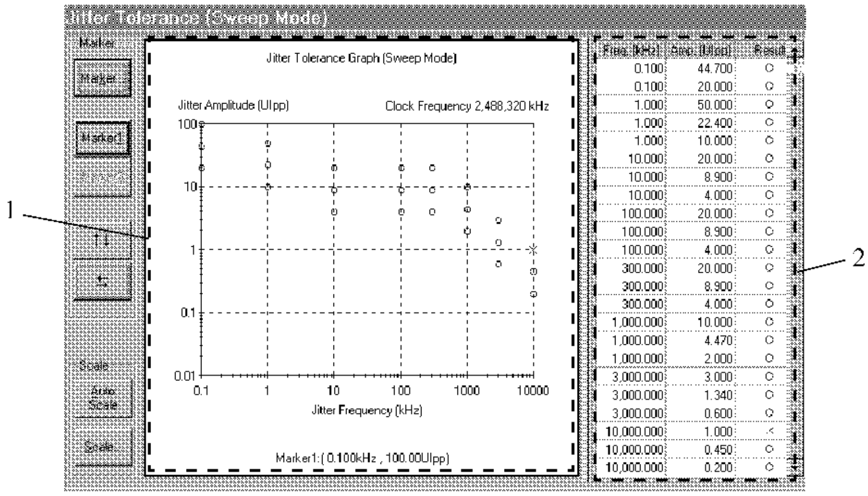


Figure 2-104 Jitter Tolerance (Sweep Mode)

1. Graphics areas

The X axis and the Y axis indicate jitter frequencies and jitter amplitudes, respectively. Logarithmic scales are used for both axes.
Each measurement data is plotted at the corresponding measurement points on the graphs with a symbol. Symbols used and their meanings are as follows.

Symbol	Description
○ (blue)	Indicates that the number of errors is less than the error threshold.
× (red)	Indicates that the number of errors is equal to or larger than the error threshold or detection is impossible. (A synchronization loss or clock-loss status has occurred.)

2. Table areas

Table for jitter frequencies, jitter amplitudes and evaluation results are provided. Evaluation results are indicated with the following.

Indication	Description
○ (blue)	Indicates that the number of errors is less than the error threshold.
× (red)	Indicates that the number of errors is equal to or larger than the error threshold.
FAIL	Measurement is impossible. (A synchronization loss or clock-loss state has occurred.)

2.6.3.5 Saving and Opening Measurement Results

Jitter tolerance measurement results can be saved on the following data files and can be read from them.

Refer to 2.7.1, "Settings/data Files" for how to perform file-saving/file-opening operations.

File type	Extension	Explanation	Save	Open
Measurement data (Jitter Tolerance Text Data)	txt	Jitter tolerance measurement data file.	✓	-
Jitter tolerance measurement data (Jitter Tolerance Data)	jid	Jitter tolerance measurement data file.	✓	✓
Jitter tolerance measurement graph (Jitter Tolerance Graph BMP) (Jitter Tolerance Graph EMF)	bmp emf	Jitter tolerance measurement graphics data file. Possible to save in either EMF or BMP format.	✓	-

2.6.3.6 Printing Measurement Results

Jitter tolerance measurement result data being displayed in the result display area of the Jitter Tolerance window can be printed.

A printing format can be selected from the following two formats. To alter printing formats, make the setting through **[Display Measurement Data]** in the jitter tolerance measurement setting window.

- Print only the graph.
- Print both graph and list.

Refer to 2.7.2, "Printing Measurement Results" for how to print.

2.7 Using the Extended Functions

The touch panel or mouse is used here. Turn the Virtual Keyboard function on. For information on the Virtual Keyboard, refer to Section 2.2.4, "How to Enter Numeric Values."

2.7.1 Settings/data Files

This section describes settings for the D3371 and data files. Settings for the D3371 and data files are provided as follows.

File type	Extension	Explanation
Setting D3371 (D3371 Setup)	tas	This is a setup file of D3371. The D3371 Setup file is saved or opened together with the setup files of SSG Setup, PPG Setup, and ED Setup.
Setting SSG modules (SSG Setup)	sgs	This is a SSG Module Setup file.
Setting PPG modules (PPG Setup)	pgs	This is a PPG Module Setup file. However, this file does not contain Data & Clock output ON/OFF settings, Clock Delay value, and PROG/STM/FLEX pattern contents.
Setting ED modules (ED Setup)	eds	This is a ED Module Setup file. However, this file does not contain Data & Clock output ON/OFF settings, Clock Delay value, and PROG/STM/FLEX pattern contents.
PROG pattern data (PPG PROG Pattern) (ED PROG Pattern)	prp	This is a PROG Pattern Data file.
STM pattern data (PPG STM Pattern) (ED STM Pattern)	stp	This is a STM Pattern Data file.
FLEX pattern data (PPG FLEX Pattern) (ED FLEX Pattern)	flp	This is a FLEX Pattern Data file.
Measurement data (Basic Measurement Log) (Error Phase Analysis Time Series) (Error Phase Analysis Statistics) (Jitter Tolerance Text Data)	txt	This file contains following four types of measurement data: Basic Measurement Log Data Error Phase Analysis Time-series Data Error Phase Analysis Statistic Data Jitter Tolerance Measurement Data
Jitter tolerance measuremet data (Jitter Tolerance Data)	jid	This is a Jitter Tolerance Measurement Data file.

File type	Extension	Explanation
Jitter tolerance measuremet graph data (Jitter Tolerance Graph BMP) (Jitter Tolerance Graph EMF)	bmp emf	This is a graph data file of Jitter Tolerance Measurement. This file can be saved in either BMP or EMF format.

2.7.1.1 Saving Files

This section explains how to save settings for the D3371 and data files.

CAUTION: ***This file saving cannot be performed during data measurement. C drive is reserved for system files. Please use D drive for file saving. To save on a floppy disk, it must be pre-formatted. To format a floppy disk, please refer to Section 2.7.3 "Formatting Floppy Disks."***

Saving data

1. Click the **[Save As]** button on the standard toolbar.

   The Save As dialog box is displayed.

Figure 2-105 Save As Dialog Box

NOTE: ***Pattern data can also be saved through the Save As dialog box which can be opened by clicking the [Save As] button in the Pattern Settings dialog box.***

Save As dialog box operations

2. From the **[Save in]** drop-down list box or list, select a drive and directory path for the file.

   Clicking the **[Up One Level]** button moves to a directory one level up.

   Clicking the **[Create New Folder]** button creates a new folder.

3. Enter a file name for the file in the **[File Name]** text box.

   The numeric keypad on the front panel (**0** to **9** and **A** to **F**) can be used to enter the file name. Any alphanumeric character can be entered from a connected keyboard.

Settings for files to be saved

4. Select the type of the file to be saved from the **[Save as type]** drop-down list box.

   [D3371 Setup(*.tas)]:
   Settings for the D3371 is saved in combination with setting files of SSG Setup, PPG Setup and ED Setup.

   [SSG Setup(*.sgs)]:
   Settings for SSG modules are saved.

   [PPG Setup(*.pgs)]:
   Settings for PPG modules are saved.

   [ED Setup(*.eds)]:
   Settings for ED modules are saved.

   [PPG PROG Pattern(*.prp)]:
   Pattern data for PPG module PROG patterns are saved.

   [ED PROG Pattern(*.prp)]:
   Pattern data for ED module PROG patterns are saved.

   [PPG STM Pattern(*.stp)]:
   Pattern data for PPG module STM patterns are saved.

   [ED STM Pattern(*.stp)]:
   Pattern data for ED module STM patterns are saved.

   [PPG FLEX Pattern(*.flp)]:
   Pattern data for PPG module FLEX patterns are saved.

   [ED FLEX Pattern(*.flp)]:
   Pattern data for ED module FLEX patterns are saved.

   [Basic Measurement Log(*.txt)]:
   Log data in basic measurement are saved.

   [Error Phase Analysis Time Series(*.txt)]:
   Time-series data in error phase analysis are saved.

   [Error Phase Analysis Statistics(*.txt)]:
   Statistics data in error phase analysis are saved.

   [Jitter Tolerance Text Data(*.jid)]:
   Jitter tolerance measurement data are saved.

   [Jitter Tolerance Data(*.jid)]:
   Jitter tolerance measurement data are saved.

   [Jitter Tolerance Graph BMP(*.bmp)]:
   Graphic data in jitter tolerance measurement are saved in BMP format.

   [Jitter Tolerance Graph EMF(*.emf)]:
   Graphic data in jitter tolerance measurement are saved in EMF format.

NOTE: If ED module patterns are set to [Use the same Pattern as PPG], ED module patterns cannot be selected.

5. Click the **[Save]** button to start the file-saving operation.
   Files are saved.
   (Click the **[Cancel]** button to cancel the saving operation.)

2.7.1.2 Opening Files

This section explains how to open settings for the D3371 and data files.

CAUTION: File opening cannot be performed during data measurement.

NOTE: Contents of text files can be viewed with an application such as WordPad.

Opening operation procedures

1. Click the **[Open]** button on the standard tool bar.
   The Open dialog box is displayed.

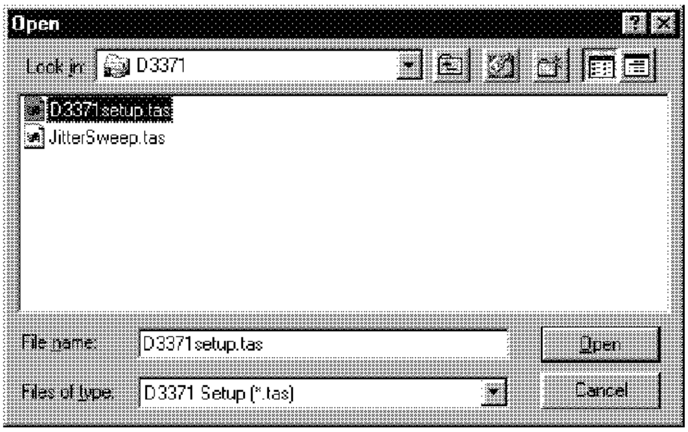


Figure 2-106 Open Dialog Box Window

NOTE: Pattern data can also be opened through the Open dialog box that is opened by clicking the [Open] button in the Pattern Settings dialog box.

Open dialog box operations.

Drive and directory path specification

2. Specify the saved drive and directory path of the file to be read from the **[Look in]** drop-down list box or list.
   Click the **[UP One Level]** button to move to the layer positioned immediately above in the directory path.

Settings for contents to be read

3. **[Files of type]** :Select the type of the file to be read from the drop-down list box.

   [D3371 Setup(*.tas)]:
   Settings for the D3371 is opened in combination with setting files for SSG Setup, PPG Setup and ED Setup.

   [SSG Setup(*.sgs)]:
   Settings for SSG modules are opened.

   [PPG Setup(*.pgs)]:
   Settings for PPG modules are opened.

   [ED Setup(*.eds)]:
   Settings for ED modules are saved.

   [PPG PROG Pattern(*.prp)]:
   Pattern data for PPG module PROG patterns is opened.

   [ED PROG Pattern(*.prp)]:
   Pattern data for ED module PROG patterns is opened.

   [PPG STM Pattern(*.stp)]:
   Pattern data for PPG module STM patterns is opened.

   [ED STM Pattern(*.stp)]:
   Pattern data for ED module STM patterns is opened.

   [PPG FLEX Pattern(*.flp)]:
   Pattern data for PPG module FLEX patterns is opened.

   [ED FLEX Pattern(*.flp)]:
   Pattern data for ED module FLEX patterns is opened.

   [Jitter Tolerance Data(*.jid)]:
   Jitter tolerance measurement data is opened.

   NOTE: ***If ED module patterns are set to [Use the same Pattern as PPG], ED module patterns cannot be selected.***

4. If a specified file exists, it will be contained in the list.

   Specify the file to be read by clicking on a file name in the list or directly typing the name of the file into the **[File name]** text box using either the front panel or keyboard.

   If the name is selected from the list, the selected name is copied in the **[File name]** text box.

5. Click the **[Open]** button to open a file. The file is read and will be set to the D3371.
   (Click the **[Cancel]** button to cancel the opening operation.)

2.7.2 Printing Measurement Results

This section explains how to print measurement results.

If a printer is set up for the D3371, measurement results can be printed. Refer to 2.7.4, "Connecting a Printer" for how to set up a printer.

Printing is possible for the following measurement results.

- Basic measurement data
- Jitter tolerance measurement data

Printing basic measurement data

1. Select the **[Basic Measurement]**, **[Quick Operation]** or **[Error Phase Analysis]** window from the function bar.
2. Click the **[Print]** button on the standard tool bar.

   The Print dialog box window is displayed.

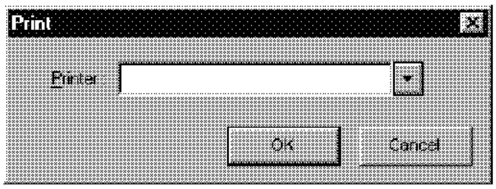
   

   Figure 2-107 Print Dialog Box Window
3. If more than one printer is set up, select a printer from the **[Printer]** drop-down list box of the Print dialog box.
4. Click the **[OK]** button.

   The Basic measurement data is printed.
   (Click the **[Cancel]** button to cancel the printing operation.)

Printing jitter tolerance measurement data

1. Select the **[Jitter Tolerance]** window from the function bar.
2. Click the **[Print]** button on the standard tool bar.
3. If more than one printer is set up, select a printer from the **[Printer]** drop-down list box of the Print dialog box.
4. Click the **[OK]** button.

   The Jitter tolerance measurement data is printed.
   (Click the **[Cancel]** button to cancel the printing operation.)

NOTE: ***Jitter tolerance measurement data-printing items correspond to what is in the [Jitter Tolerance] window display. If graphs and lists are displayed in the [Jitter Tolerance] window, those graphs and lists are printed. If only graphs are displayed, only those graphs are printed. Set [Display Measurement Data] in the jitter tolerance measurement setting window to alter what is displayed. (Refer to 2.6.1, "Jitter Tolerance Measurement Settings.")***

2.7.3 Formatting Floppy Disks

This section explains how to format floppy disks.

The D3371 has a 3.5-inch floppy disk drive. Files can be saved to floppy disks. Both 3.5-inch 2DD 720 KB and 2HD 1.44 MB floppy disks (MS-DOS format) can be used.

Write-protecting floppy disks

Floppy disks can be write-protected to prevent files from being erased or overwritten. The write-protect tab is located on the lower right rear of a floppy disk. To lock the disk, slide the tab down so that the hole is visible. To unlock the disk, slide the tab up to cover the hole.

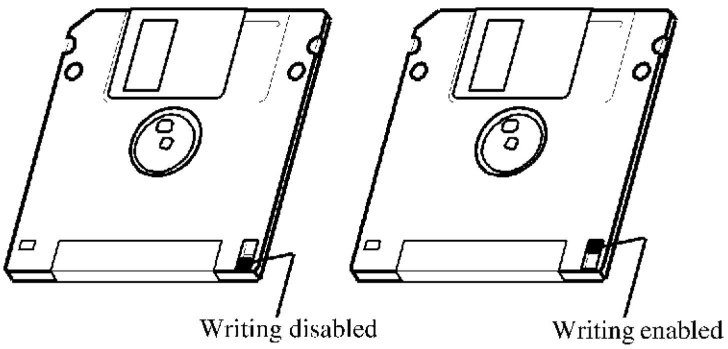


Figure 2-108 Write-Protecting a Floppy Disk

Inserting a floppy disk

1. Insert a floppy disk into the drive with the floppy disk label facing to the right.

Removing a floppy disk

CAUTION: ***When the drive indicator is lit, the floppy disk is being accessed. To prevent files from being damaged, do not press the eject button while the drive indicator is lit.***

1. Make sure that the drive indicator is not lit.
2. Press the eject button.
   The floppy disk is ejected from the drive.
3. Remove the floppy disk from the drive.

Formatting a floppy disk

A new floppy disk must be formatted before it can be used. Format the floppy disk from the My Computer window as described below.

CAUTION:

1. ***Do not insert an unformatted floppy disk while a measurement is being performed. Inserting an unformatted floppy disk could interrupt the measurement operation.***
2. ***If the user needs to format a floppy disk using this analyzer, make sure to close the D3371 Transmission Analyzer application first and then format it from the Windows desktop.***
3. ***When a floppy disk is formatted, all data on the floppy disk will be erased. To prevent any important data from being lost, check the floppy before formatting it and back up any files as required***

Quiting the D3371 Transmission Analyzer.

1. Click **[File]-[Exit]** on the menu bar.
   The Exit D3371 Transmission Analyzer Application window is displayed.

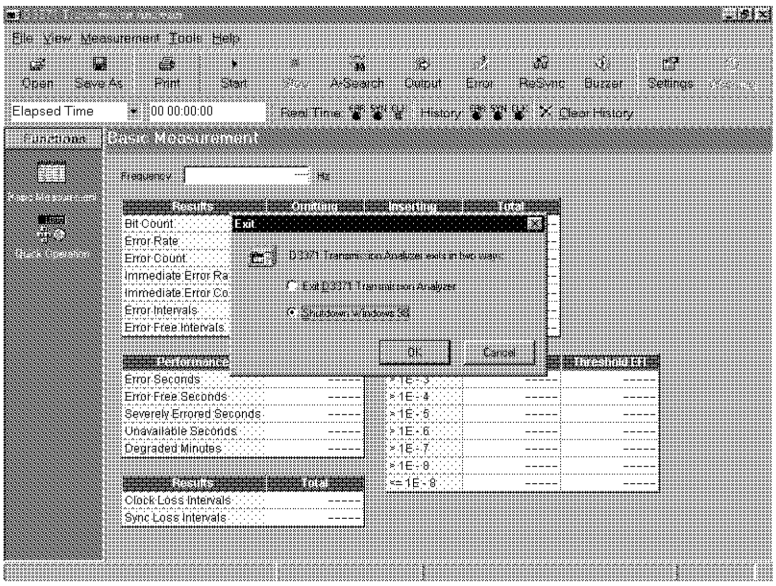


Figure 2-109 Exit D3371 Transmission Analyzer Application Window

2. Select **[Exit D3371 Transmission Analyzer]** and then click the **[OK]** button.
   The D3371 application closes and the Windows Desktop is displayed.

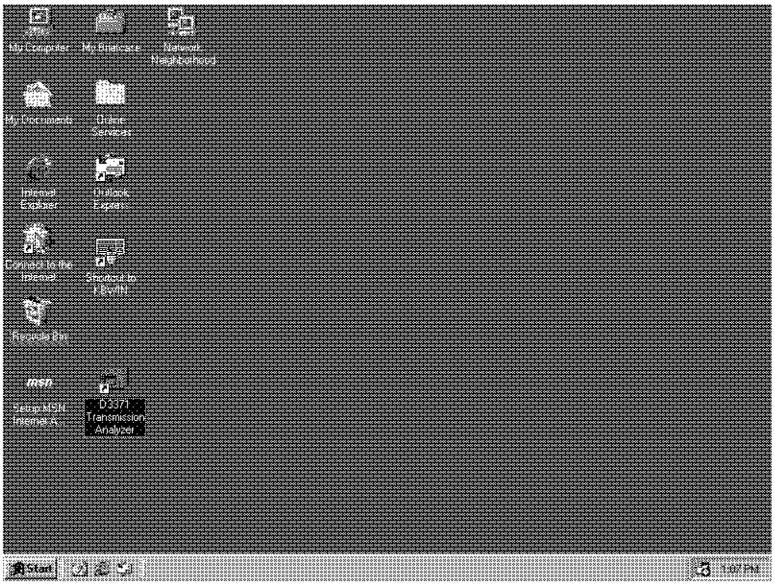


Figure 2-110 Windows Desktop

3. Double-click **[My Computer]** on the Windows Desktop.
   The My Computer window is displayed.

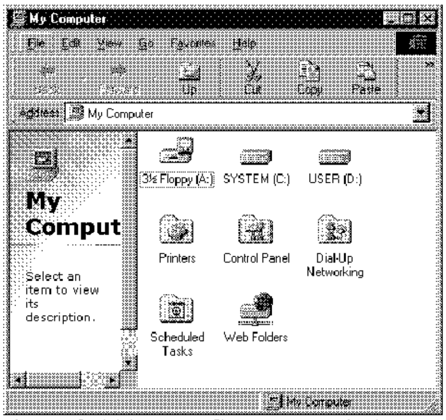


Figure 2-111 My Computer Window

4. Click **[3 1/2 Floppy (A:)]** to select Floppy disk drive.

   The 3 1/2 Floppy (A:) selection window is displayed.

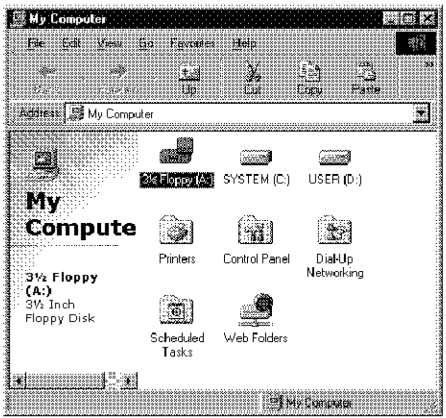


Figure 2-112 3 1/2 Floppy (A:) Selection Window

5. Click **[File]-[Format...]** on the menu bar.

   The Format - 3 1/2 Floppy (A:) dialog box is displayed.

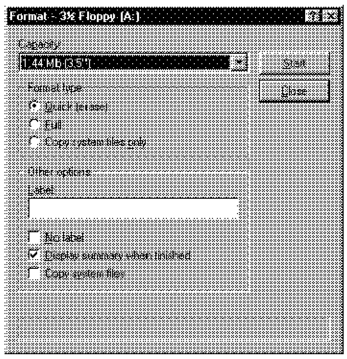


Figure 2-113 Format - 3 1/2 Floppy (A:) Dialog Box

6. Select the appropriate settings (such as size).

7. Make sure that floppy disk's write-protect tab is unlocked.

CAUTION: ***When a floppy disk is formatted, all data on the floppy disk is erased. To prevent important data from being lost, check the floppy before formatting it and back up any important data.***

---

8. Insert a floppy disk.

9. Click the **[Start]** button.

   The formatting process starts. The access indicator is lit while the disk is being formatted (this takes about one minute).

10. When the floppy disk has been formatted, click the **[Close]** button.

    The Format - 3 1/2 Floppy (A:) dialog box closes.

11. Click **[File]-[Close]** on the My Computer window.
    The My Computer window closes.

Starting the D3371 Transmission Analyzer

12. Double-click the **[D3371 Transmission Analyzer]** icon on the Windows Desktop.
    The D3371 application starts, and the measurement window is displayed.

2.7.4 Connecting a Printer

Before a printer can be used, the appropriate driver must be installed. This section explains the general procedure for adding new printer drivers to the D3371.

CAUTION: ***Do not attempt to install printer drivers while the D3371 Transmission Analyzer application is running.***

Installing a printer driver

Quiting the D3371 Transmission Analyzer.

1. Click **[File]-[Exit]** on the menu bar.
   The Exit D3371 Transmission Analyzer Application window is displayed.

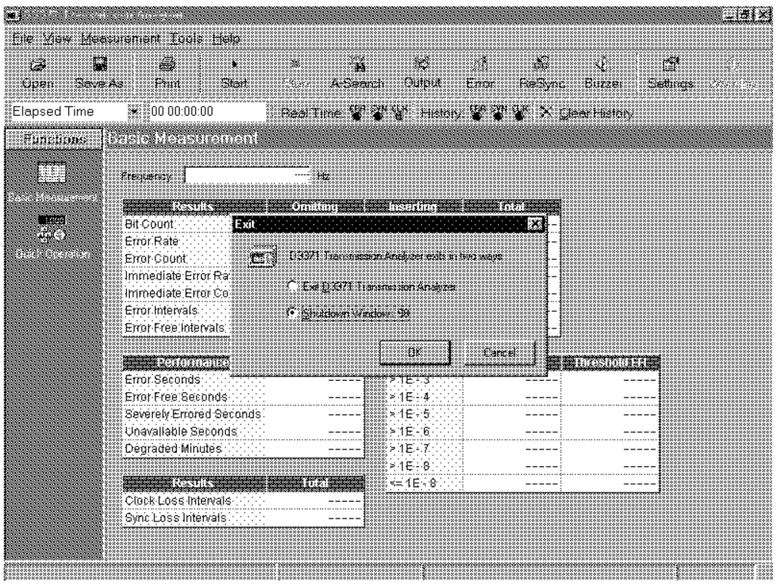


Figure 2-114 Exit D3371 Transmission Analyzer Application Window

2. Select **[Exit D3371 Transmission Analyzer]** and then click the **[OK]** button.

   The D3371 Transmission Analyzer closes, and the Windows Desktop is displayed.

3. Connect the printer cable to the PARALLEL connector on the rear panel.

NOTE: ***For more information on how to connect the printer cable, refer to the Instruction Manual supplied with the printer.***

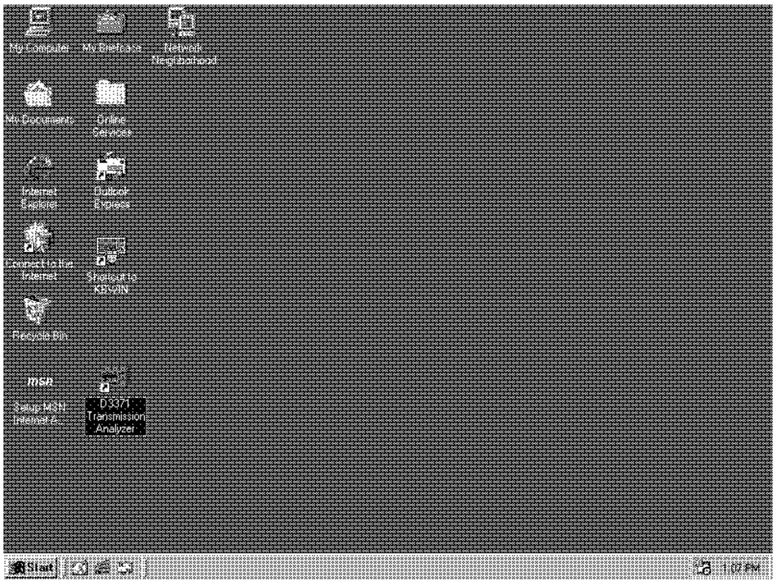


Figure 2-115 Windows Desktop

4. Double-click **[My Computer]** on the Windows Desktop.

   The My Computer window is displayed.

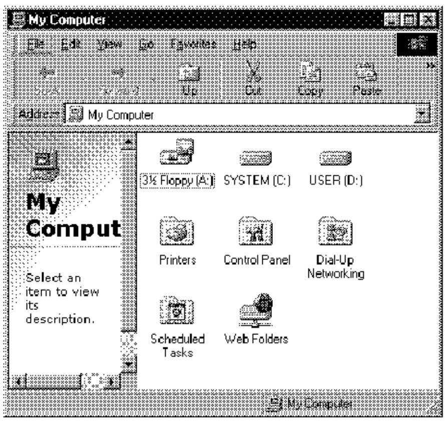


Figure 2-116 My Computer Window

5. Double-click **[Printers]**.

   The Printers window is displayed.

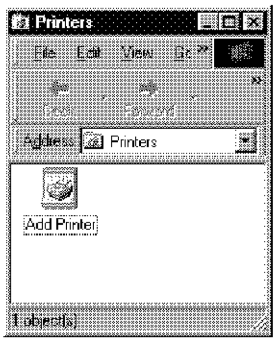


Figure 2-117   Printers Window

6. Double-click the **[Add Printer]** icon.

   The Printer Wizard start window is displayed.

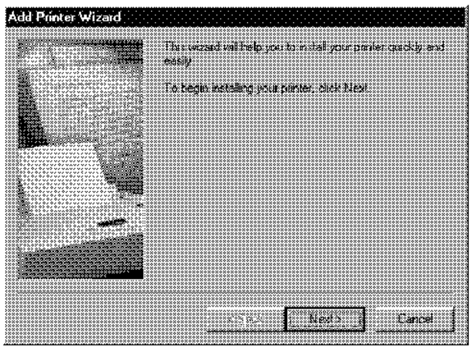


Figure 2-118   Printer Wizard Start Dialog Box Window

7. Follow the instructions in the window to add the driver.

NOTE: ***Only printers supported by Windows can be used. Drivers must be obtained from the manufacturer of the printer.***

8. Click **[File]-[Close]** on the menu bar of the Printers window.

   The Printers window closes.

Starting the D3371 Transmission Analyzer

9. Double-click the **[D3371 Transmission Analyzer]** icon on the Windows Desktop.

   The D3371 Transmission Analyzer starts, and the measurement window is displayed.

2.7.5 Connecting the D3371 to a Network

The D3371 can be connected to an Ethernet (10Base-T) network. Connecting the D3371 to a network enables the user to connect the D3371 to network printers or personal computers (PC) on the network.

NOTE:

1. ***Before connecting the D3371 to a network or modifying the network settings, quit D3371 Transmission Analyzer and setup the connection from the Windows Desktop.***
2. ***It is recommended that a keyboard be used to make network settings.***
3. ***Connect the D3371 to the network as instructed by the network administrator.***

Network settings

Quiting the D3371 Transmission Analyzer.

1. Click **[File]-[Exit]** on the menu bar.
   The Exit D3371 Transmission Analyzer Application window is displayed.

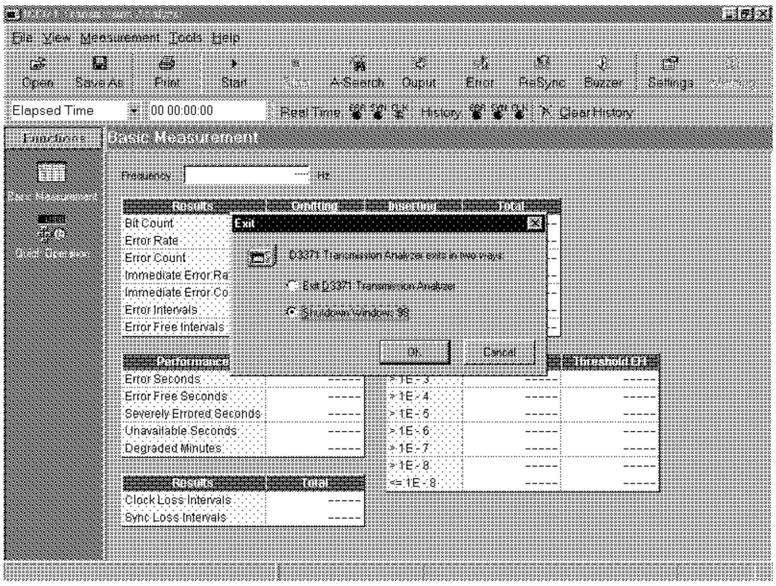


Figure 2-119 Exit D3371 Transmission Analyzer Application Window

2. Select **[Exit D3371 Transmission Analyzer]** and then click the **[OK]** button.
   The D3371 application closes, and the Windows Desktop is displayed.

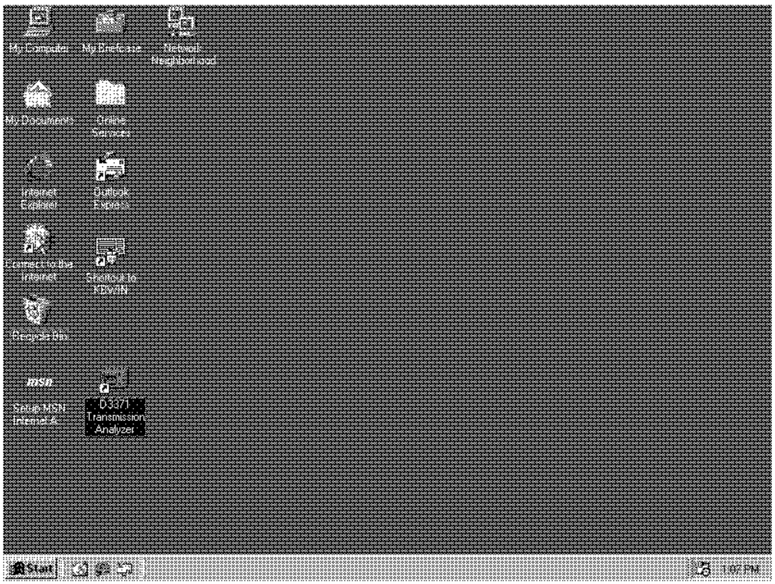


Figure 2-120 Windows Desktop

3. Connect a LAN cable to the ETHERNET connector on the rear panel.
4. Double-click **[My Computer]** on the Windows Desktop.
   The My Computer window is displayed.

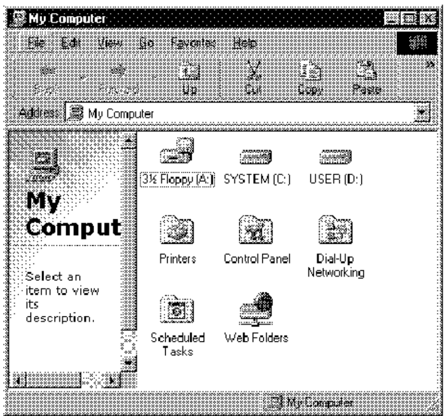


Figure 2-121 My Computer Window

5. Double-click **[Control Panel]**.

   The Control Panel window is displayed.

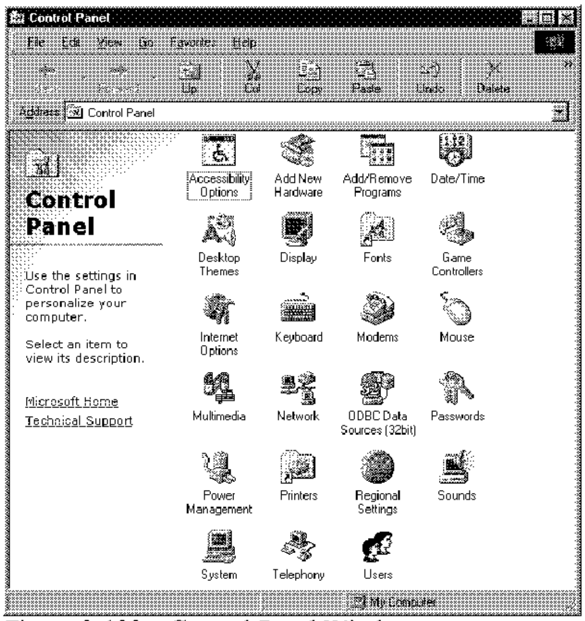


Figure 2-122 Control Panel Window

6. Double-click the **[Network]** icon.

   The Network window is displayed.

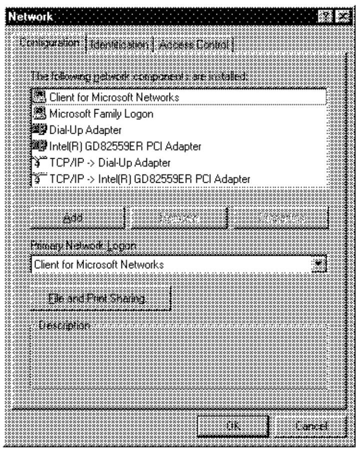


Figure 2-123 Network Dialog Box Window

7. Make the settings as instructed by the administrator.

CAUTION:

1. ***The installed card for the D3371 is the Intel (R) GD82559ER PCI Adapter card. Do not change the properties of this card.***
2. ***Depending on the settings, the user may be prompted for the Intel (R) GD82559ER PCI Adapter installation files. If so, specify the following directory: C:/Windows/Options***
3. ***Depending on the settings, the user may be prompted for Windows installation files. If so, specify the following directory: C:/Windows/Options/Cabs***
4. ***The system may need to be restarted. If this is indicated, follow the instructions as displayed.***

8. Click the **[File]-[Close]** on the menu bar of the Network window.

   The Network window closes.

Starting the D3371 Transmission Analyzer

9. Double-click the **[D3371 Transmission Analyzer]** icon on the Windows Desktop.

   The D3371 Transmission Analyzer starts, and the measurement window is displayed.

2.7.6 Setting the Date and Time

This section explains how to set the date and time.
The example here uses the date December 21, 2000, and the time 21:05:15.

Setting the date

1. Click the **[Settings]** button on the standard toolbar.
   The Settings window is displayed.
2. Click **[System]** on the Module list bar.
   The System setup window is displayed.

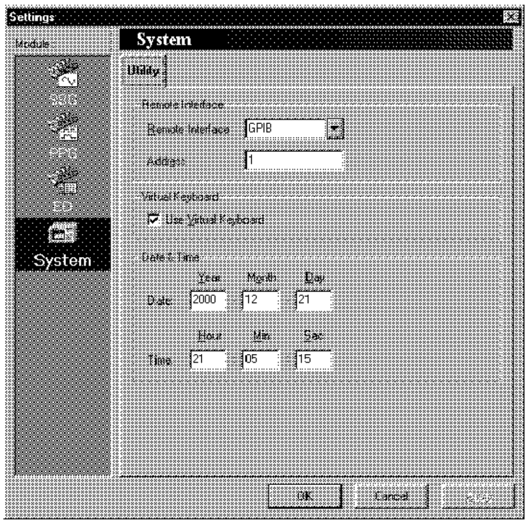


Figure 2-124 System setting Dialog Box Window

3. Click the **[Year]** text box.
   The Virtual Keyboard is displayed.
4. Press **[2]**, **[0]**, **[0]**, and **[0]**, and then click the **[OK]** button.
5. Click the **[Month]** text box.
   The Virtual Keyboard is displayed.
6. Press **[1]** and **[2]**, and then click the **[OK]** button.
7. Click the **[Day]** text box.
   The Virtual Keyboard is displayed.
8. Press **[2]** and **[1]**, and then click the **[OK]** button.

Setting the time

9. Click the **[Hour]** text box.

   The Virtual Keyboard is displayed.

10. Press **[2]** and **[1]**, and then click the **[OK]** button.

11. Click the **[Min]** text box.

    The Virtual Keyboard is displayed.

12. Press **[5]**, and then click the **[OK]** button.

13. Click the **[Sec]** text box.

    The Virtual Keyboard is displayed.

14. Press **[1]** and **[5]**, and then click the **[OK]** button.

15. Click the **[OK]** button.

    The Settings window closes, and the date and time are set.

NOTE:

1. ***If the date and time are changed during a measurement, the change will not affect the log data recording time during measurement. The elapsed time from the start of measurement is used.***
2. ***Changing the date and time settings also changes the clock used by Windows.***

2.7.7 Calibrating the Touch Screen

This section explains how to calibrate the touch screen. This calibration is used to ensure that the touch screen is working correctly.

NOTE: ***We recommend calibrating the touch panel the first time that the D3371 is used or whenever a new operator starts operating the D3371.***

Starting calibration

1. Press **F8 (SHIFT-8)**.
   The calibration start window is displayed.

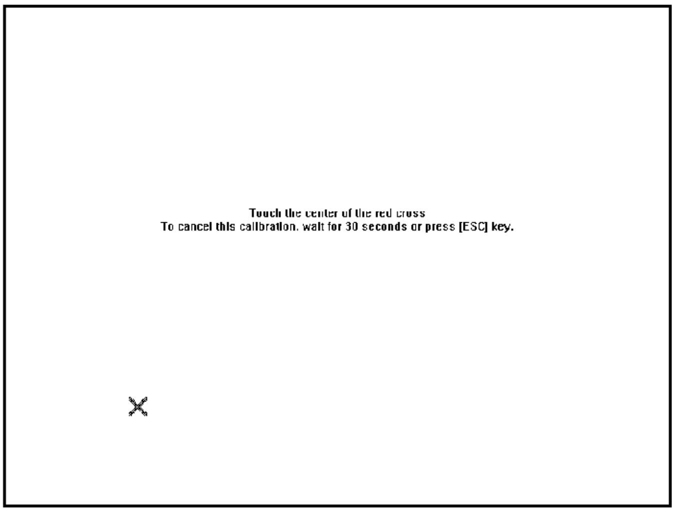


Figure 2-125 Calibration Start Window

Calibration

2. Click the center of the × displayed on the window four times using the special pen.

CAUTION: ***To ensure that the touch screen operates correctly, tap the center of the × as precisely as possible.***

2.7.8 Remote Control Function

This section explains how to select and set up the interface for the D3371 remote control function. The D3371 uses GPIB as the standard remote interface.

For information about remote control, refer to the "D3371 Remote Programming Manual."

The example here selects GPIB as the remote interface and sets 15 as the GPIB address for the D3371.

Selecting the remote interface

1. Click the **[Settings]** button on the standard toolbar.
   The Settings window is displayed.
2. Click **[System]** on the Module list bar.
   The System setup window is displayed.

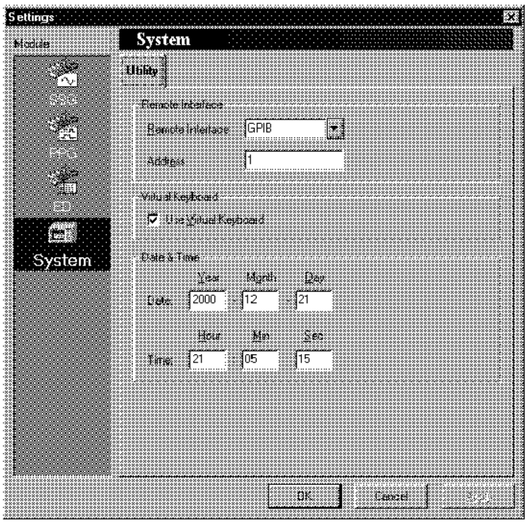


Figure 2-126 System setting Dialog Box Window

3. Click the **[Remote Interface]** drop-down list box.

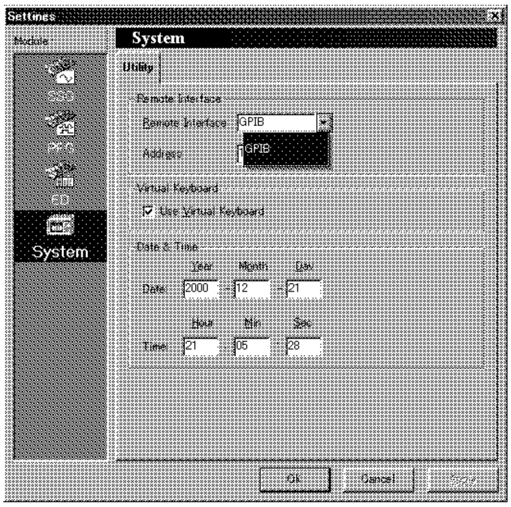


Figure 2-127   Remote Interface Click Area

4. Click **[GPIB]**.

Setting the GPIB address

5. Click the **[Address]** text box.

   The Virtual Keyboard is displayed.

6. Press **[1]** and **[5]**, and then click the **[OK]** button.

7. Click the **[OK]** button.

   The Settings window closes, the GPIB interface is selected, and the GPIB address is set.

2.7.9 Initializing the Settings

This section explains how to initialize the D3371 Transmission Analyzer.

1. Click **[Measurement]-[Set Installation Defaults]** on the menu bar.

   The D3371 Transmission Analyzer display and settings are initialized.

NOTE: ***The initialization process described in this section does not affect the Windows operating system status or settings. See Section 4.6, "Settings," for the default values.***

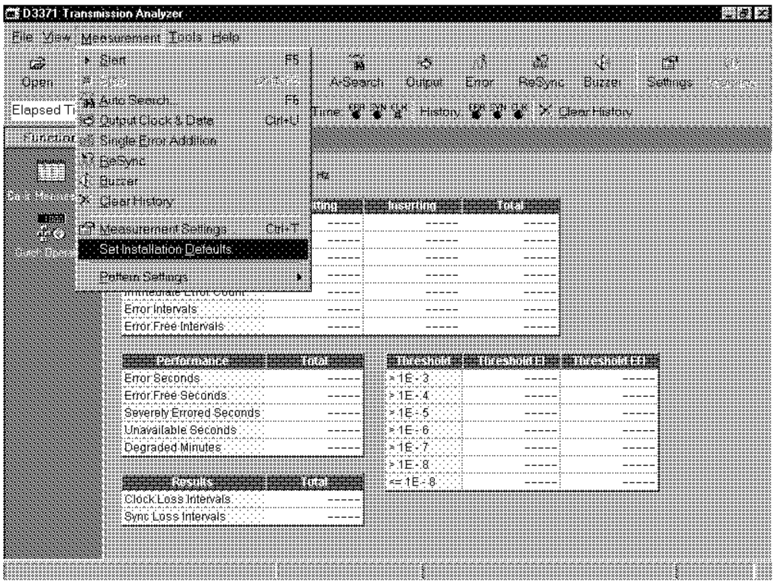


Figure 2-128 Set Installation Defaults Selection Window

2.7.10 Checking the Warning Messages

This section explains how to check warning messages.

If an error occurs during a D3371 operation, the **[Warning]** button on the standard toolbar is enabled, and the occurrence of an error is reported.

If an error occurs, check the warning message. For information on the warning messages, refer to Appendix A.3, "Messages."

CAUTION: ***If the same warning message is displayed repeatedly, it is possible that the end of the life span of the D3371 has been reached, or that the D3371 is faulty. For more information, contact the nearest ADVANTEST Field Office or representative.***

Displaying warning messages

1. Click the **[Warning]** button on the standard toolbar or click **[View]-[Warning...]** on the menu bar.

   The Warning dialog box is displayed.

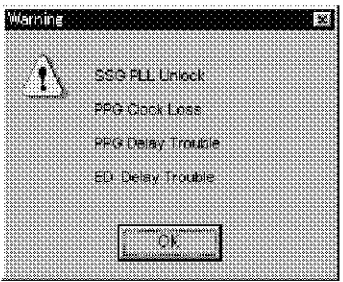


   Figure 2-129 Warning Dialog Box

2. Read the description of the error and then click the **[OK]** button.

   The Warning dialog box closes, and the measurement window is redisplayed.

2.7.11 Checking the Module Configuration of the D3371

This section explains how to check the module configuration of the D3371.
The displayed information consists of the following information:

- D3371 system information
  Revision
  Options
- Installed module information
  Module name
  Revision
  Options

Displaying the module configuration

1. Click **[Help]-[Information]** on the menu bar.
   The Information dialog box is displayed.

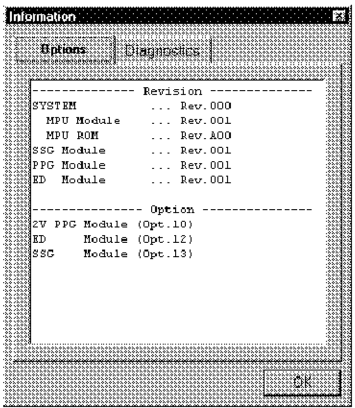


Figure 2-130 Information Dialog Box

2. Confirm that the **[Options]** tab has been selected.
3. Click the **[OK]** button.
   The Information dialog box closes, and the measurement window is redisplayed.

2.7.12 Self-Test

This section explains how to check the results of the D3371 self-test. A self-test is carried out automatically at the start of the D3371 Transmission Analyzer application of this analyzer.

Checking the results of the self-test

1. Click **[Help]-[Information]** on the menu bar.
   The Information dialog box is displayed.

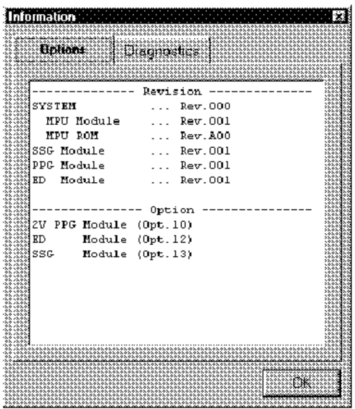


Figure 2-131 Information Dialog Box

2. Click the **[Diagnostics]** tab.
   The results of the self-test are displayed.

If the results indicate no failures:

All test results are displayed in black.

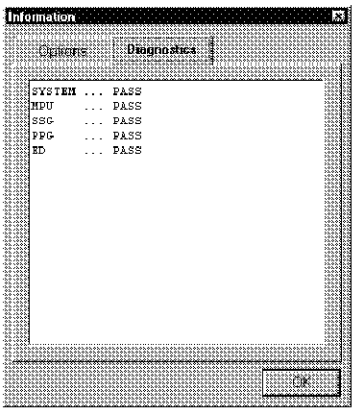


Figure 2-132 Self-Test Window

1. Click the **[OK]** button.

   The Information dialog box closes, and the measurement window is displayed.

If an error occurs

If an error is detected during the self-test, a description of the error is displayed in red.

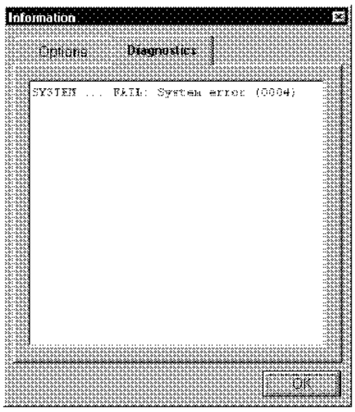


Figure 2-133 A Self-Test Error

1. Record any information displayed about the error. This is information is used by Advantest to determine the cause of the error.
2. Click the **[OK]** button.

   The Information dialog box closes, and the measurement window is displayed.
3. Turn off the power to the D3371. (See Section 1.8.2, "Exiting the D3371 and Turning the Power Switch Off")

NOTE: ***If an error is detected during the self-test, contact the nearest ADVANTEST Field Office or representative for information on getting the D3371 repaired. In addition, provide any relevant information about the error when requesting repairs.***

3. MEASUREMENT EXAMPLE

This chapter uses an example measurement to explains how to use the D3371.

3.1 Bit Error Measurement

The bit error measurement process flow with the bit error measurement example is described as a basic function of the D3371 in the following sections.

3.1.1 Bit Error Measurement Process Flow

This section describes the bit error measurement process flow.

Measurement process flow

Setting-up
- Connect SSG module and PPG module
- Turn power on

↓

Initialization of settings

↓

SSG module settings
- Clock frequency

↓

PPG module settings
- DATA OUTPUT, $\overline{\text{DATA}}$ OUTPUT
- CLOCK OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT
- Patterns
- Burst mode
- Error insertion
- Trigger/auxiliary outputs

↓

Continued on the next page

3.1.1 Bit Error Measurement Process Flow

ED module settings

- DATA INPUT
- CLOCK INPUT
- Patterns
- Pattern synchronization
- Auto-search
- Mask roots
- Trigger/auxiliary outputs
- Log
- Measurement conditions
- Display formats
- Buzzer
- Specific field

↓

Saving the settings

↓

Connections of UUT or DUT

↓

Performing the bit error measurement

- Enable output
- Perform auto search
- Start bit error measurement
- Terminating error measurement
- Disable output

↓

Checking of results

↓

Saving of results

↓

Removal of UUT or DUT

↓

The operation of this D3371 is terminated and the power is turned off.

3.1.2 Bit Error Measurement Example

This section introduces a bit error measurement example. In the example, settings examples and operation examples are described.

Measurement example

Measurement items:	Bit error measurement (including error rates and error counts)
Measurement object:	ECL-interface DFF IC
System configuration:	The D3371 main unit, SSG module, PPG module and ED module
Saving of settings:	Save
Saving of results:	Save

An example of settings

CAUTION: Specify settings that are suitable for objects for which measurement is performed.

SSG module settings

- Clock frequency: 3.6 GHz

PPG module settings

• DATA OUTPUT:	Termination: ECL (-2 V); Amplitude: 0.80 V; Offset (High): -0.90 V
• $\overline{\text{DATA}}$ OUTPUT:	Default
• CLOCK OUTPUT:	Termination: ECL (-2 V); Amplitude: 0.80 V; Offset (High): -0.90 V
• $\overline{\text{CLOCK}}$ OUTPUT:	Termination: ECL (-2 V); Amplitude: 0.80 V; Offset (High): -0.90 V
• Patterns:	PRBS patterns; Pattern length: 2^{23}-1; Mark ratio: 1/2.
• Burst:	Default
• Error insertion:	Default
• Trigger/auxiliary outputs:	Default

ED module settings

• DATA INPUT:	Threshold voltage: -1.300 V; Termination voltage: ECL (-2V)
• CLOCK INPUT:	Termination voltage: ECL (-2V)
• Patterns:	PRBS patterns; Pattern length: 2^{23}-1; Mark ratio: 1/2.
• Pattern synchronization:	Default
• Auto-search:	Default
• Mask route:	Default
• Trigger/auxiliary outputs:	Default

• Log:	Default
• Measurement conditions:	Default
• Display formats:	Default
• Buzzer:	Error: ON; Alarm: ON
• Specific field:	Default

* Refer to "4.6 Settings" about the default

An opetration example

CAUTION: ***The hard disk or files may be damaged if the D3371 power is turned off while the D3371 is being started.***

NOTE: ***To take accurate measurements using the built-in SSG module in the D3371, and wait at least 30 minutes after the power turned on for warm up.***

Setup

1. Connect the SSG and PPG module referring to Section 1.7, "Setup."

Turning the power on

2. Check that the **POWER** switch on the front panel is turned off.
   Connect the supplied power cable to the AC power connector on the rear panel.

   CAUTION:

   1. Do not apply an input voltage or frequency exceeding the specified range to prevent damage to the D3371 (refer to Section 1.5.2).
   2. The power consumption is 450 VA or less. Use a suitable power supply.

3. Turn on the **POWER** switch on the front panel.

   The **POWER** indicator is lit. The D3371 checks the internal memory while the ADVANTEST logo window is being displayed. The system startup window is displayed first. Then, the measurement initialization window is displayed.

   NOTE: ***The window display after the startup may be different depending on the previous settings.***

Initializing the settings condition

Initialize D3371 settings to default condition.

4. Click **[Measurement]-[Set Installation Defaults]** on the menu bar.

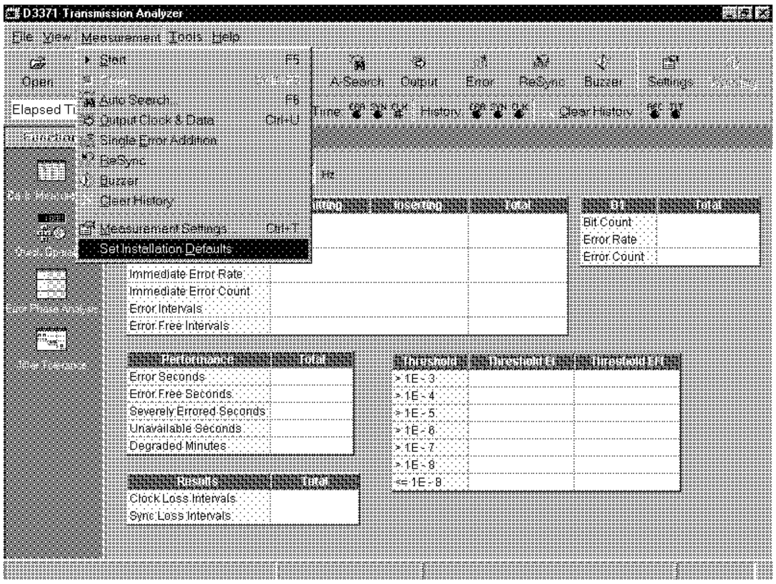


Figure 3-1 Set Installation Defaults Selection Window

SSG module settings

Displaying settings window

5. Click the **[Settings]** button on the standard tool bar.

   The settings window is displayed. At this time, **[SSG]** is selected in the module selection list bar.

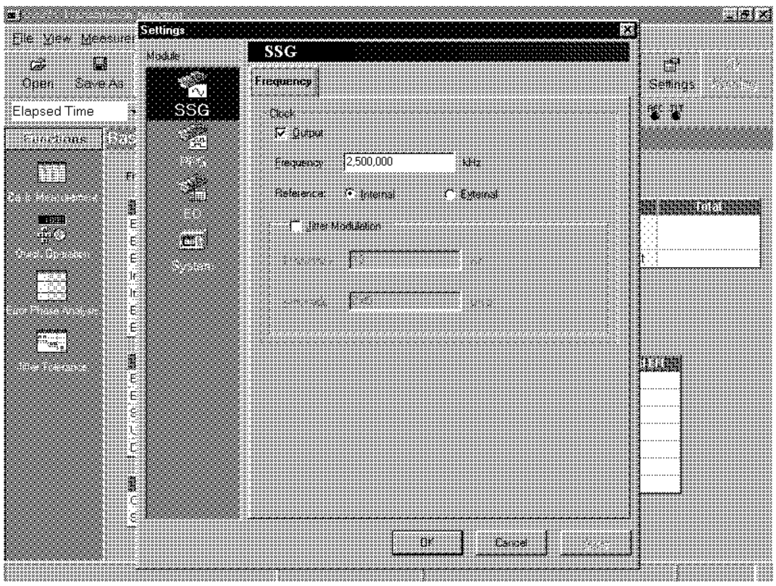


Figure 3-2 Settings Dialog Box Window

Clock frequency settings

6. Click **[Frequency]** text box.

   The Virtual Keyboard is displayed. Input 3.6 GHz through the Virtual Keyboard.

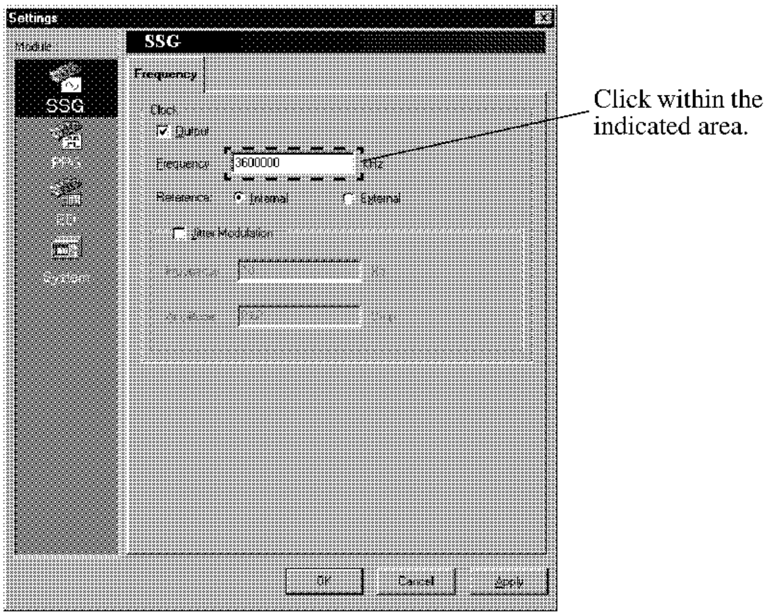


Figure 3-3 Window displayed after thea Frequency has been

PPG module settings

Displaying the PPG module settings window.

7. Click **[PPG]** on the module selection list bar.

   The PPG module settings window is displayed.

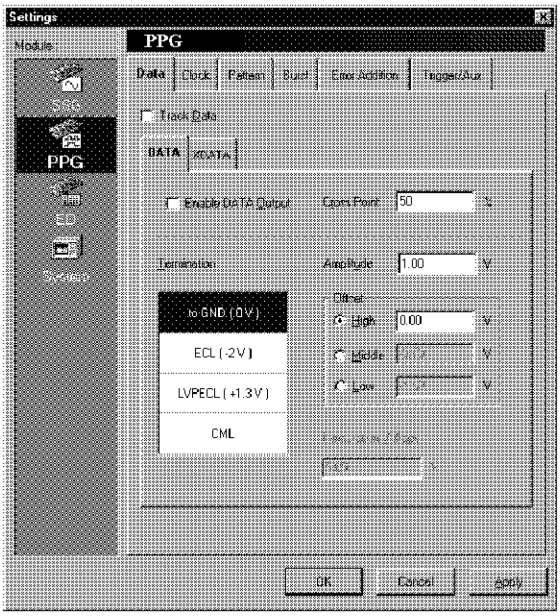


Figure 3-4 PPG Module Settings Window

DATA OUTPUT settings

8. Click ECL (-2 V) on the **[Termination]** list box.

   ECL (-2 V) is selected as the termination voltage. At this time, the **[Amplitude]** text box and Offset **[High]** text box are automatically set to 0.80 V and -0.90 V, respectively.

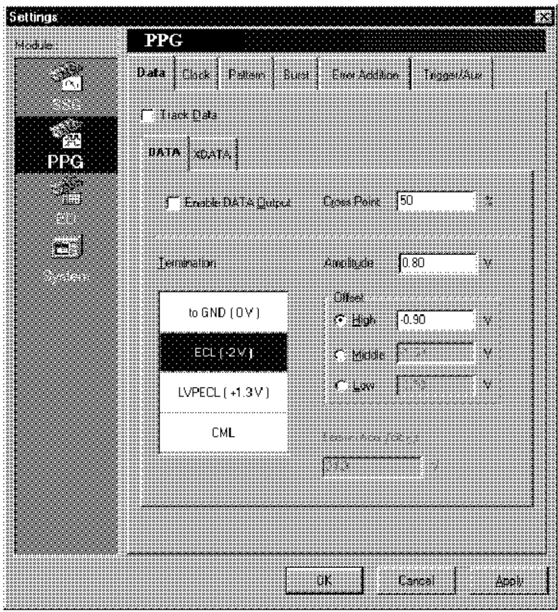


Figure 3-5 Window displaying the DATA OUTPUT Settings

Displaying the CLOCK OUTPUT settings window

9. Click the **[Clock]** tab.

   The clock output settings window is displayed.

CLOCK OUTPUT settings

10. Click ECL (-2 V) on the **[Termination]** list box.

    ECL (-2 V) is selected as the termination voltage. At this time, the **[Amplitude]** text box and Offset **[High]** text box are automatically set to 0.80 V and -0.90 V, respectively.

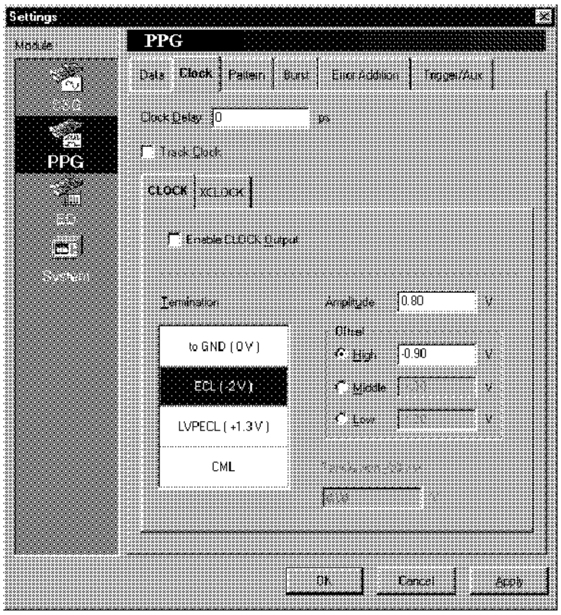


Figure 3-6 Window displaying the CLOCK OUTPUT Settings

Displaying the $\overline{\text{CLOCK}}$ OUTPUT settings window

11. Click the **[XCLOCK]** tab.

    The $\overline{\text{CLOCK}}$ OUTPUT settings window is displayed.

$\overline{\text{CLOCK}}$ OUTPUT settings

12. Click ECL (-2 V) on the **[Termination]** list box.

    ECL (-2 V) is selected as the termination voltage. At this time, the **[Amplitude]** text box and Offset **[High]** text box are automatically set to 0.80 V and -0.90 V, respectively.

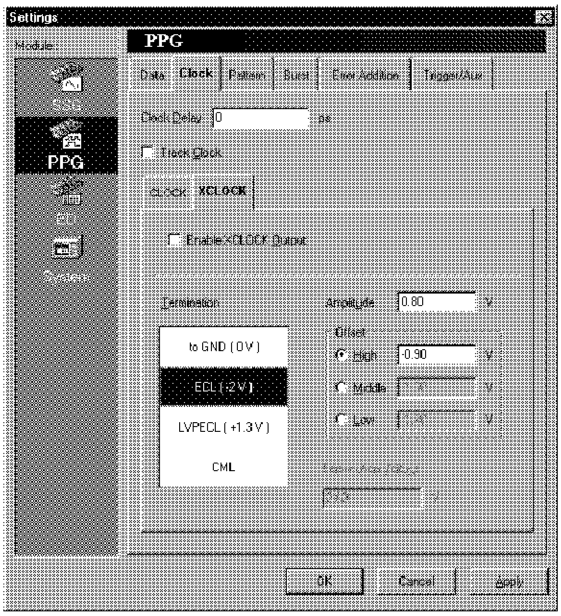


Figure 3-7 Window displaying the $\overline{\text{CLOCK}}$ OUTPUT Settings

Displaying the pattern settings window

13. Click the **[Pattern]** tab.

    The pattern settings window is displayed. At this time, PRBS pattern is selected as the pattern type.

Pattern settings

14. Click the **[Pattern Length]** drop-down list box.

    A pattern length list is displayed. Click **[2^23-1]** on the list. The pattern length is set to 2^23-1.

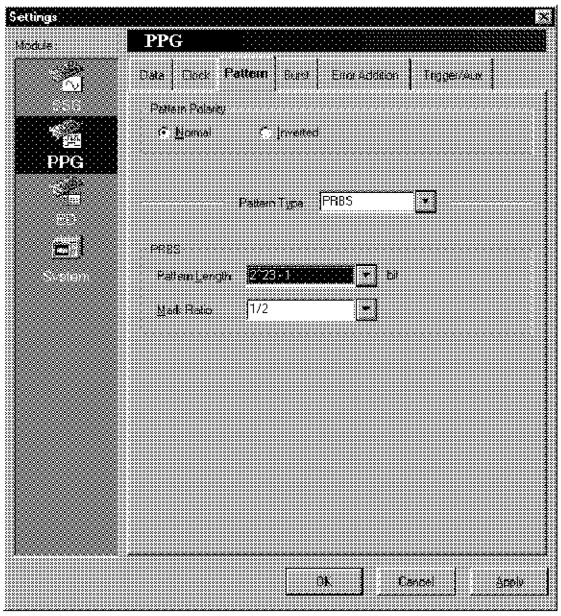


Figure 3-8 Window diplayed after a Pattern (for PPG module) has been set

ED module settings

Displaying the ED module settings window

15. Click **[ED]** on the module selection list bar.

    The ED module settings window is displayed and the **[DATA]** tab is selected.

DATA INPUT settings

16. Click ECL (-2 V) on the **[Termination]** list box.

    ECL (-2 V) is selected as the termination voltage. At this time, -1.30 V is automatically set in the **[Threshold Voltage]** text box.

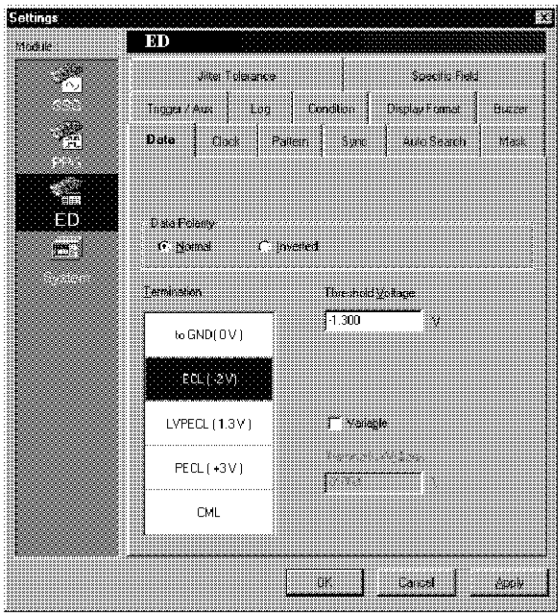


Figure 3-9 Window displaying the DATA INPUT Settings

Displaying the CLOCK INPUT settings window

17. Click the **[Clock]** tab.
    The clock input settings window is displayed.

CLOCK INPUT settings

18. Click ECL (-2 V) on the **[Termination]** list box.
    ECL (-2 V) is selected as the termination voltage.

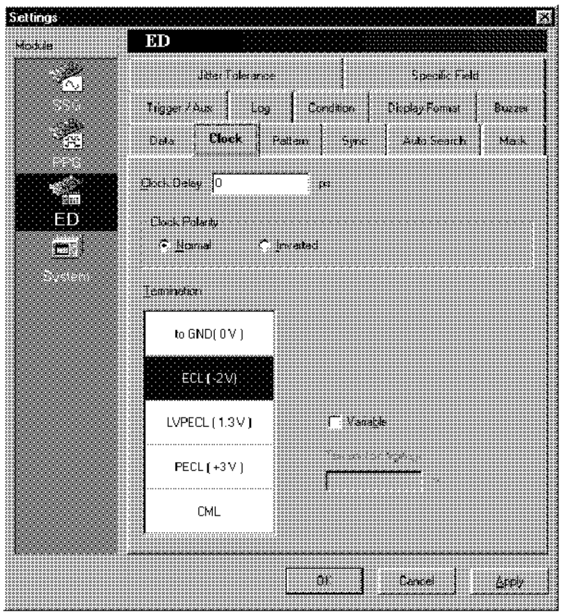


Figure 3-10 Window displaying the CLOCK INPUT Settings

Displaying the pattern settings window

19. Click the **[Pattern]** tab.

    The pattern settings window is displayed. At this time, the PRBS pattern is selected as the pattern type.

Pattern settings

20. Click the **[Pattern Length]** drop-down list box.

    The pattern length list is displayed. Click **[2^23-1]** on the list. The pattern length is set to 2^23-1.

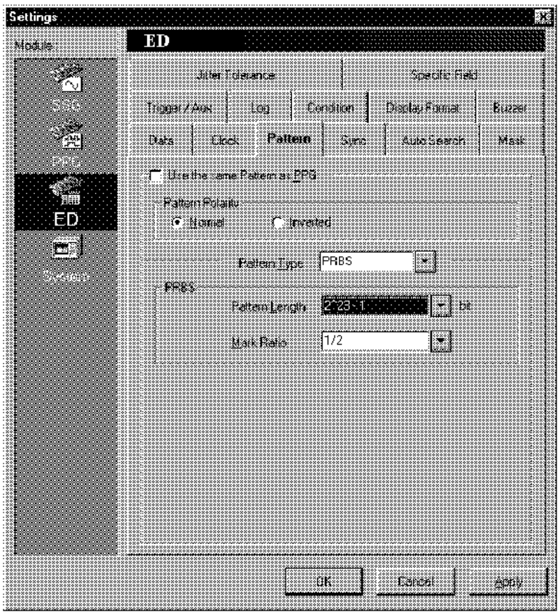


Figure 3-11 Window displaying Pattern Settings (for ED module)

Displaying the buzzer settings window

21. Click the **[Buzzer]** tab.

    The buzzer settings window is displayed.

Buzzer settings

22. Click the **[Error]** check box.

    The check mark (✓) is displayed.

23. Click the **[Alarm]** check box.

    The check mark (✓) is displayed.

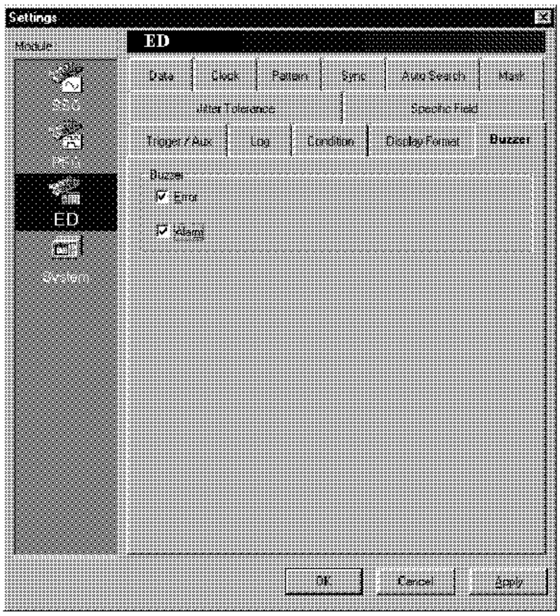


Figure 3-12 Window displaying the Buzzer Settings

NOTE: ***The buzzer may also be set using [Buzzer] on the standard tool bar. If the sound is annoying, set the buzzerit to OFF in the settings window and turn it ON using the standard tool bar when taking measurements.***

Updating the settings

24. Click the **[OK]** button.

    Updated contents are set. The Settings window closes.

Saving of settings

Displaying the Save As dialog box.

25. Click the **[Save As]** button on the standard tool bar.

    The Save As dialog box is displayed.

Naming a save file

26. Input the file name of the data to be saved in the **[File name]** text box. In this example, 001 is entered.

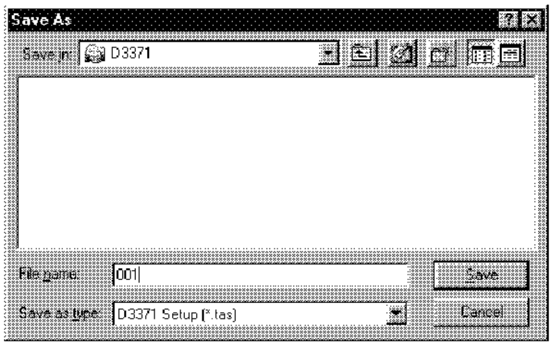


Figure 3-13 (D3371 Set up) Window Displaying the Save As dialog Box Settings

Execute to save

27. Click the **[Save]** button.

Connecting the UUT or DUT

CAUTION: ***Refer to Section 1.6, "Safety precautions when using the D3371," when connecting a UUT or DUT to the D3371. Discharge any static electricity before connecting cables or equipment to the I/O connectors. Connect 50 Ω terminators to any CLOCK OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT, DATA OUTPUT, and $\overline{\text{DATA}}$ OUTPUT connectors that are not used.***

---

28. As shown in Figure 3-14, use the supplied coaxial cable to connect to the measurement module on the right side of the front panel. Connect the supplied 50 Ω terminator to the $\overline{\text{DATA}}$ OUTPUT connector that is not used.

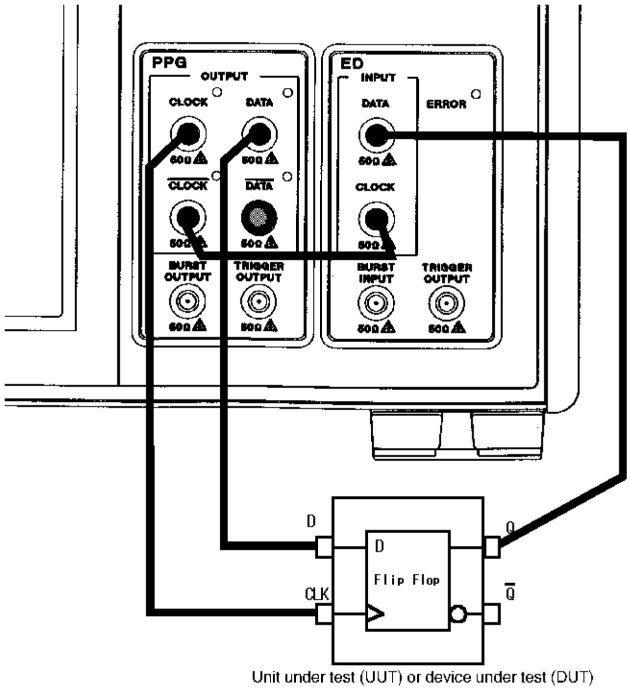


Figure 3-14 Cable Connections between the PPG and ED Module

Executing the bit error measurement

Enabling the output

CAUTION:

1. ***Depending on output interface settings, The UUT or DUT may become damaged. Check the device settings carefully before the excuting the output.***
2. ***The output is disabled immediately after the power is turned on. When the outputting is disabled, it is set to 50Ω and GND (0 V) is provided (However, there may be a potential difference of several millivolts between the output terminal and the frame ground).***

29. Click the **[Output]** button on the standard tool bar.

    Both the output data and clock data are enabled.

[Output] button

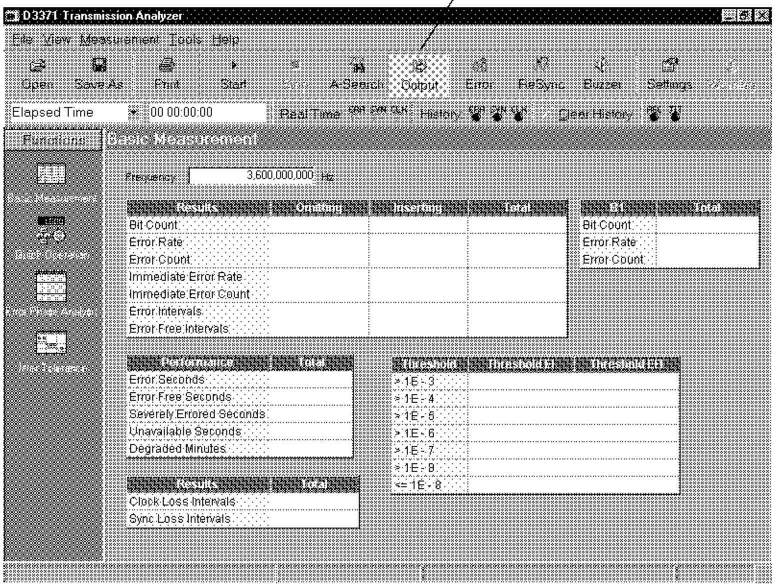


Figure 3-15 Window displaying OUTPUT Set to ON

Executing the auto-search

30. Click the **[A-Search]** button on the standard tool bar.

    The Auto Search dialog box is displayed. Progress status is displayed in the Auto Search dialog box.

    With Auto Search, the following conditions are optimized.

    • Phase relationship between data input and clock input

    • Data input threshold voltage

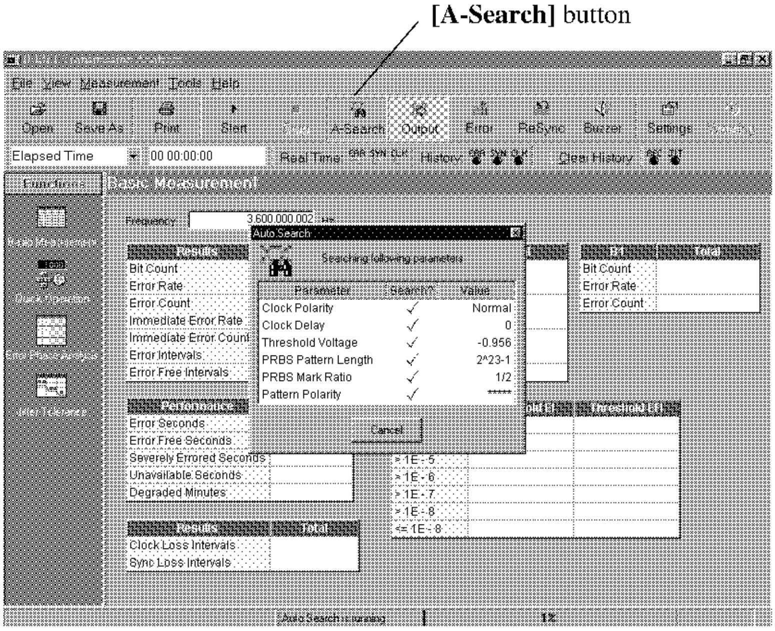


Figure 3-16 Auto Search Running Window

NOTE:

The case in which synchronization is not established with auto-search.

- ***If the phase relationship between the data input and clock input of the UUT or DUT is not suitable, the UUT or DUT may not function correctly and running the auto-search may not establish synchronization. In such a case, adjust the input phase of the UUT or DUT by varying the clock delay of the PPG module.***

Starting bit error measurement

31. Click the **[Start]** button on the standard tool bar.

    Bit error measurement starts.

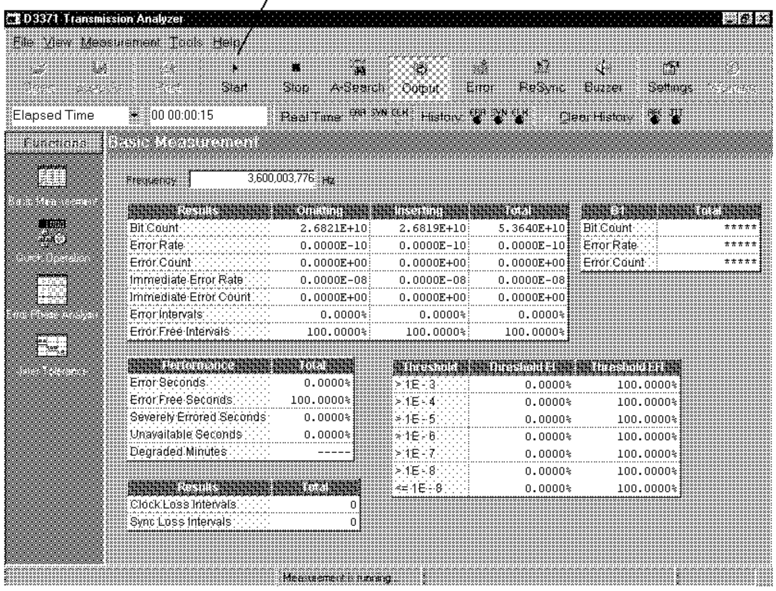


Figure 3-17 Basic Measurement Window (while bit errors are being measured)

Terminating bit error measurement

32. Click the **[Stop]** button on the standard tool bar.
    Bit error measurement ends.

Disabling the output

33. Click the **[Output]** button on the standard tool bar.
    Both data output and clock output are disabled.

Checking the results

34. Check results in the Basic Measurement window.

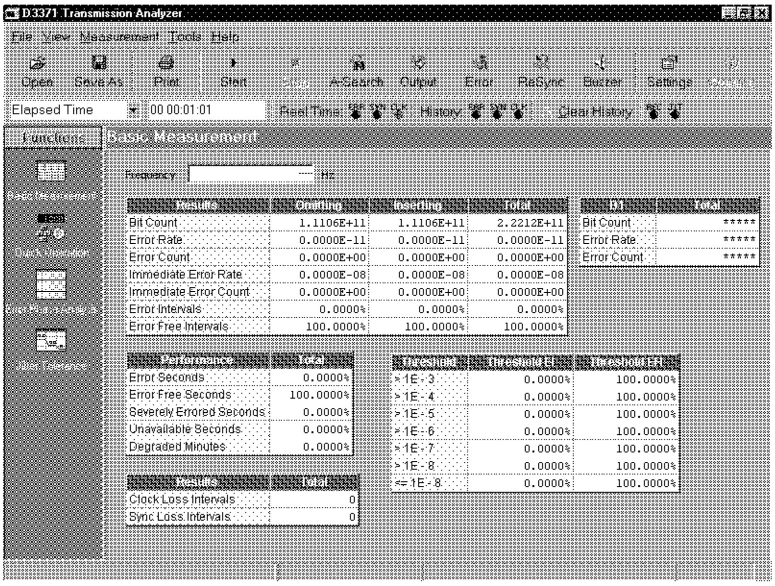


Figure 3-18 Basic Measurement Window (used to display results)

Saving the results

Displaying Save As dialog box

35. Click the **[Save As]** button on the standard tool bar.

    The Save As dialog box is displayed.

Naming a save file

36. Input the file name of the data to be saved in the **[File name]** text box. In this example, 002 is entered.

Selecting a file type

37. Select Basic Measurement Data Log[*.text] from the **[Save As type]** drop-down list box.

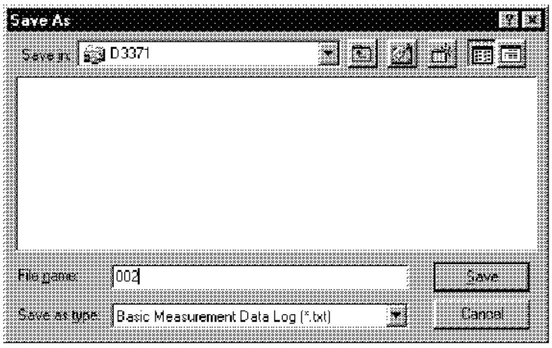


Figure 3-19 Window Displaying the Save As Dialog Box (Basic Measurement Data Log)

To save

38. Click **[Save]** button.

    The file is saved.

Removal of the UUT or DUT

CAUTION: ***Take pre-cautions with static electricity and other dangerous factors when removing the UUT or DUT. Refer to "1.6 Safety precautions when using the D3371" for details.***

---

39. Remove cables connecting the UUT or DUT with the D3371.

    Attach a 50Ω terminator to DATA OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT and CLOCK OUTPUT.

Terminating the operation of the D3371 and turning-off of the power

40. Follow the procedure described in "1.8.2 Exiting the D3371 and Turning the Power Switch Off" to turn the power off.

3.2 Measurement of Phase Margins

This section describes the process flow of manual phase margin measurement and provides a measurement example.

3.2.1 Phase Margin Measurement Process Flow

This section describes the process flow of phase margin measurement. It is very similar to the process flow used in the bit error measurement except for the following three points: Measurement is performed using the Quick Operation window; results are checked using calculations; and results are not saved.

Measurement process flow

Setting-up
- Connect SSG module with PPG module
- Turn power on

↓

Initialization of settings

↓

SSG module settings
- Clock frequency

↓

PPG module settings
- DATA OUTPUT, $\overline{\text{DATA}}$ OUTPUT
- CLOCK OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT
- Patterns
- Burst mode
- Error insertion
- Trigger/auxiliary outputs

↓

Continued on the next page

ED module settings
- DATA INPUT
- CLOCK INPUT
- Patterns
- Pattern synchronization
- Auto-search
- Mask route
- Trigger/auxiliary outputs
- Logs
- Measurement conditions
- Display formats
- Buzzer
- Specific field

↓

Saving of settings

↓

Connection of UUT or DUT

↓

Performing phase margin measurement
- Enable output
- Perform auto search
- Start bit error measurement
- Display Quick Operation window
- Measure phase margins
- Terminate bit error measurement
- Disable output

↓

Checking of results
- Calculate phase margins

↓

Removal of UUT or DUT

↓

The operation of the D3371 is terminated and the power is turned off.

3.2.2 Phase Margin Measurement Example

This section describes a phase margin measurement example. Operation examples are also included.

Measurement example

CAUTION: ***Specify settings that are suitable for objects for which measurement is performed.***

Measurement items:	Phase margin measurement
Measurement object:	ECL-interface DFF IC
System configuration:	The D3371 main unit, SSG module, PPG module and ED module
Saving of settings:	Save

Setting example

The same settings as in bit error measurement example are used. Refer to Section 3.1.2, "Bit Error Measurement Example."

Example operation:

Operations for:
From set-up to the performing phase margin measurement, and the start of bit error measurement

1. Settings are the same as that for bit error measurement. Refer to Section 3.1.2, "Bit Error Measurement Example."

Performing the phase margin measurement

Displaying the Quick Operation window

2. Click **[Quick Operation]** on the function bar.
   The Quick Operation window is displayed.

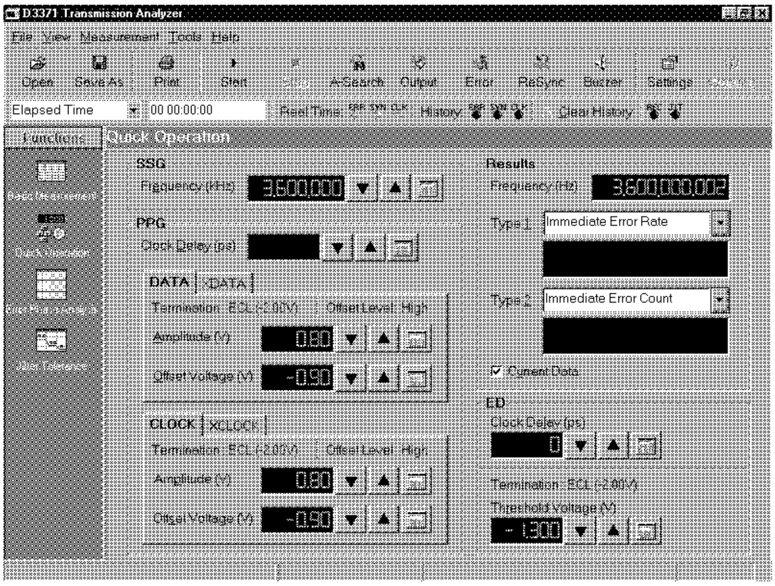


Figure 3-20 Quick Operation Window

Phase margin measurement

Moving the cursor

3. Click numeric data in the **[Clock Delay (ps)]** display area for ED module.

   The cursor moves to the numeric data. Blinking numeric data requires updating. Use the ← and → keys to move the cursor through the data.

Example: This digit blinks.

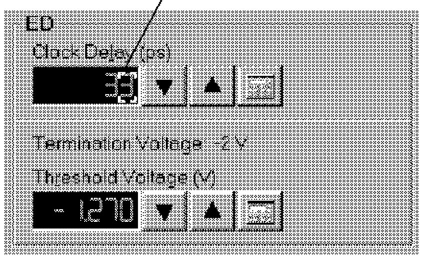


Figure 3-21 Clock Delay Specification

Maximum clock delay measurement

4. Rotate the data knob on the panel key to the right while monitoring the **[Immediate Error Count]** display. Clock delay increases with rotation.

   Rotate the data knob until the buzzer generates a sound or an error count is indicated in **[Immediate Error Count]**.
   If an error occurds, rotate the data knob to the left until the error stop. Record the clock delay (as Dmax).

NOTE: ***In Quick Operation, measurement condition updates are set to the D3371 in real time.***

Minimum clock delay

5. Rotate the data knob of the panel key to the left while monitoring the **[Immediate Error Count]** display.

   Clock delay decreases with rotation. Rotate the data knob until the buzzer generates a sound or an error count is indicated in **[Immediate Error Count]**.
   If an error occurds, rotate the data knob to the right until the error stops. Record the clock delay (as Dmin).

Terminating bit error measurement

6. Click the **[Stop]** button on the standard tool bar

   The bit error measurement is terminated.

Disabling data output

7. Click the **[Output]** button on the standard tool bar.

   Both output are disabled.

Confirmation of results

Phase margin calculations

8. A phase margin is calculated using the following equation. The data calculated gives a UUT or DUT phase margin for the ED module of the D3371.

   (Phase margin) = (Dmax of the ED module) - (Dmin of the ED module)

Operations for:
From the removal of UUT or DUT to the termination of the operation of the D3371, and turning-off the power

9. The operations are the same as those in bit error measurement example. Refer to Section 3.1.2, "Bit Error Measurement Example."

3.3 Measurement for Error Phase Analysis

This section describes the process flow of error phase analysis measurement (error phase analysis option) and shows an example measurement.

3.3.1 Process Flow of Error Phase Analysis Measurement

This section describes the process flow of error phase analysis measurement (error phase analysis option). The process flow is almost the same as that of the bit error measurement except for the following four items which are particular to the process flow of error phase analysis measurement: Error recording is specified; patterns are restricted; error phase analysis is performed when checking results; and a different file format is used to save results.

Measurement process flow

Setting-up
- Connect SSG module with PPG module
- Turn power on

↓

Initialization of settings

↓

SSG module settings
- Clock frequency

↓

PPG module settings
- DATA OUTPUT, $\overline{\text{DATA}}$ OUTPUT
- CLOCK OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT
- Patterns
- Burst mode
- Error insertion
- Trigger/auxiliary outputs

↓

Continued on the next page

ED module settings
- DATA INPUT
- CLOCK INPUT
- Patterns
- Pattern synchronization
- Auto-search
- Mask route
- Trigger/auxiliary outputs
- Logs
- Measurement conditions
- Display formats
- Buzzer
- Specific field
- Error recording

↓

Saving of settings

↓

Connection of UUT or DUT

↓

Performing the bit error measurement
- Enable output
- Perform auto search
- Start bit error measurement
- Terminate bit error measurement
- Disable output

↓

Checking of results
- Display Error Phase Analysis window
- Set display format
- Error phase analysis

↓

Saving of results

↓

Removal of UUT or DUT

↓

The operation of the D3371 is terminated and the power is turned off.

3.3.2 Measurement for Error Phase Analysis Examples

This section describes an example of the error phase analysis measurement. Operational examples are also included.

Measurement example

Measurement items:	Error phase analysis Measurement
Measurement object:	ECL-interface DFF IC
System configuration:	The D3371 main unit, SSG module, PPG module, ED module and Error phase analysis option
Saving of settings:	Save
Saving of results:	Saved with a statistics format

An example of settings

NOTE: Specify settings that are suitable for objects for which measurement is pefromed.

PPG module settings

Patterns:	STM patterns Frame format: Default Insertion of PRBS patterns into payloads: Enabled PRBS patterns: Pattern length PRBS 2^{23} -1; Mark ratio: 1/2 Scrambling: Default B1-byte insertion: Default
Others:	The same settings as in bit error measurement example are used. Refer to Section 3.1.2, "Bit Error Measurement Example."

* Refer to Section 4.6, "Settings."

ED module settings

Patterns:	Enable pattern associated functions
Others:	The same settings as in bit error measurement example are used. Refer to Section 3.1.2, "Bit Error Measurement Example."

Measurement settings for error phase analysis

Error recording:	Enabled
Error-recording area:	The entire area

Operation examples

Operations for:
From setting-up to the ED module settings

1. The operations are the same as those in bit error measurement example. Refer to Section 3.1.2, "Bit Error Measurement Example" for the details. However, the pattern settings and updating the settings are omitted, since the settings will be performed again.

PPG module settings

Pattern settings
Displaying the pattern settings window

2. Click the **[Pattern]** tab.

   The pattern settings window is displayed.

Selecting a pattern type

3. Click the **[Pattern Type]** drop-down list box. Then, select **[STM]** from the list.

Enabling (ON)/disabling (OFF) PRBS pattern insertion into payloads

4. Click the **[Insert PRBS into Payload]** check box. The check mark (✓) is displayed.

Settings of PRBS pattern length

5. Click the **[Pattern Length]** drop-down list box. Then, select **[2^23-1]** from the list.

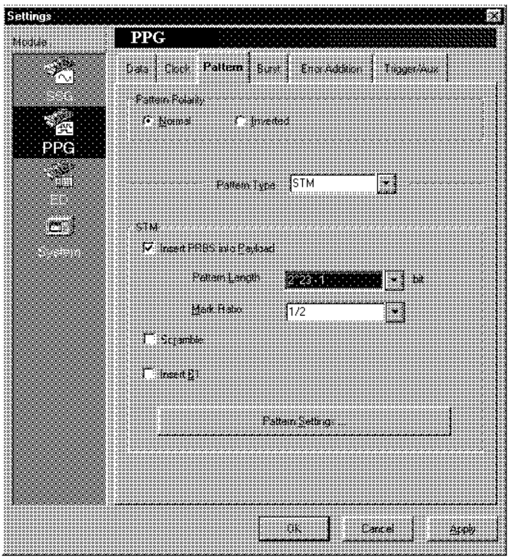


Figure 3-22 Window displaying the STM Pattern Settings (for PPG module)

ED module settings

Pattern settings
Displaying the pattern settings window

6. Click the **[Pattern]** tab.

   The pattern settings window is displayed.

Pattern settings-associated functions

7. Click the **[Use the same Pattern as PPG]** check box.

   The check mark (✓) is set.

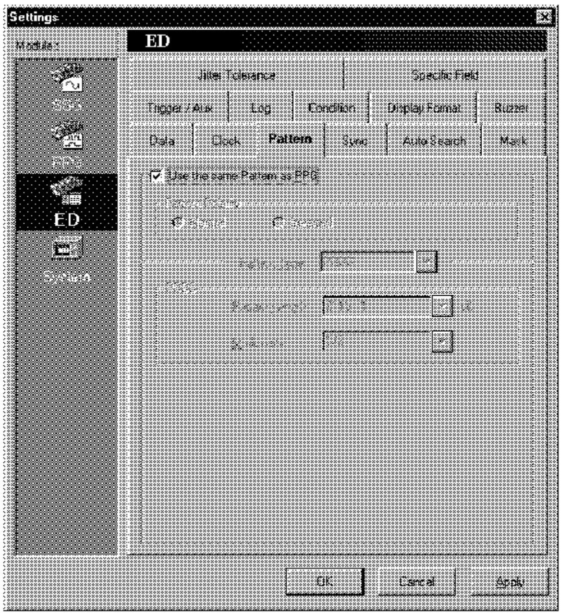


Figure 3-23 Window displaying the STM Pattern Settings (for ED module)

Settings for error recording

Displaying the measurement condition settings window

8. Click the **[Condition]** tab.

   The measurement condition settings window is displayed.

Enabling (ON)/disabling (OFF) error recording

9. Click the **[Error Record]** check box.

   The check mark (✓) is set.

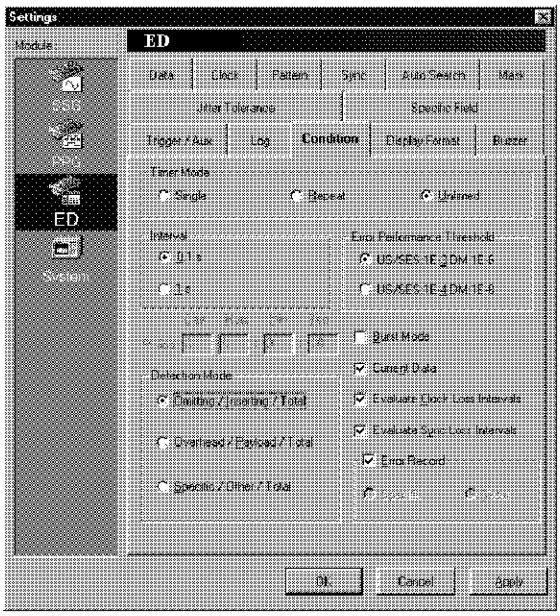


Figure 3-24 Window displaying the Error Record Settings

Updating the settings

10. Click the **[OK]** button.

    Updated contents are set. The Settings window closes.

Operations for:
From the saving of settings to the performing of bit error measurement

11. The operations are the same as those in the bit error measurement example. Refer to Section 3.1.2, "Bit Error Measurement Example."

Confirmation of results

Displaying the Error Phase Analysis window

12. Click **[Error Phase Analysis]** on the function bar.

    The Error Phase Analysis window is displayed.

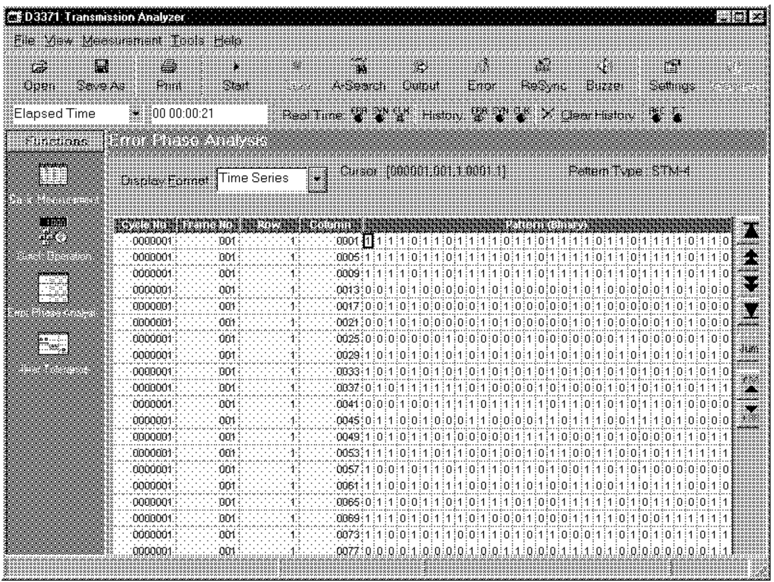


Figure 3-25 Error Phase Analysis Window (with a time-series format)

Setting the display format

13. Click the **[Display Format]** drop-down list box. In this example, **[Statistics]** is selected from the list.

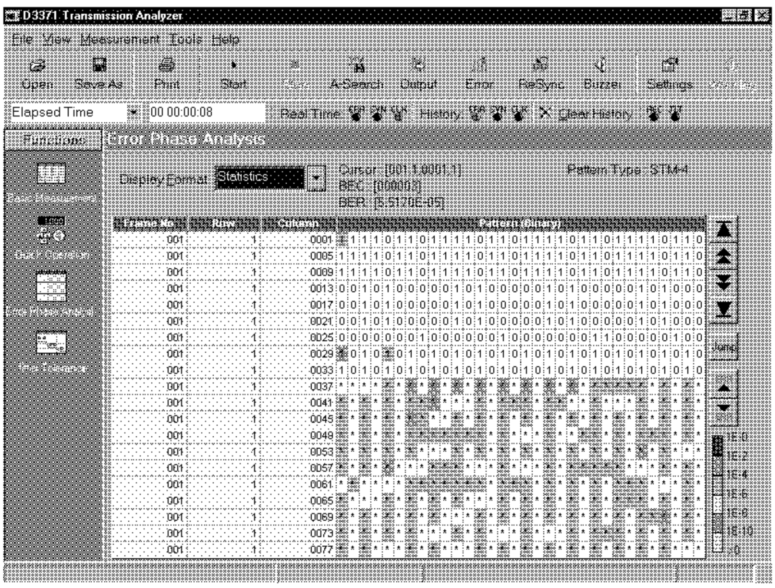


Figure 3-26 Error Phase Analysis Window (with a statistics format)

Error phase analysis

14. Error phases are analyzed by scrolling the window or using jumping operations.

Saving of results

Displaying the Save As dialog box

15. Click the **[Save As]** button on the standard tool bar.

    The Save As dialog box is displayed.

Naming a save file

16. Input the file name of a data to be saved to the **[File name]** text box. In this example, 003 is entered

Selecting a file type

17. Select Error Phase Analysis Statistics [*.text] from the **[Save as type]** drop-down list box.

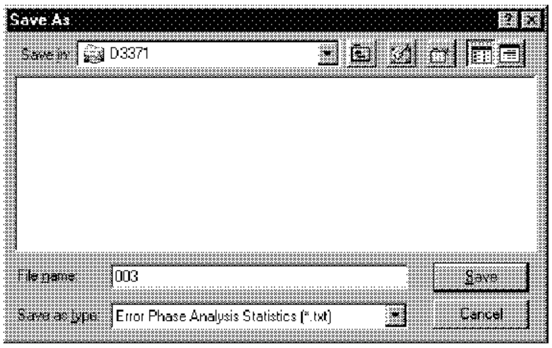


Figure 3-27 Window displaying the Save As Dialog Box Settings (Error Phase Analysis Statistics)

Specifying the save range

18. Click the **[Save]** button.

    The Save dialog box is displayed. In this example, data in the entire area is saved. 1 is entered in the **[Frame No.]** text box, the **[Row]** text box and the **[Column]** text box, and 77760 in the **[Range]** text box.

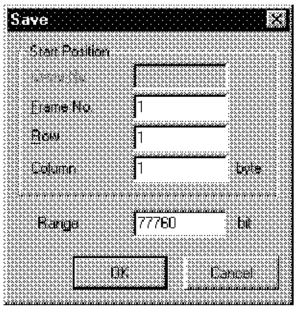


Figure 3-28 Window displaying the Save Dialog Box Settings

Executing to save

19. Click the **[OK]** button.

Operations for:
From the removal of UUT or DUT to the termination of the operation of the D3371, and turning-off the power.

20. The operations are the same as those in the bit error measurement example. Refer to Section 3.1.2, "Bit Error Measurement Example."

3.4 Jitter Tolerance Measurement

This section describes the jitter tolerance measurement process flow (jitter tolerance option) and provides a measurement example.

3.4.1 Jitter Tolerance Measurement Process Flow

This section describes the jitter tolerance measurement process flow.

Measurement process flow

Setting-up
- Connect SSG module and PPG module
- Turn power on

↓

Initialization of settings

↓

PPG module settings
- DATA OUTPUT, $\overline{\text{DATA}}$ OUTPUT
- CLOCK OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT
- Patterns
- Burst mode
- Error insertion
- Trigger/auxiliary outputs

↓

ED module settings
- DATA INPUT
- CLOCK INPUT
- Patterns
- Pattern synchronization
- Auto-search
- Mask route
- Trigger/auxiliary outputs
- Measurement conditions
- Buzzer
- Specific field

↓

Continued on the next page

3.4.1 Jitter Tolerance Measurement Process Flow

Jitter tolerance measurement settings

- Measurement mode
- Clock frequency
- Settling time
- Measurement time
- Error threshold
- Enabling (ON)/disabling (OFF) of the displaying of measurements
- Editing templates
- Template type
- Editing the parameter table for jitter tolerance
  (Jitter frequency and jitter amplitude)
- Enabling (ON)/disabling (OFF) of auto-search

↓

Saving of settings

↓

Connection of UUT or DUT

↓

Performing the jitter tolerance measurement

- Enable output
- Start jitter tolerance measurement
- Terminate jitter tolerance measurement
- Disable output

↓

Checking of results

↓

Saving of results

↓

Removal of UUT or DUT

↓

The operation of the D3371 is terminated and the power is turned off.

3.4.2 Jitter Tolerance Measurement Example

This section describes a jitter tolerance measurement example. Operation examples are also included.

Measurement example

Measurement items:	Jitter tolerance measurement
Measurement object:	ECL-interface DFF IC
System configuration:	The D3371 main unit, SSG module, PPG module, ED module and Jitter tolerance option
Templates:	Edited
Parameter table for jitter tolerance:	Edited
Saving of settings:	Save
Saving of results:	Save

An example of settings

CAUTION: Specify settings that are suitable for objects for which measurement is performed.

PPG module settings

The settings are the same as those in the bit error measurement example. Refer to Section 3.1.2, "Bit Error Measurement Example."

ED module settings

The settings are the same as those in the bit error measurement example. Refer to Section 3.1.2, "Bit Error Measurement Example."

Settings for jitter tolerance measurement

Measurement mode:	Default
Clock frequency:	2.49416 GHz
Settling time:	0.5 s
Measurement time:	Default
Error threshold:	Default
Enabling (ON)/disabling (OFF) of measurement results:	Default
	Templates: 100% margin of STM-16 (A) (the jitter amplitude is set to 200%.)
	Template name: STM 16(A)200

Parameter table for jitter tolerance performance:

Jitter frequency: The range exceeding the coverage of the templates is deleted.

Jitter amplitude: 10% of the default.

The number of measurement points: Two-fold of default.

Saving of results: Saved with the format used in the Jitter Tolerance window

* Refer to Section 4.6, "Settings" about default settings.

Measurement methods

Operations for:
From setting-up to the ED module settings

1. The operations are the same as those in the bit error measurement example. Refer to Section 3.1.2, "Bit Error Measurement Example."

Settings for jitter tolerance measurement

Displaying the jitter tolerance measurement settings window

2. Click the **[Settings]** button on the standard tool bar.

   The Settings window is displayed.
   Click the **[Jitter Tolerance]** tab.
   The window to make a settings for jitter tolerance measurement is displayed.

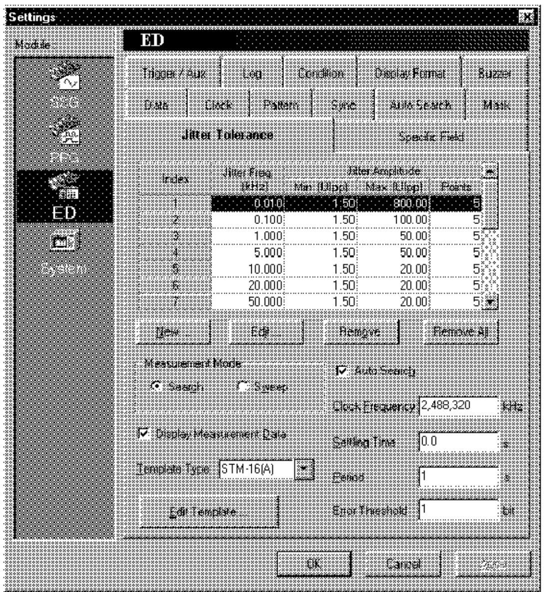


Figure 3-29 Jitter Tolerance Measurement Settings Window

Clock frequency settings

3. Click the **[Clock Frequency]** text box. A Virtual Keyboard is displayed. Then, input 2.49416 GHz through the Virtual Keyboard.

Setting the settling time

4. Click the **[Settling Time]** text box. A Virtual Keyboard is displayed. Input 0.5 through the Virtual Keyboard.

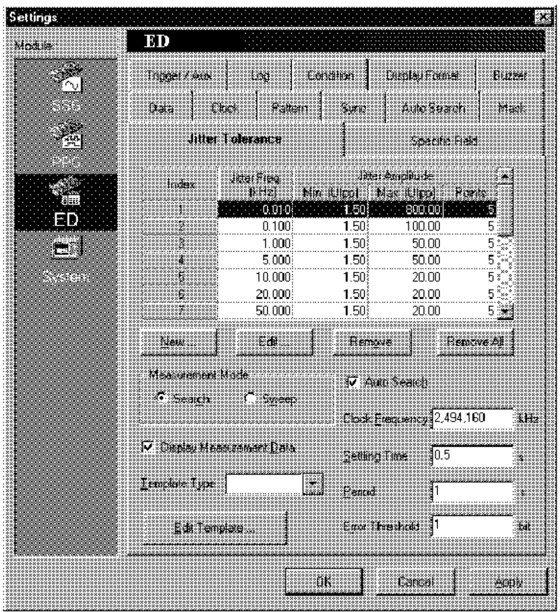


Figure 3-30 Jitter Tolerance Measurement Settings Window
(In the process of being set)

Editing the templates

Displaying the template settings window

5. Click the **[Edit Template]** button.

   The Jitter Tolerance Template dialog box is displayed.

Specifying a template to edit

6. Click STM-16 (A) in the template list. The template is selected.

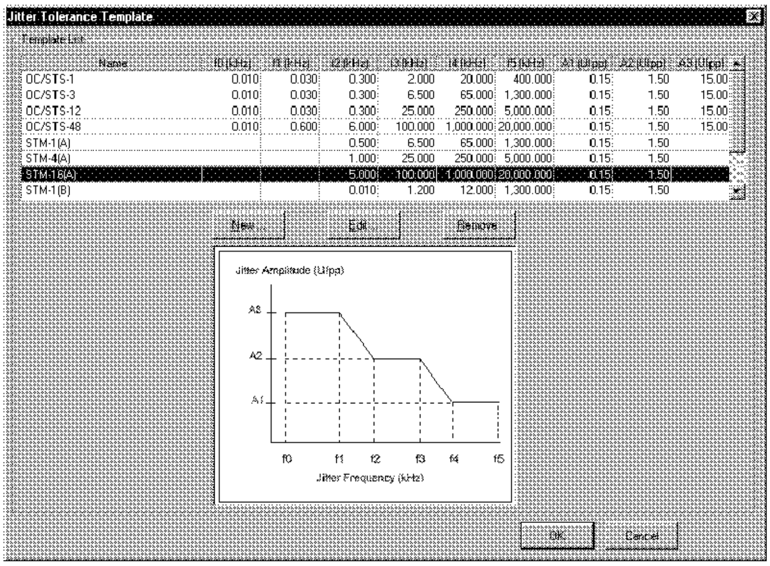


Figure 3-31 Template to be Edited selection Window

Displaying the template editing window

7. Click the **[Edit...]** button.

   The Template dialog box is displayed.

Naming a template

8. Click the **[Template Name]** text box.

   The Virtual Keyboard is displayed. Input STM-16(A)200 through the Virtual Keyboard.

Jitter amplitude settings

9. Click the **[A1]** text box.

   The Virtual Keyboard is displayed. Then, enter 0.3 corresponding to 200% of 0.15 through the Virtual Keyboard.

   Similarly, click the **[A2]** text box. The Virtual Keyboard is displayed. Then, enter 3 corresponding to 200% of 1.5 through the Virtual Keyboard.

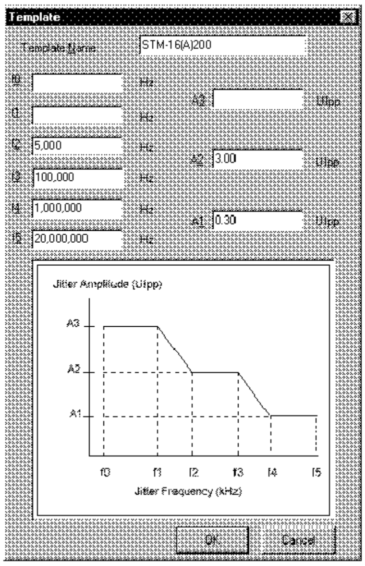


Figure 3-32 Window displaying the Template Settings

Closing the Template dialog box

10. Click the **[OK]** button.
    The STM-16(A)200 template is displayed on the template edit window.

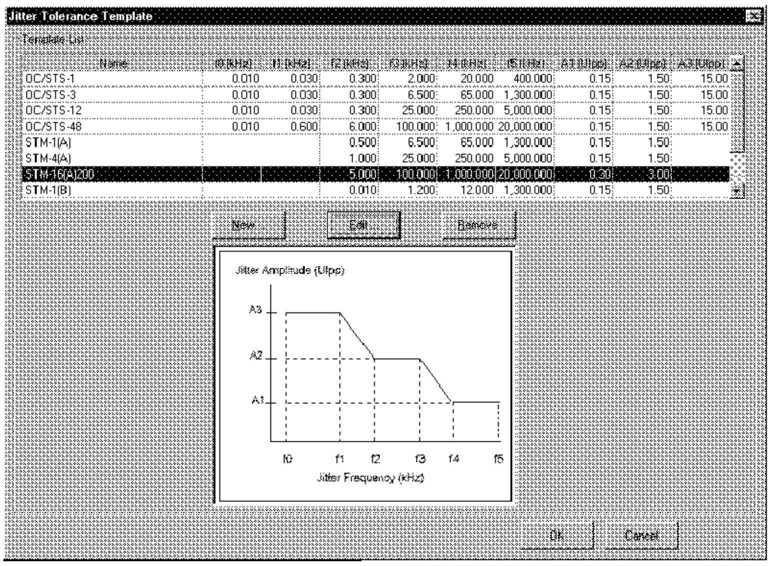


Figure 3-33 Template Edit Dialog Box Window (settings completed)

Registering a template

11. To register an edited template, click the **[OK]** button.

    The STM-16(A)200 template is registered in the Template Type dialog box.

Selecting a template type

12. Click the **[Template Type]** drop-down list box. The template list is displayed.

    Select STM-16(A)200 from the list.

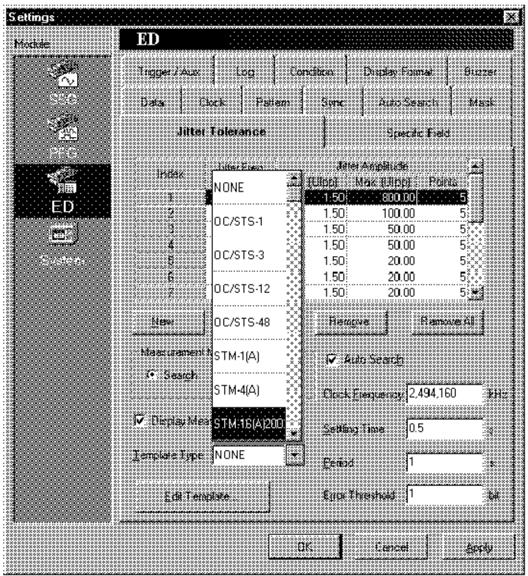


Figure 3-34 Template Type Selection Window

Editing the parameter table for jitter tolerance

Specifying the measurement points to edit

13. Click the measurement points to be edited. In this example, the jitter frequency range is set to that of the template. With the template having a jitter frequency range of 5 kHz to 20 MHz, click the 5 kHz measurement point.

    The 5 kHz point is selected for measurement.

Displaying the measurement point settings window

14. Click the **[Edit...]** button.

    The Jitter Tolerance Parameters dialog box is displayed.

Specifying the minimum jitter amplitude

15. Click the **[Minimum]** text box

    The Virtual Keyboard is displayed. Enter a value corresponding to 10% of the default value through the keyboard. Input 0.15 for 5 kHz, since the default for the frequency is 1.5.

Specifying the number of measurement points

16. Click the **[Points]** text box.

    The Virtual Keyboard is displayed. Enter a value corresponding to 200% of the default value through the keyboard. Input 10 for 5 kHz, since the default for the frequency is 5.

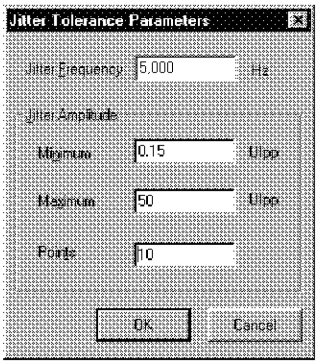


Figure 3-35 Window displaying Jitter Tolerance Parameters

Confirming the settings

17. Click the **[OK]** button to confirm the settings. The measurement point parameters are updated.

Repeat the editing process

18. Repeat operations from 13 through 17 for measurement points between 10 kHz and 20 MHz of jitter frequency.

Specifying the measurement points to be removed

19. Click measurement points to be removed. Since the jitter frequency range of the template is 5 kHz to 20 MHz, 0.01 kHz, 0.1 kHz and 1 kHz measurement points are removed. First, click the 0.01 kHz measurement point. Then, the 0.01 kHz measurement point is selected.

Removing the settings

20. Click the **[Remove]** button.

    Then, the selected measurement point is removed.

Repeat the removing process

21. Repeat operations 18 through 19 for measurement points under 5 kHz of jitter frequency.

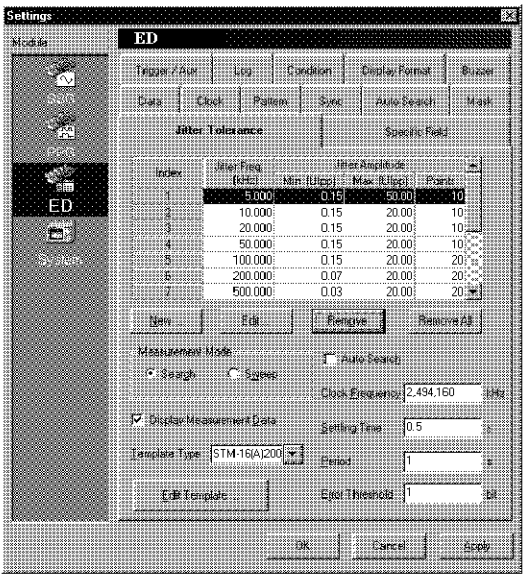


Figure 3-36 Window displaying the Jitter Tolerance Parameter Table (Settings completed)

Confirming the settings

22. Click the **[OK]** button to confirm the settings.

Saving the settings, and connecting UUT or DUT

23. The operations are the same as those in bit error measurement example. Refer to Section 3.1.2, "Bit Error Measurement Example."

Executing the jitter tolerance measurement

Selecting the Jitter Tolerance window

24. Click **[Jitter Tolerance]** on the function bar.

    The Jitter Tolerance window is displayed.

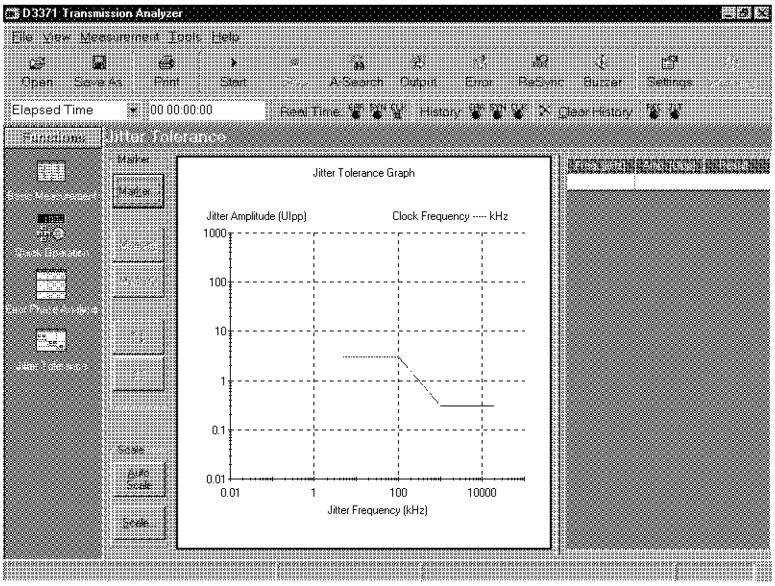


Figure 3-37 Jitter Tolerance Window

Enabling the output

CAUTION:

1. ***Depending on output interface settings, UUT or DUT may be damaged. Check the settings carefully before the output is enabled.***
2. ***The output is disabled immediately after the power is turned on. When the output is disabled, 50 Ω to GND (0 V) is provided (However, there may be a potential of several millivolts between the output terminal and the frame ground).***

---

25. Click the **[Output]** button on the standard tool bar.

    Both output of data and output of clock are enabled.

Starting the jitter tolerance measurement

26. Click the **[Start]** button on the standard tool bar.

    Jitter tolerance measurement starts.

Confirming the measurement status

27. The Jitter Tolerance Measurement dialog box is displayed at the lower left part of the window.

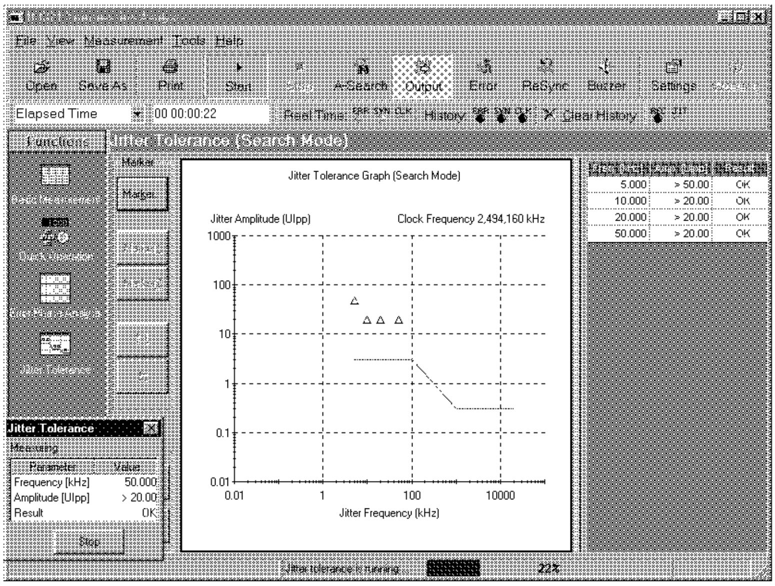


Figure 3-38 Jitter Tolerance Window (in measurement)

Terminating the jitter tolerance measurement

28. The measurement is automatically terminated when all measurements are completed.

Disabling of output

29. Click the **[Output]** button on the standard tool bar.

    Both output of data and output of clock are enabled.

Confirming the of results

30. Check the results on the Jitter Tolerance window. Measured data (for measurement points) are displayed soon after the measurement is completed. Therefore, status in progress can be monitored on the window.

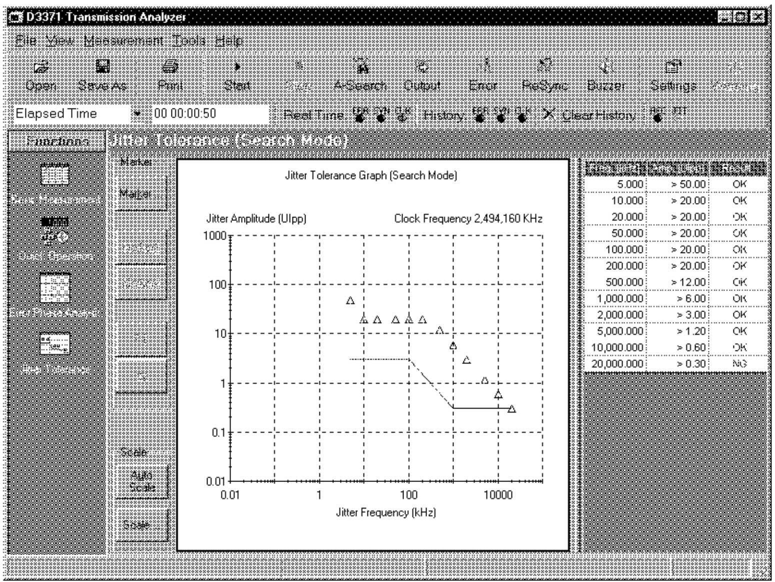


Figure 3-39 Jitter Tolerance Window (displaying results)

Saving of the results

Displaying the Save As dialog box

31. Click the **[Save As]** button on the standard tool bar.
    The Save As dialog box is displayed.

Naming a save file

32. Input the file name of a data to be saved to the **[File name]** text box. In this example, 004 is entered.

Selecting a file type

33. Select Jitter Tolerance Data [*.jid] from the **[Save as type]** drop-down list box.

Figure 3-40 Window displaying the Save As Dialog Box (for Jitter Tolerance)

To save

34. Click **[Save]** button.
    The file is saved.

Operations for:
From the process of removing the UUT or DUT to the operation termination and power-off of the D3371.

35. The operations are the same as those in the bit error measurement example. Refer to Section 3.1.2, "Bit Error Measurement Example."

4. REFERENCE

This chapter describes the menu bar, toolbars, list bars, Settings window, and Pattern Settings dialog box.

4.1 Menu Index

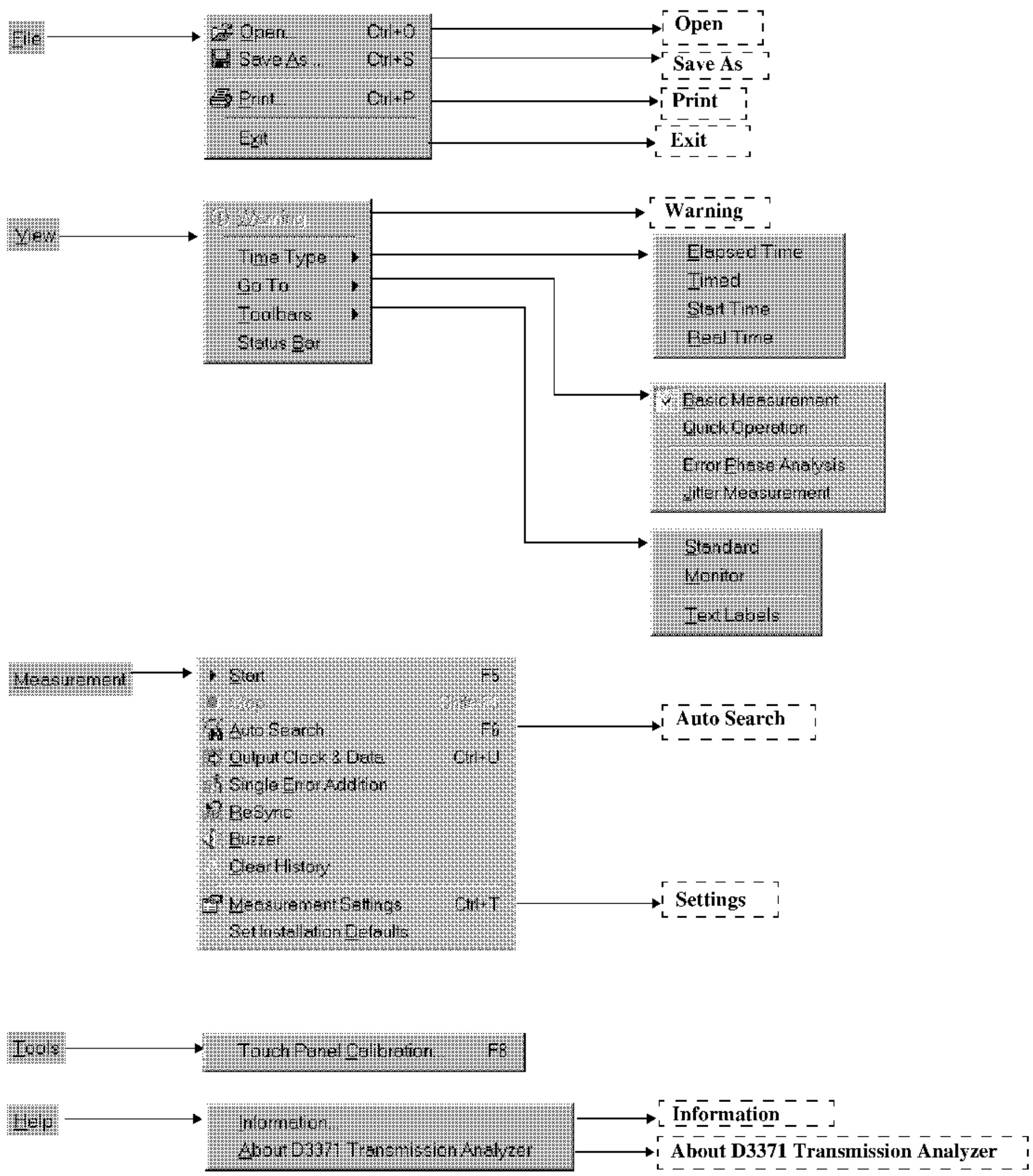
This menu index is used to find information with the keys described in Chapter 4.

4.2 Menu Map

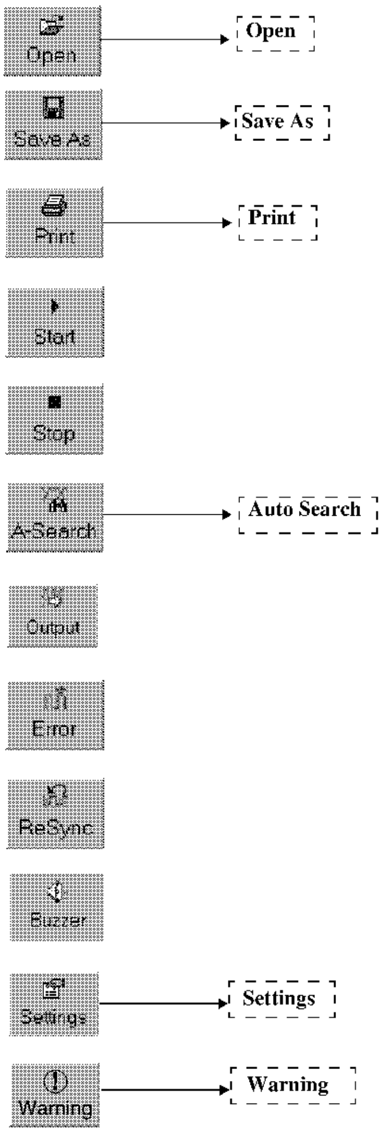
This section provides menu maps of the menu bar, toolbars, and list bars. This section also provides maps of the Settings window and Pattern Settings window.

NOTE: Dashed lines indicate dialog boxes or windows.

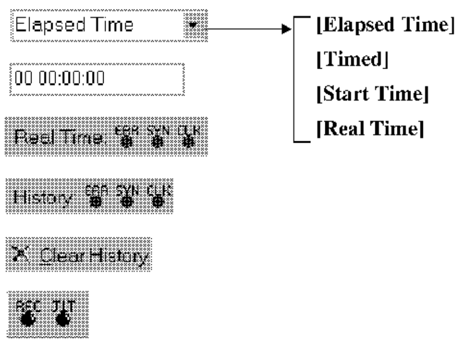
4.2.1 Menu Bar



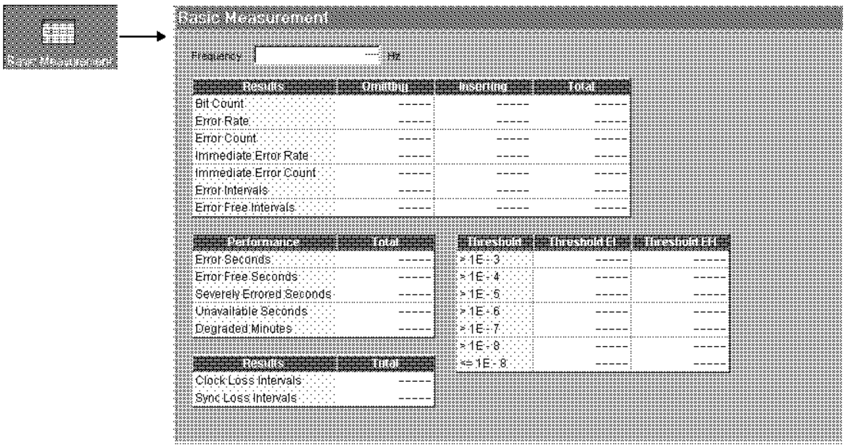
4.2.2 Standard Toolbar

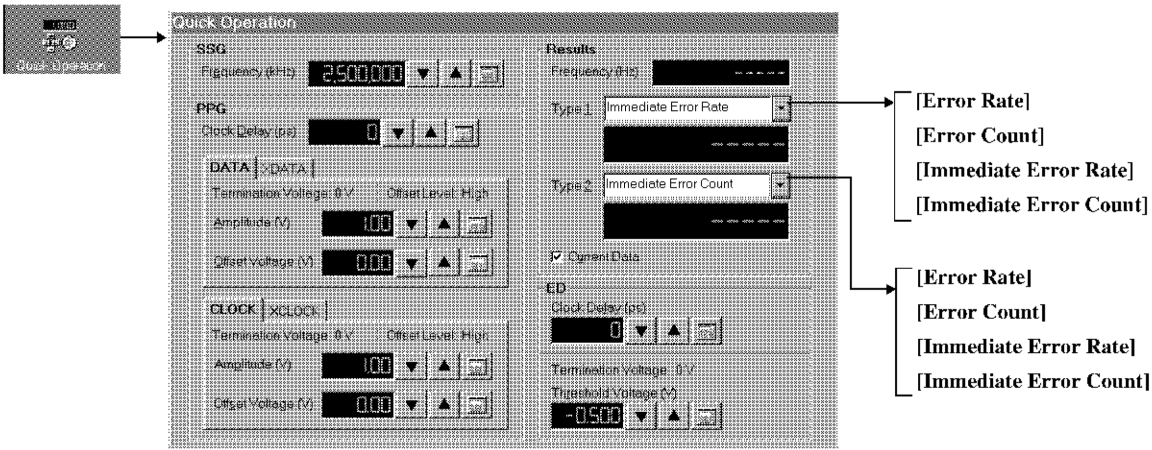


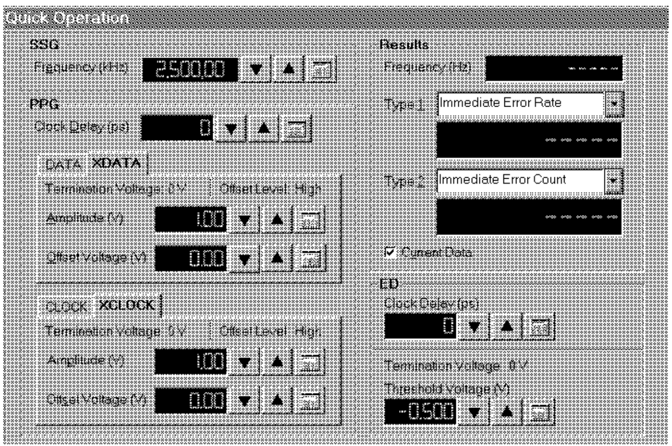
4.2.3 Monitor Toolbar



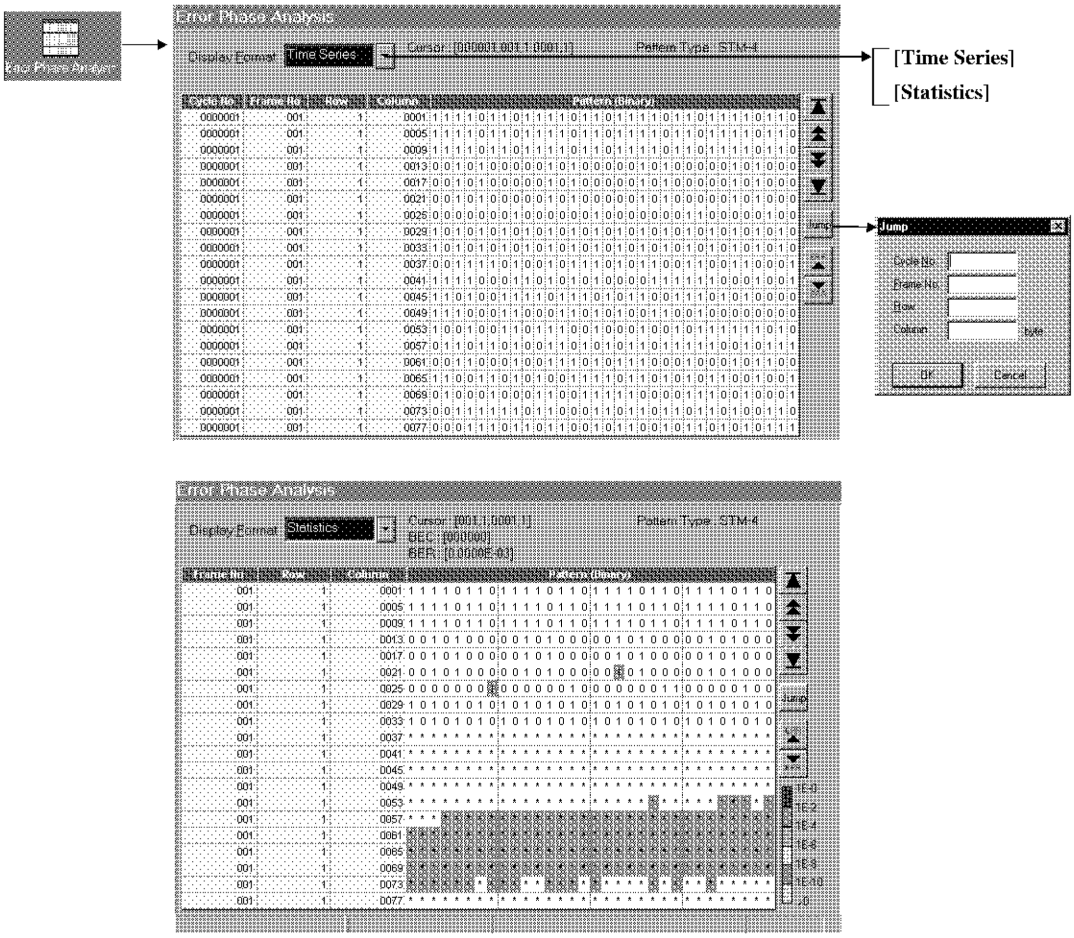
4.2.4 Functions bar

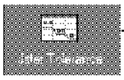


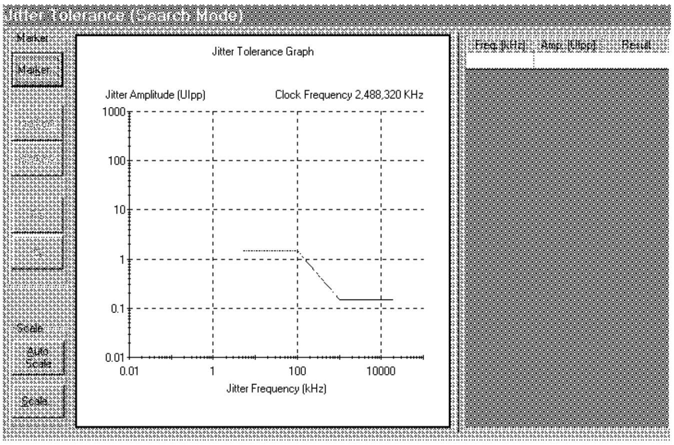


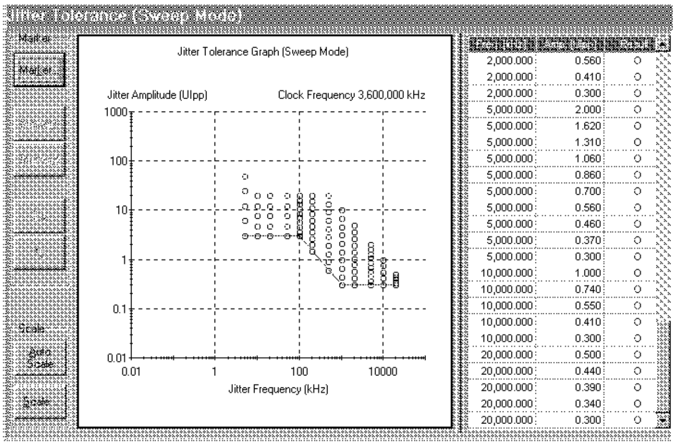


4.2.4 Functions bar

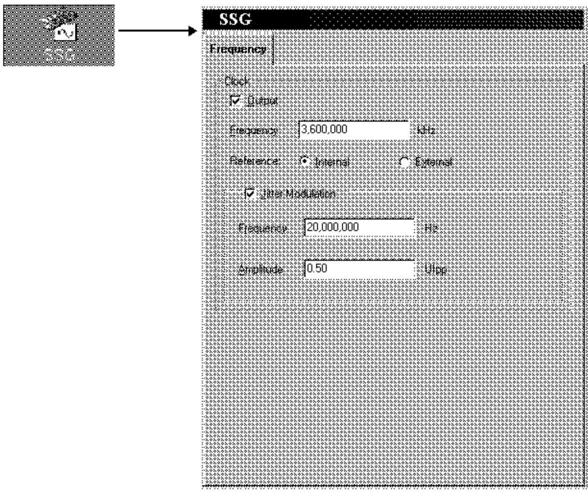


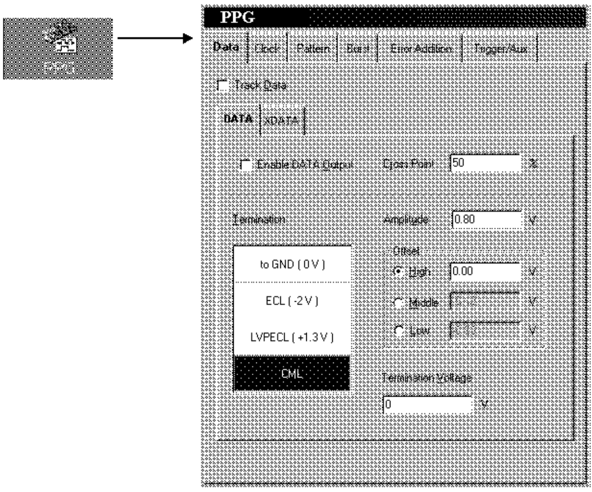

Jitter Tolerance

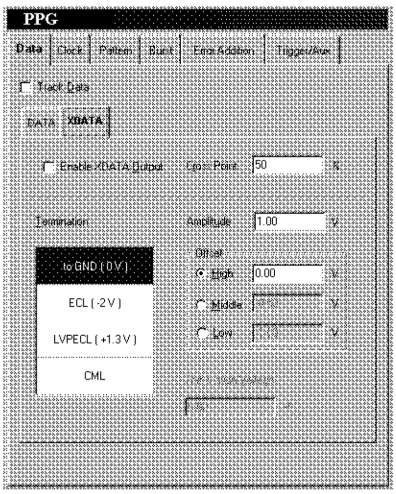

Jitter Tolerance (Search Mode)
Marker
Jitter Tolerance Graph
Jitter Amplitude (UIpp)
Clock Frequency 2,488,320 KHz
1000
100
10
1
0.1
0.01
0.01
1
100
10000
Jitter Frequency (kHz)
Scale
Auto Scale
Scale
Freq. (kHz)
Amp. (UIpp)
Result

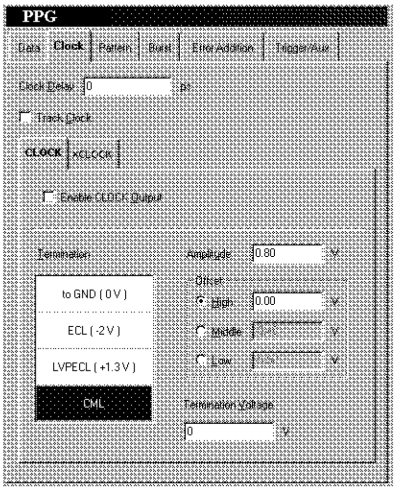

Jitter Tolerance (Sweep Mode)
Marker
Jitter Tolerance Graph (Sweep Mode)
Jitter Amplitude (UIpp)
Clock Frequency 3,600,000 kHz
1000
100
10
1
0.1
0.01
0.01
1
100
10000
Jitter Frequency (kHz)
Scale
Auto Scale
Scale
2,000.000 0.560 O
2,000.000 0.410 O
2,000.000 0.300 O
5,000.000 2.000 O
5,000.000 1.620 O
5,000.000 1.310 O
5,000.000 1.060 O
5,000.000 0.860 O
5,000.000 0.700 O
5,000.000 0.560 O
5,000.000 0.460 O
5,000.000 0.370 O
5,000.000 0.300 O
10,000.000 1.000 O
10,000.000 0.740 O
10,000.000 0.550 O
10,000.000 0.410 O
10,000.000 0.300 O
20,000.000 0.500 O
20,000.000 0.440 O
20,000.000 0.390 O
20,000.000 0.340 O
20,000.000 0.300 O

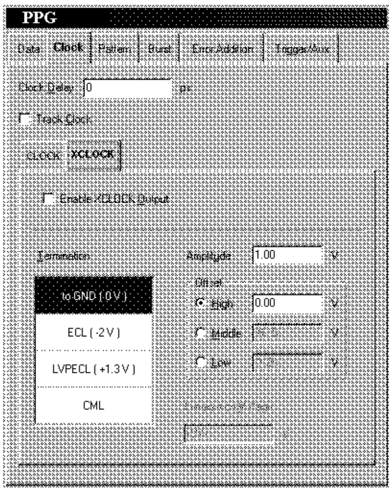
4.2.5 Settings Window

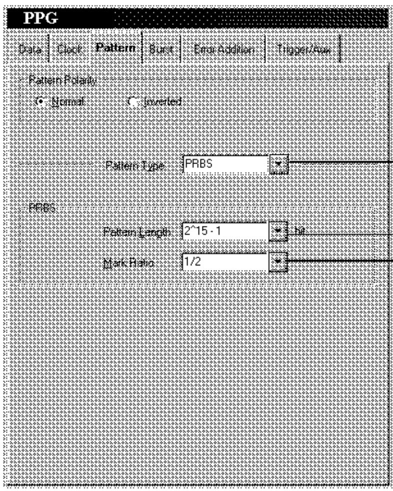












[PRBS]
[ZSUB]
[PROG]
[STM]
[FLEX]

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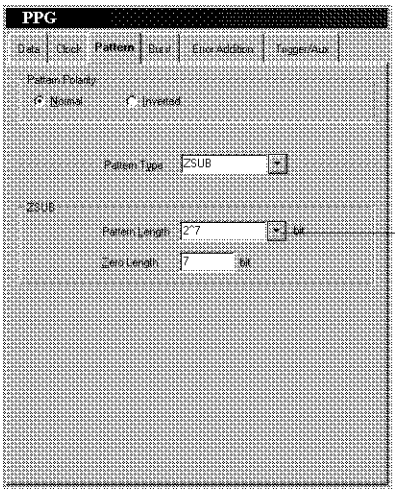
[2^9-1]
[2^10-1]
[2^11-1]
[2^15-1]
[2^23-1]
[2^31-1]

[0/8]
[1/8]
[1/4]
[1/2]
[3/4]
[7/8]
[8/8]
[1/2B]



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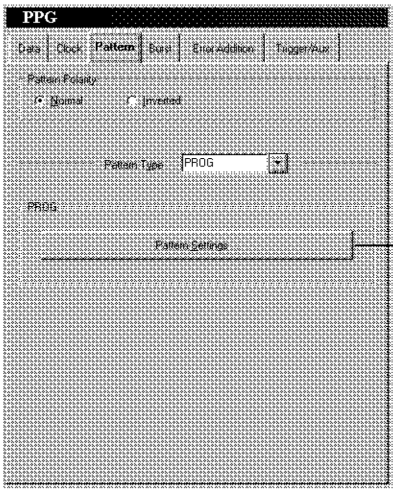
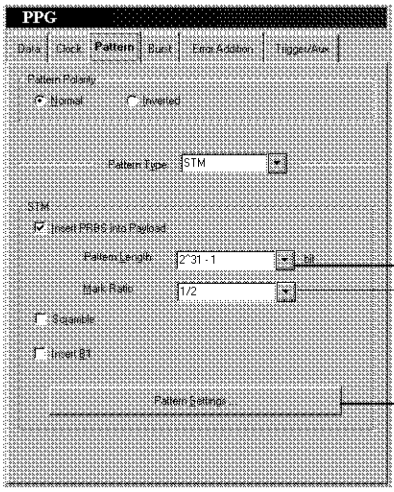


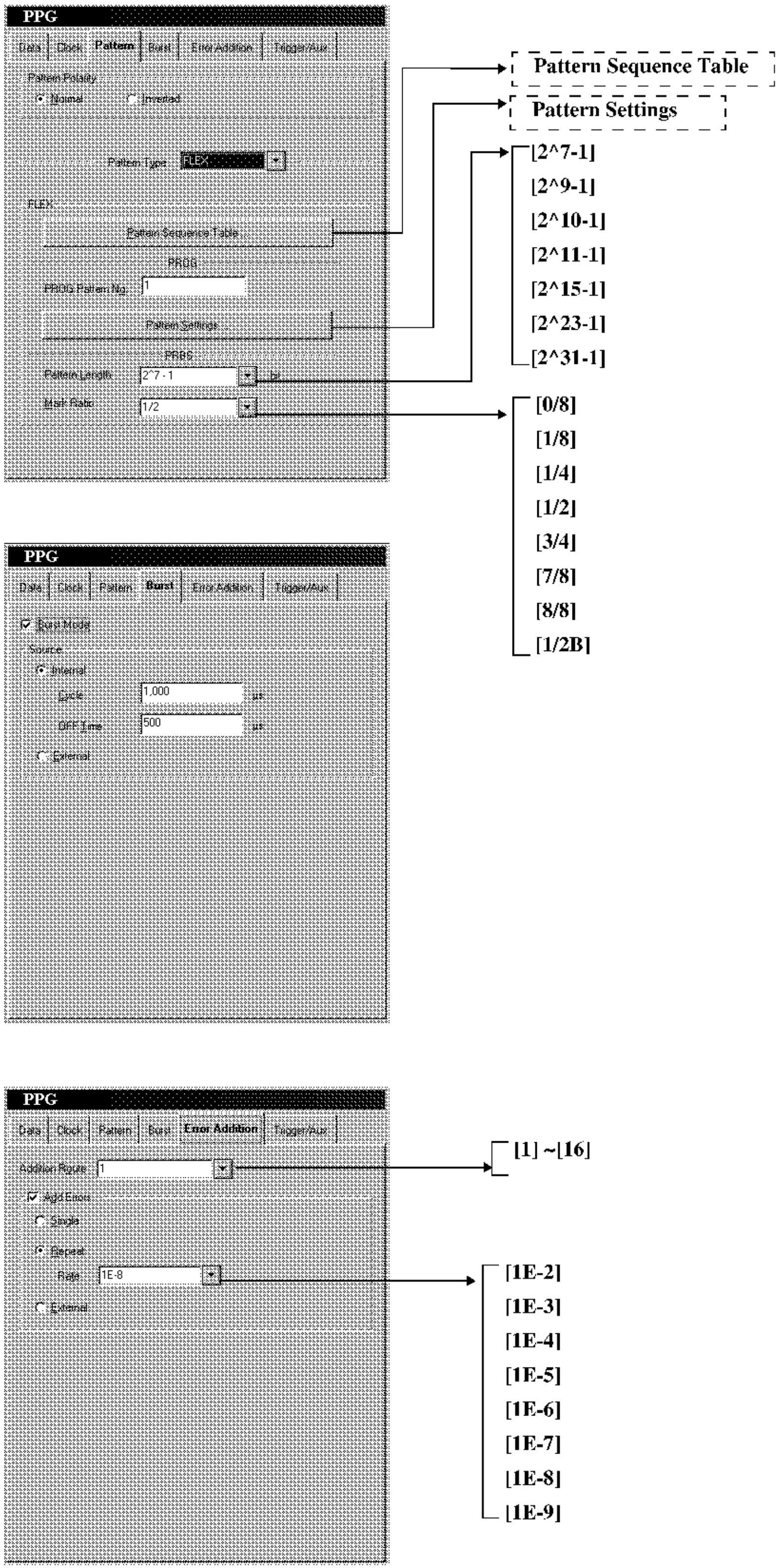
Pattern Settings



[2^7-1]
[2^9-1]
[2^10-1]
[2^11-1]
[2^15-1]
[2^23-1]
[2^31-1]

[0/8]
[1/8]
[1/4]
[1/2]
[3/4]
[7/8]
[8/8]
[1/2B]

Pattern Settings


PPG
Pattern Sequence Table
Pattern Settings
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[2^15-1]
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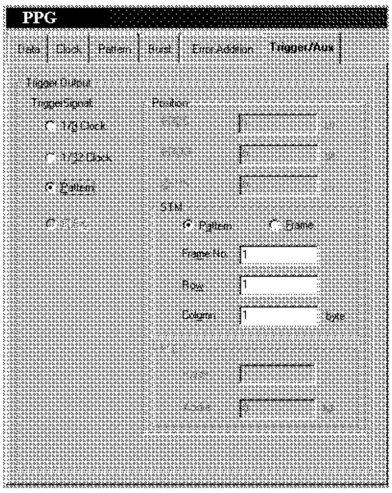
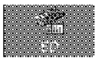
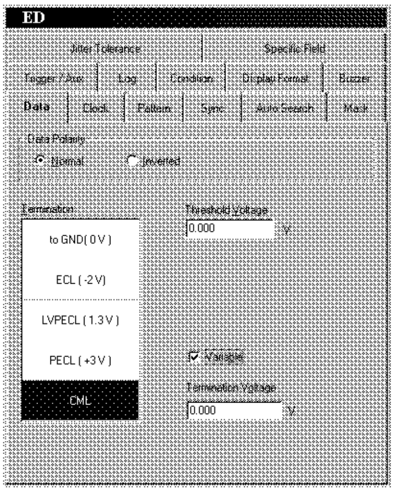
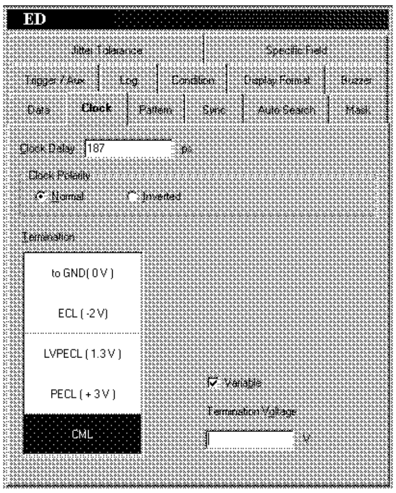
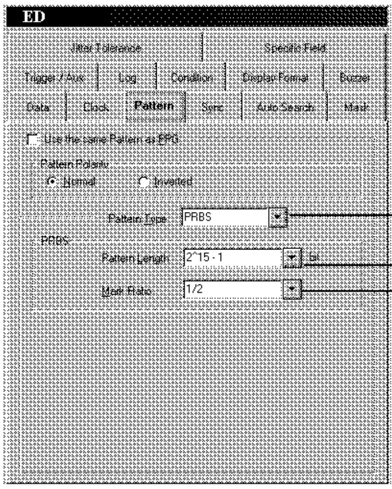
[1/8]
[1/4]
[1/2]
[3/4]
[7/8]
[8/8]
[1/2B]
PPG
PPG
[1] ~[16]
[1E-2]
[1E-3]
[1E-4]
[1E-5]
[1E-6]
[1E-7]
[1E-8]
[1E-9]







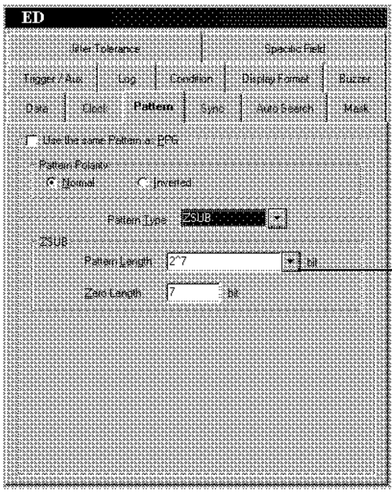




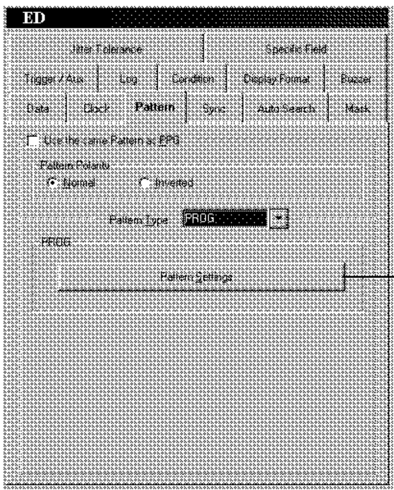
[PRBS]
[ZSUB]
[PROG]
[STM]
[FLEX]

[2^7-1]
[2^9-1]
[2^10-1]
[2^11-1]
[2^15-1]
[2^23-1]
[2^31-1]

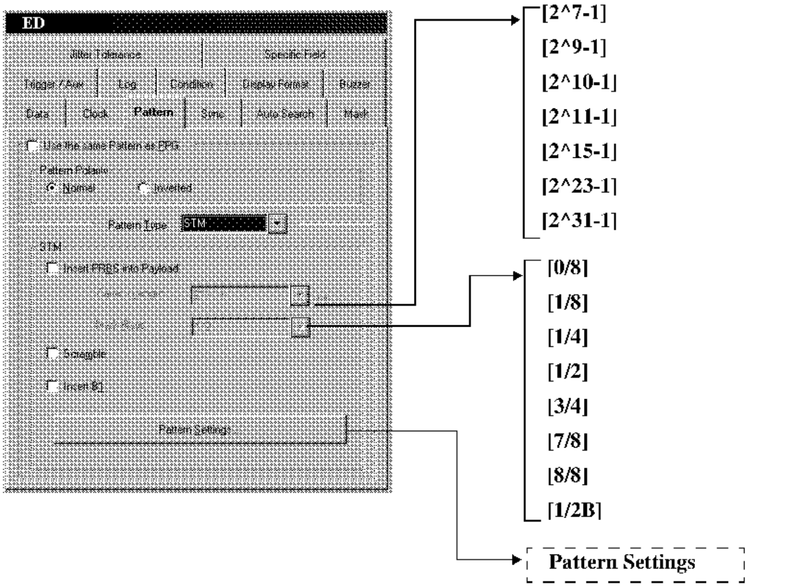
[0/8]
[1/8]
[1/4]
[1/2]
[3/4]
[7/8]
[8/8]
[1/2B]

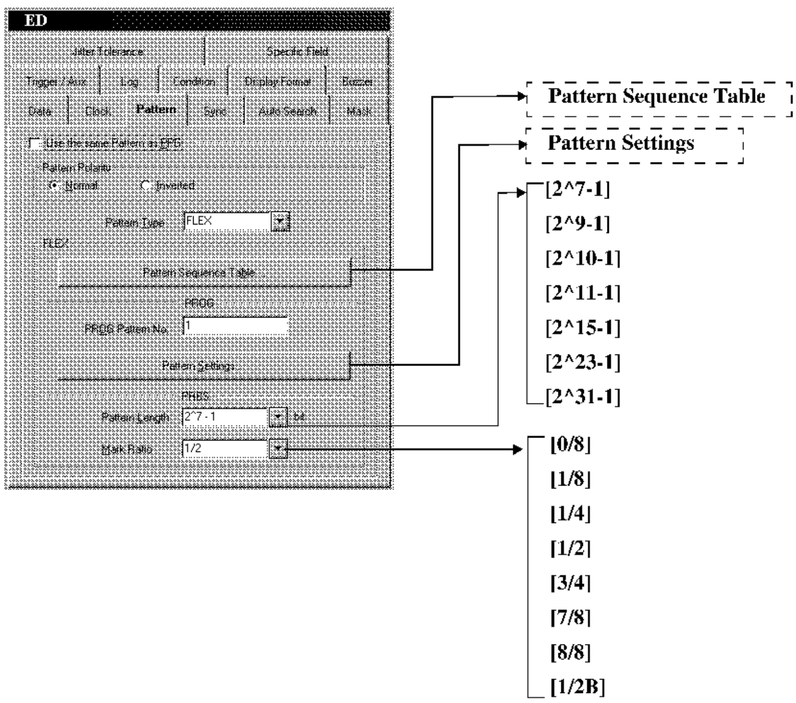


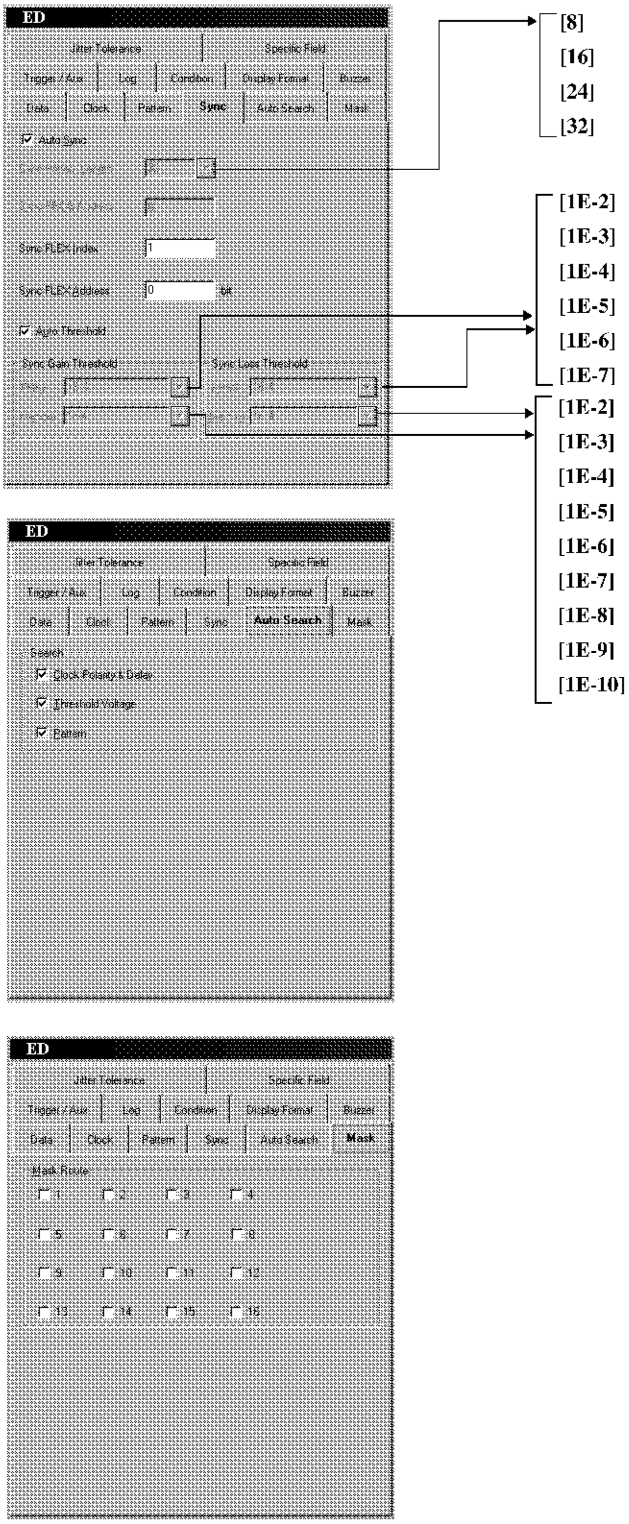
[2^7]
[2^9]
[2^10]
[2^11]
[2^15]



Pattern Settings


ED
[2^7-1]
[2^9-1]
[2^10-1]
[2^11-1]
[2^15-1]
[2^23-1]
[2^31-1]
[0/8]
[1/8]
[1/4]
[1/2]
[3/4]
[7/8]
[8/8]
[1/2B]
Pattern Settings


ED
Pattern Sequence Table
Pattern Settings
[2^7-1]
[2^9-1]
[2^10-1]
[2^11-1]
[2^15-1]
[2^23-1]
[2^31-1]
[0/8]
[1/8]
[1/4]
[1/2]
[3/4]
[7/8]
[8/8]
[1/2B]


ED
Jitter Tolerance
Specific Field
Trigger / Aux
Log
Condition
Display Format
Buzzer
Data
Clock
Pattern
Sync
Auto Search
Mask
Auto Sync
Sync FLEX Index
Sync FLEX Address
bit
Auto Threshold
Sync Gain Threshold
Sync Loss Threshold
[8]
[16]
[24]
[32]
[1E-2]
[1E-3]
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[1E-5]
[1E-6]
[1E-7]
[1E-2]
[1E-3]
[1E-4]
[1E-5]
[1E-6]
[1E-7]
[1E-8]
[1E-9]
[1E-10]
Search
Clock Polarity & Delay
Threshold Voltage
Pattern
Mask Route
1
2
3
4
5
6
7
8
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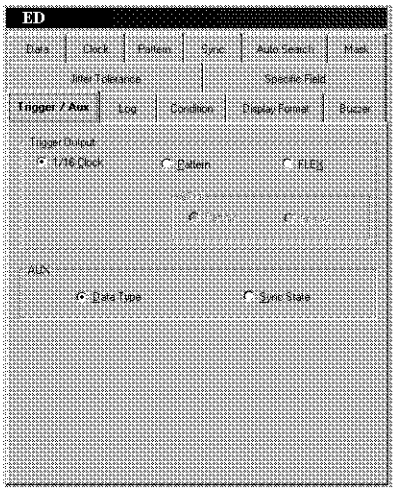
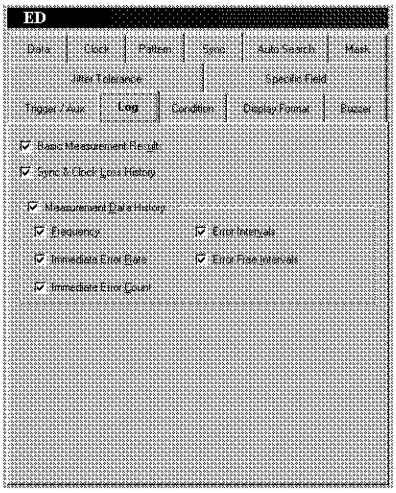
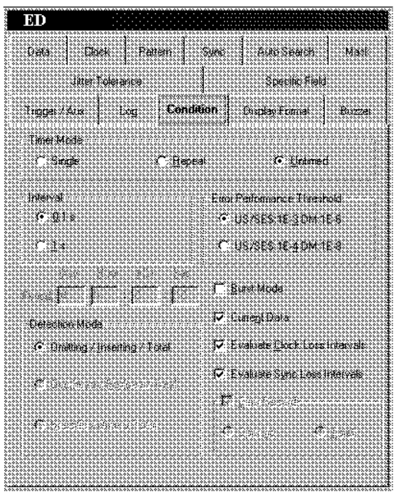
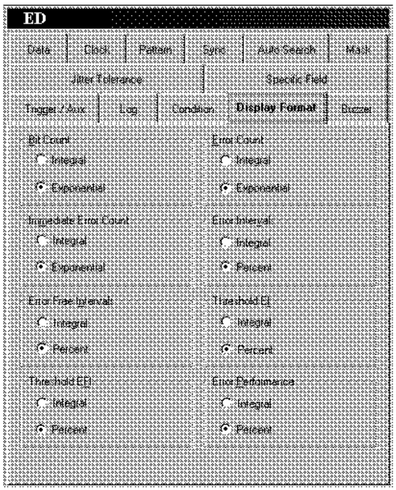
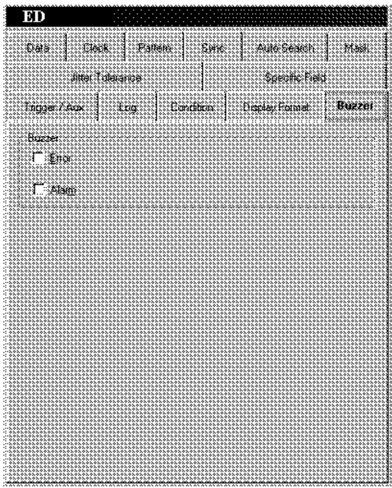
12
13
14
15
16

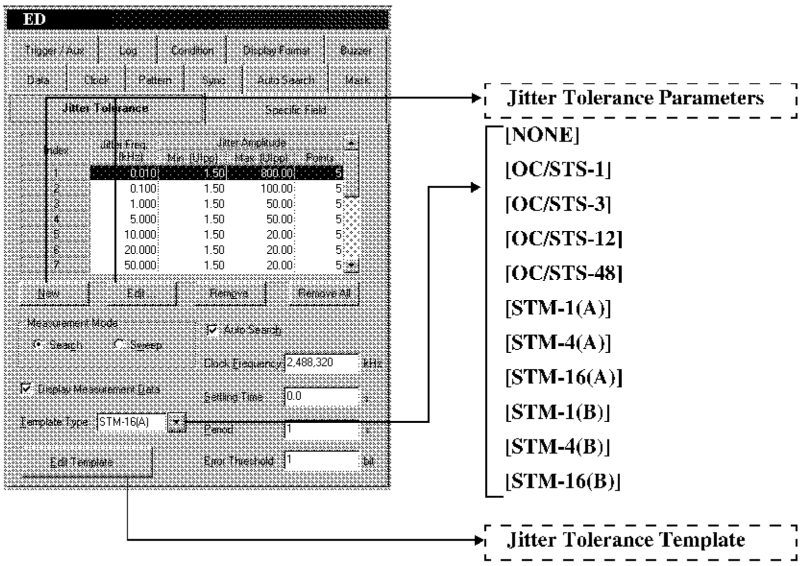

ED
Data
Clock
Pattern
Sync
Auto Search
Mask
Jitter Tolerance
Specific Field
Trigger / Aux
Log
Condition
Display Format
Buzzer
Trigger Output
AUX

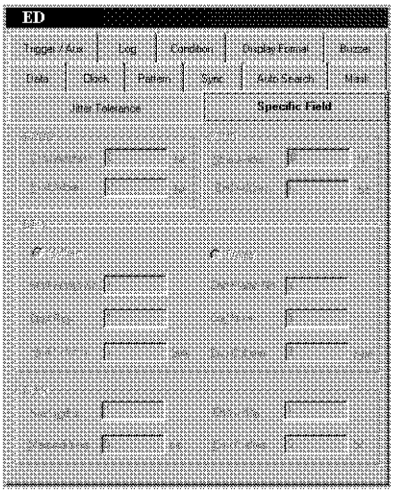

ED
Data
Clock
Pattern
Sync
Auto Search
Mask
Jitter Tolerance
Specific Field
Trigger / Aux
Log
Condition
Display Format
Buzzer

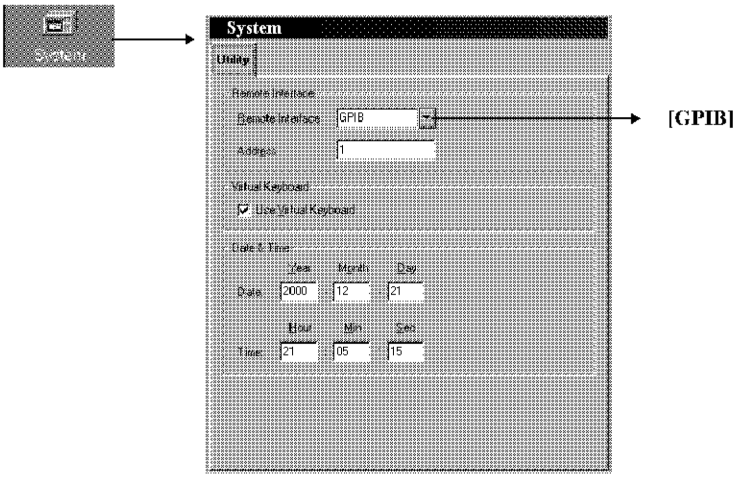

ED
Data
Clock
Pattern
Sync
Auto Search
Mask
Jitter Tolerance
Specific Field
Trigger / Aux
Log
Condition
Display Format
Buzzer

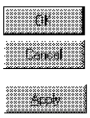




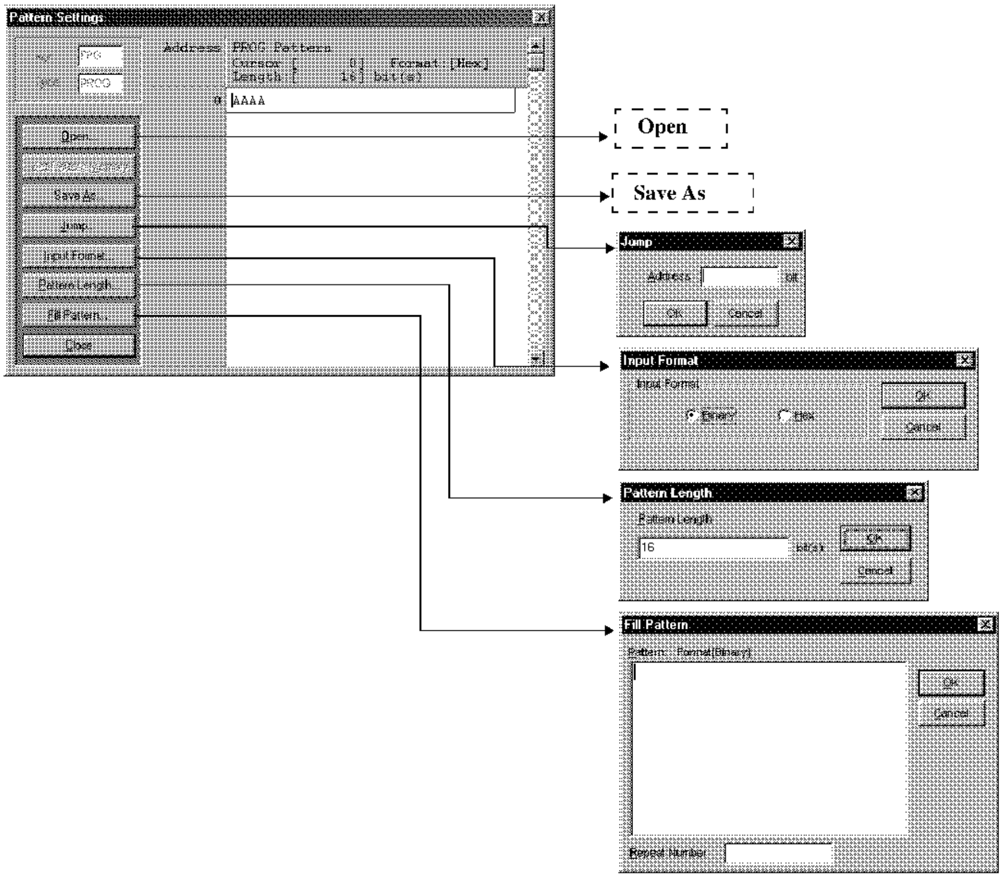

Jitter Tolerance Parameters
[NONE]
[OC/STS-1]
[OC/STS-3]
[OC/STS-12]
[OC/STS-48]
[STM-1(A)]
[STM-4(A)]
[STM-16(A)]
[STM-1(B)]
[STM-4(B)]
[STM-16(B)]
Jitter Tolerance Template


ED
Trigger / Aux
Log
Condition
Display Format
Buzzer
Data
Clock
Pattern
Sync
Auto Search
Mask
Jitter Tolerance
Specific Field

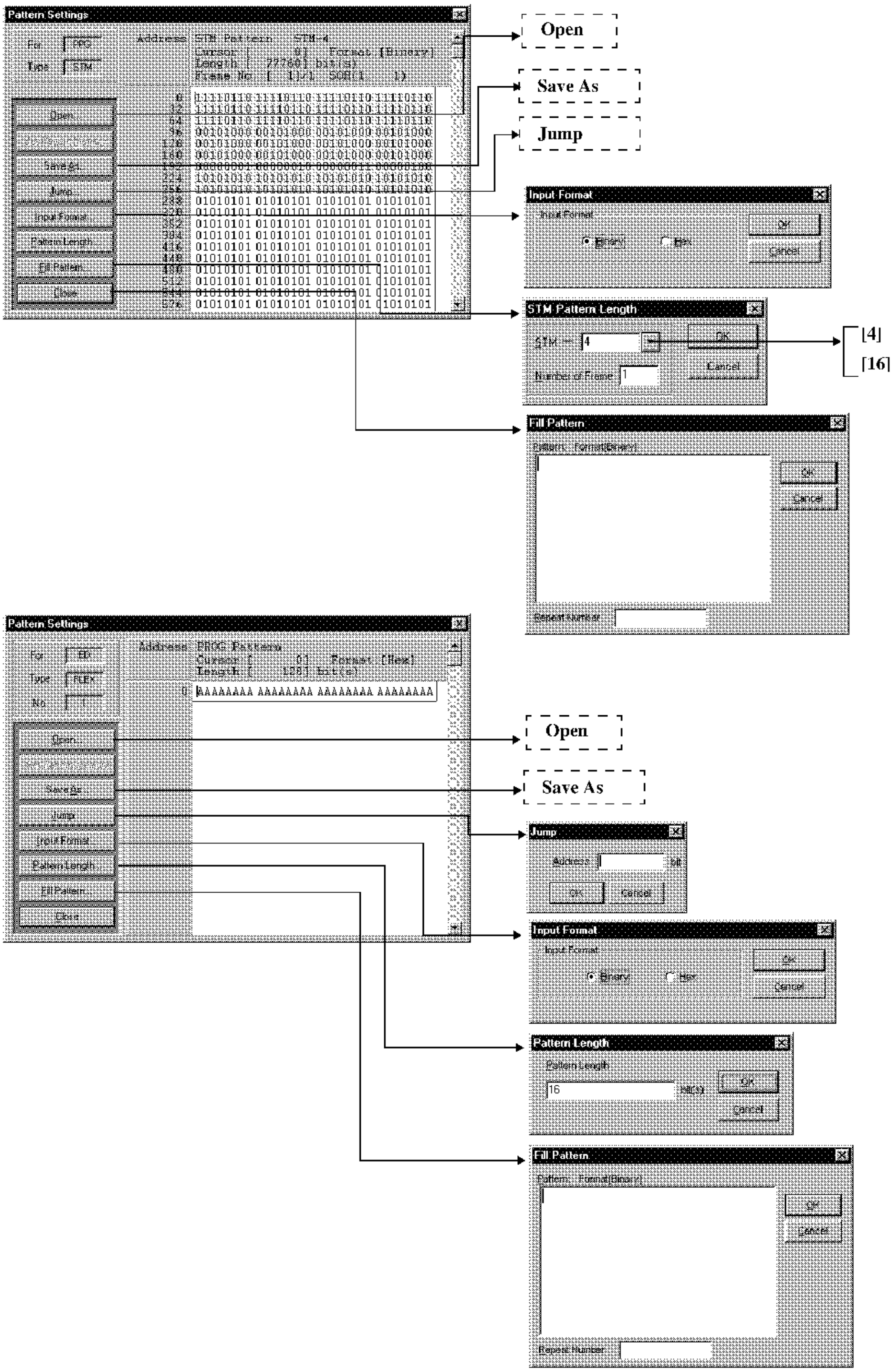

System
System
Utility
Remote Interface
Remote Interface
GPIB
Address
1
Virtual Keyboard
Use Virtual Keyboard
Date & Time
Year
Month
Day
Date
2000
12
21
Hour
Min
Sec
Time
21
05
15
[GPIB]


OK
Cancel
Apply

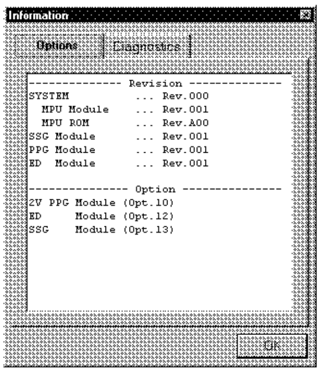
4.2.6 Pattern Settings Dialog Box

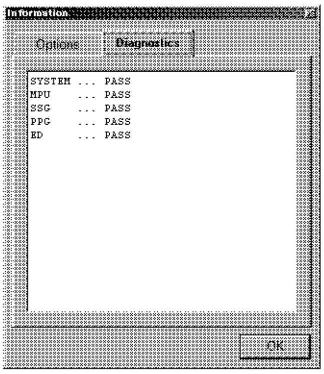


4.2.6 Pattern Settings Dialog Box

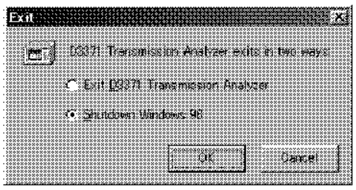


4.2.7 Information Window

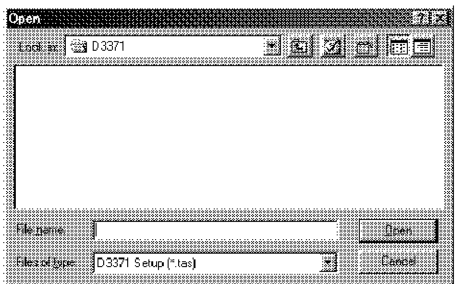




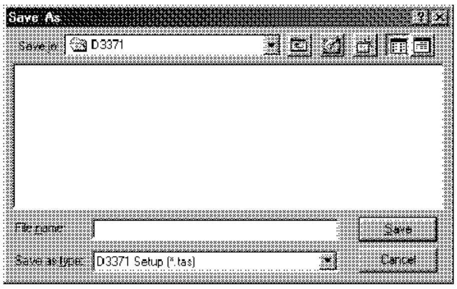
4.2.8 Exit Dialog Box



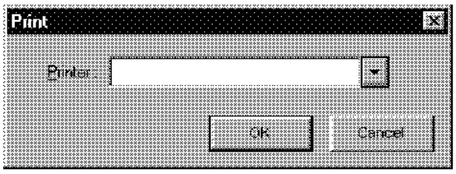
4.2.9 Open Dialog Box



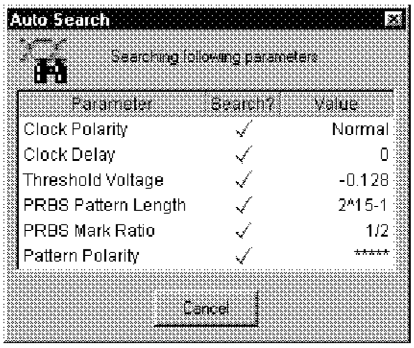
4.2.10 Save As Dialog Box



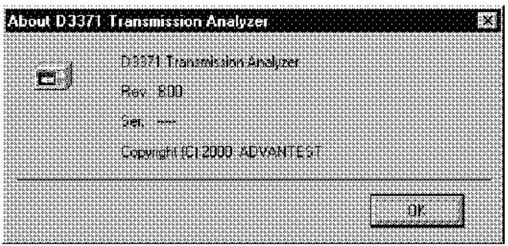
4.2.11 Print Dialog Box



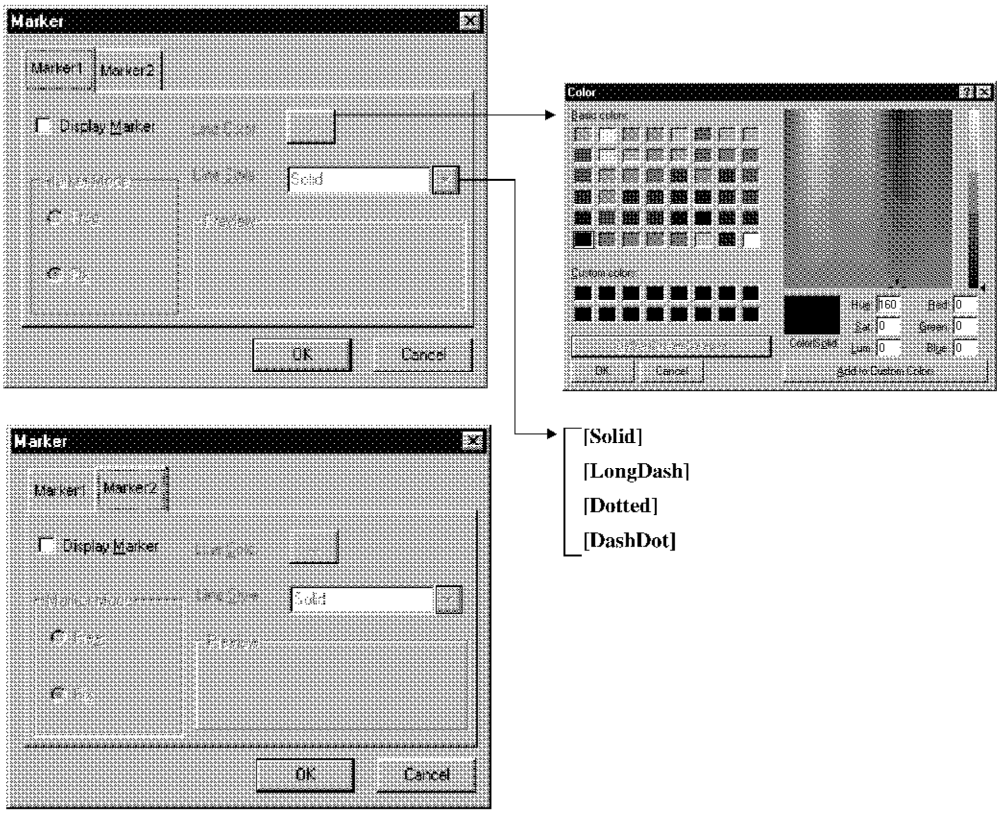
4.2.12 Auto Search Dialog Box



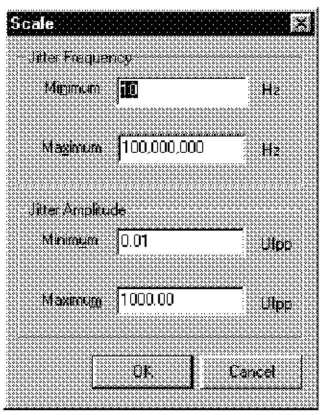
4.2.13 D3371 Transmission Analyzer Dialog Box



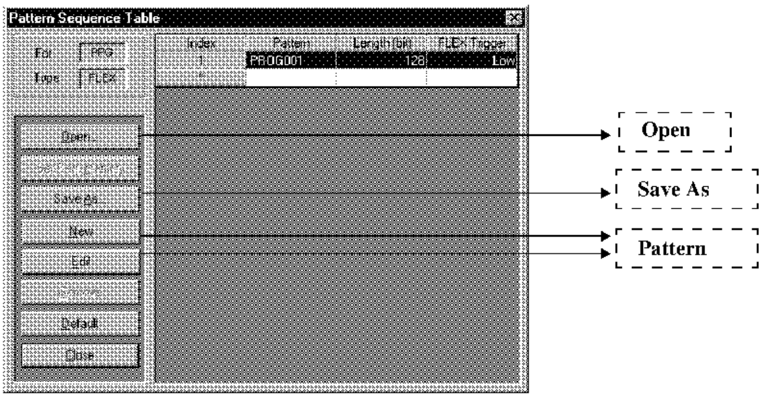
4.2.14 Marker Dialog Box



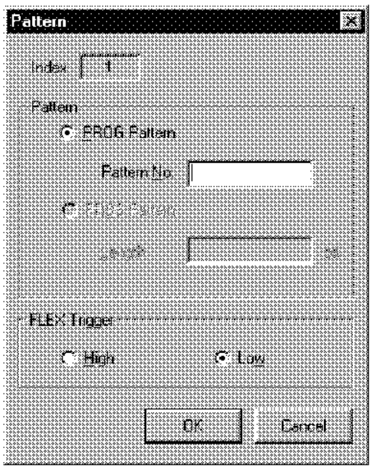
4.2.15 Scale Dialog Box



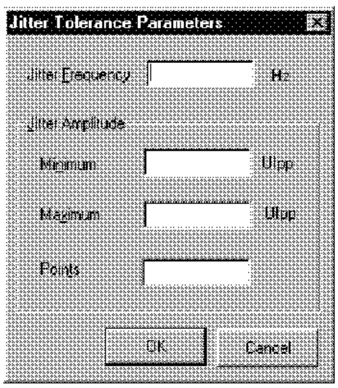
4.2.16 Pattern Sequence Table Dialog Box



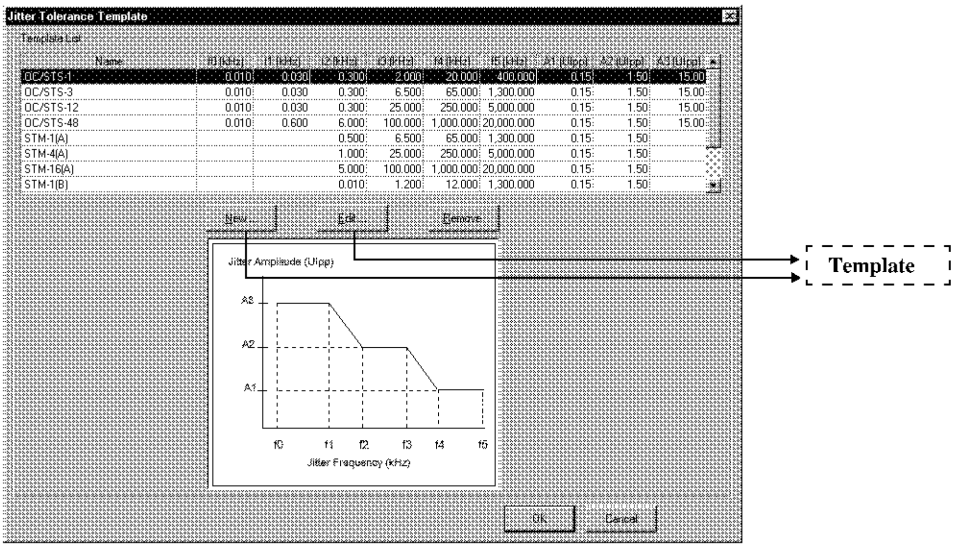
4.2.17 Pattern Dialog Box



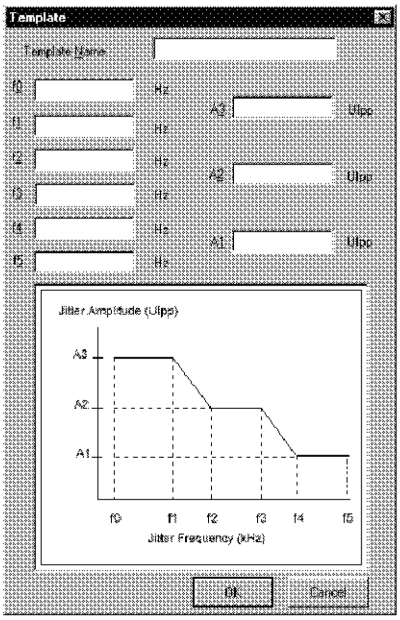
4.2.18 Jitter Tolerance Parameters Dialog Box



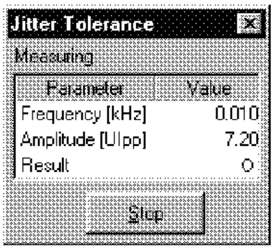
4.2.19 Jitter Tolerance Template Dialog Box



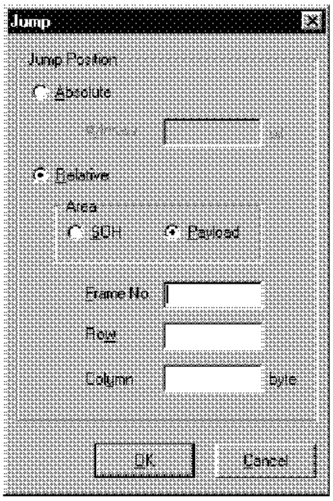
4.2.20 Template Dialog Box



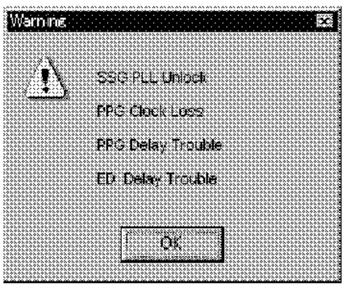
4.2.21 Jitter Tolerance Dialog Box



4.2.22 Jump Dialog Box



4.2.23 Warning Dialog Box



4.3 Explanation of Functions

This section describes the functions of the D3371.

4.3.1 Menu Bar

[File]	Displays and saves the file, and displays the Print and Exit drop-down menu.
[Open... Ctrl+O]	Displays the Open dialog box. Refer to Section 4.3.9, "Open Dialog Box." Then, reads files (except during measurements).
[Save As... Ctrl+S]	Displays the Save As dialog box. Refer to Section 4.3.10, "Save As Dialog Box Dialog Box." Then, saves files (except during measurements).
[Print... Ctrl+P]	Displays the Print dialog box. Refer to Section 4.3.11, "Print Dialog Box." This can be used to print measurement results (except during measurements).
[Exit]	Quits the D3371 Transmission Analyzer application for the D3371. Displays the Exit dialog box.
[View]	Displays a drop-down menu containing commands for displaying and hiding toolbars and the status bar.
[Warning...]	Displays warning messages. Selection of this menu is enabled when an error occurs during operation. For information on the warning messages, refer to A.3, "Messages."
[Time Type ►]	Displays a submenu used to select the time display type on the monitor toolbar.
[Elapsed Time]	Displays the elapsed measurement time on the monitor toolbar.
[Timed]	Displays the remaining measurement time on the monitor toolbar.
[Start Time]	Displays the time measurement started on the monitor toolbar.
[Real Time]	Displays the current date and time on the monitor toolbar.
[Go To ►]	Displays a submenu used to select the items on the Functions bar.
[Basic Measurement]	Displays the basic measurement results. For details, refer to **[Basic Measurement]** in Section 4.3.4, "Functions bar."
[Quick Operation]	Performs measurement using the operating environment equivalent to the conventional enviroment. Two measurement items, such as the error rate and error count, can be selected. The settings for SSG module frequency, PPG module output conditions, and ED module input conditions can be modified in real time. For details, refer to **[Quick Operation]** in Section 4.3.4, "Functions bar."
[Error Phase Analysis]	Results of "Error phase analysis measurement" are displayed. Refer to **[Error Phase Analysis]** in "4.3.4 Functions bar" for details.
[Jitter Tolerance]	Jitter tolerance measurement results are displayed. Refer to **[Jitter Tolerance]** in "4.3.4 Functions bar" for details.

[Toolbars ►] Displays a submenu for switching between displaying and hiding the toolbars.

[Standard] Switches between displaying and hiding the standard toolbar. When checked, the standard toolbar is displayed.

[Monitor] Switches between displaying and hiding the monitor toolbar. When checked, the monitor toolbar is displayed.

[Text Labels] Switches between displaying and hiding the button names of the standard toolbar. When checked, the button names of the standard toolbar are displayed.

[Status Bar] Switches between displaying and hiding the status bar. When checked, the status bar is displayed. Messages indicating the operating status of the D3371 and the Progress Bar indicating the progress of measurements that take a long time are displayed on the status bar. For details, refer to A.3, "Messages."

[Measurement] Displays a drop-down menu related to measurement.

[Start F5] Starts a measurement using the current settings.

[Stop Shift+F5] Stops measurement.

[Auto Search... F6] Performs Auto Search.

[Output Clock & Data Ctrl+U]
Simultaneously controls the on/off status of the PPG module clock outputs (CLOCK OUTPUT and $\overline{\text{CLOCK}}$ OUTPUT) and data outputs (DATA OUTPUT and $\overline{\text{DATA}}$ OUTPUT).

CAUTION:

1. ***The UUT or DUT may be damaged if the output interface settings are incorrect. Carefully check the settings before turning the output on.***
2. ***No output signal is displayed immediately after power is turned on. When the output is off, output is 50 Ω to 0 V. (However, for a frame ground, there can also be a potential difference of several mV.)***

[Single Error Addition] Adds a single-bit error to the PPG module output pattern. To use this function, select **[PPG]-[Error Addition]-[Add Errors]-[Single]** in the Settings window.

[ReSync] Resynchronizes the ED module patterns.

[Buzzer] Controls whether buzzer is on or off. When checked, the buzzer is on.

[Clear History] Clears the monitor toolbar history information.

[Measurement Settings... Ctrl+T]
Displays the Settings window used to specify the setup conditions and measurement items. Refer to Section 4.3.5, "Settings Window."

[Set Installation Defaults] Restores the settings for the D3371 to the initial values set at installation. For information about the initial values, refer to Section 4.6, "Settings."

[Tools] Tools is a set of convenient D3371 functions. Displays a drop-down menu.

[Touch Panel Calibration... F8]
Calibrates the touch screen.

[Help]
Displays a drop-down menu related to the module configuration and revision of the D3371.

[Information...]
Enables the module configuration and the results of the D3371 self-test to be accessed. Displays the Information window. Refer to Section 4.3.7, "Information Window."

[About D3371 Transmission Analyzer]
Displays a dialog box that displays the software revision. After checking the displayed information, click the **[OK]** button to close the dialog box.

4.3.2 Standard Toolbar

[Open]
Displays the Open dialog box. Refer to Section 4.3.9, "Open Dialog Box." Then, reads files (except during measurements).

[Save As]
Displays the Save As dialog box. Refer to Section 4.3.10, "Save As Dialog Box." Then, saves files (except during measurements).

[Print]
Displays the Print dialog box. Refer to Section 4.3.11, "Print Dialog Box." Then prints measurement results (except during measurements).

[Start]
Starts measurement using the current settings.

[Stop]
Stops measurement.

[A-Search]
Performs Auto Search.

[Output]
Simultaneously controls the on/off status of all PPG module clock outputs (CLOCK OUTPUT and $\overline{\text{CLOCK}}$ OUTPUT) and data outputs (DATA OUTPUT and $\overline{\text{DATA}}$ OUTPUT).

CAUTION:

1. ***The UUT or DUT may be damaged if the output interface settings are incorrect. Carefully check the settings before turning the output on.***
2. ***No output signal is displayed immediately after power is turned on. When the output is off, output is 50 Ω to 0 V. (However, for a frame ground, there can also be a potential difference of several mV.)***

[Error]
Adds a single-bit error to the output pattern of the PPG module. To use this function, select **[PPG]-[Error Addition]-[Add Errors]-[Single]** in the Settings window.

[ReSync]
Resynchronizes the ED module pattern.

[Buzzer]
Controls whether buzzer is on or off. When checked, the buzzer is on.

[Settings]
Displays the Settings window used to specify measurement items. Refer to Section 4.3.5, "Settings Window."

[Warning]
Displays a dialog box for displaying information about errors that occur during operation. After checking the displayed information, click the **[OK]** button. The dialog box closes. This button can be enabled when an error occurs.

4.3.3 Monitor Toolbar

[Time Type] Selects the time display type.

- **[Elapsed Time]** Displays the elapsed measurement time.
- **[Timed]** Displays the remaining measurement time.
- **[Start Time]** Displays the measurement start time.
- **[Real Time]** Displays the current date and time.

[Time Information] Displays the time information set for the Time Type.

[Real Time] Displays error information in real time using changes in the colors displayed.

CAUTION: All of the error information will not be displayed if the error information changes too quickly.

[ERR]

Bit error detected:	Red
Bit error not generated:	Light blue
Bit error cannot be detected (When synchronization loss or clock loss is detected.):	Black

[SYN]

Synchronization loss detected:	Red
Synchronized:	Light blue
Synchronization status cannot be detected (When clock loss is detected.):	Black

[CLK]

Clock loss detected:	Red
Clock entered normally:	Light blue

[History] Displays history information. The history information is initialized when measurement starts (displayed in black).

- **[ERR]** Lights in red when an error is detected. The history information is retained until the next measurement starts or the **[Clear History]** button is clicked.
- **[SYN]** Lights in red when synchronization loss is detected. The history information is retained until the next measurement starts or the **[Clear History]** button is clicked.
- **[CLK]** Lights in red when clock loss is detected. The history information is retained until the next measurement starts or the **[Clear History]** button is clicked.

[Clear History] Clears the history information of the monitor toolbar.

[REC] Error recording status is indicated with color.

While error recording is being performed:	Light Blue
If error recording cannot be performed: (When synchronization loss or clock loss is detected.)	Red
Error recording has been completed or is disabled:	Black

[JIT] Jitter modulation status is indicated with color.

Jitter modulation is enabled:	Light Blue
Jitter modulation is disabled:	Black

4.3.4 Functions bar

[Basic Measurement]

Displays the results of basic measurements. Use ED module **[Condition]** in the Settings window to set up the measurement condition. Use ED module **[Condition]-[Display Format]** in the Settings window to set up the display format of each item.

The following parameters are displayed for the basic measurement:

- Frequency
- Bit Count *1
- Error Rate *1
- Error Count *1
- Immediate Error Rate *1
- Immediate Error Count *1
- Error Intervals *1
- Error Free Intervals *1
- Threshold EI *2
- Threshold EFI *2
- Error Performance *3
- Clock Loss Intervals
- Sync Loss Intervals
- B1 error (B1) *4

*1: The parameters above display results corresponding to the mode selected from three error Detection Modes listed below. Each Detection mode contains three parameters and are measured simultaneously. The Overhead/Payload/Total detection mode requires the pattern option. Each of the error detection mode setting is as follows.

[Omitting/Inserting/Total]:
Omitting errors (Omitting), Insertion errors (Insertion) and Total errors (Total) are displayed simultaneously.

[Overhead/Payload/Total]:
Errors in Overhead area (Overhead), errors in Payload area (Payload) and total errors (Total) are displayed simultaneously. This mode can be selected if this mode is set to the STM pattern.

[Specific/Others/Total]:
Errors in specific fields (Specific), errors in non-specific fields (Other), and total errors (Total) are displayed simultaneously.

*2: The threshold mode measures and displays the seven levels listed in the table below.

	Threshold						
Average error rate per second	> 10^{-3}	> 10^{-4}	> 10^{-5}	> 10^{-6}	> 10^{-7}	> 10^{-8}	≤ 10^{-8} *

*: When the error rate is 0, it is calculated as a threshold EFI.

*3: Corresponds to the following measurement items: Error Seconds, Error Free Seconds, Severely Errored Seconds, Unavailable Seconds, and Degraded Minutes

*4: If the pattern option is installed, the data corresponds to B1 error measurements of STM frames.

NOTE: ******** is displayed for items that are not subject to measurement.***
If the measurement value is undefined (no valid data for some reason), ----- is displayed.
If the measurement value overflows, ##### is displayed.

[Quick Operation] Performs measurement using the operating environment equivalent to the conventional enviroment. Two measurement items, such as the error rate and error count, can be selected. The settings for the SSG module frequency, PPG module output conditions, and ED module input conditions can be modified in real time.

[SSG] Sets up the SSG module.

[Frequency] Sets the frequency. For connection to the PPG module, this setting is the pattern generation frequency.

[PPG] Sets up the PPG module.

[Clock Delay] Sets the amount of the clock delay.

[DATA]

[Amplitude] Sets the output amplitude of DATA OUTPUT.

[Offset Voltage] Sets the offset voltage of DATA OUTPUT.

[XDATA]

[Amplitude] Sets the output amplitude of $\overline{\text{DATA}}$ OUTPUT.

[Offset Voltage] Sets the offset voltage of $\overline{\text{DATA}}$ OUTPUT.

[CLOCK]

[Amplitude] Sets the output amplitude of CLOCK OUTPUT.

[Offset Voltage] Sets the offset voltage of CLOCK OUTPUT.

[XCLOCK]

[Amplitude] Sets the output amplitude of $\overline{\text{CLOCK}}$ OUTPUT.

[Offset Voltage] Sets the offset voltage of $\overline{\text{CLOCK}}$ OUTPUT.

[Results] Selects the measurement items.

[Type1]

[Error Rate] Selects the error rate.

[Error Count] Selects the error count.

[Immediate Error Rate]
Selects the immediate error rate.

[Immediate Error Count]
Selects the immediate error count.

[Type2]

[Error Rate] Selects the error rate.

[Error Count] Selects the error count.

[Immediate Error Rate]
Selects the immediate error rate.

[Immediate Error Count]
Selects the immediate error count.

[Current Data] Sets whether display of the intermediate results is on or off.

[ED] Sets up the ED module.

[Clock Delay] Sets the amount of the clock delay.

[Threshold Voltage] Sets the threshold voltage of DATA INPUT.

[Error Phase Analysis] Results of error phase analysis measurement are displayed. The expressions include time-series formats and statistics formats. Time-series format is used to display time-series data, while statistics format is used to display statistical data.

Time-series data
Time-series data is displayed, together with patterns, in the order that error bits are recorded. Error bits are displayed in brown in time-series data list.
Time-series data consists of the white-colored part displaying patterns and error bits and the yellow-colored part displaying phases of pattern. Parameters to be displayed in the yellow-colored phase-indicating part depend on pattern types. The following table indicates relationships between pattern types and pattern phase-indicating parameters.

Pattern type	Pattern phase-indicating parameter	Description
PROG patterns ZSUB patterns	Cycle No. *	Cycle number of a pattern
	Address	Address
STM patterns	Cycle No. *	Cycle number of a pattern
	Frame No.	Frame number
	Row	Row in a frame
	Column	Column in a frame
FLEX patterns	Cycle No. *	Cycle number of a pattern
	Index	Index
	Address	Address

*: The cycle number of a pattern indicates a serial number that specifies the position of the pattern in a cycle of patterns and starts with the first error-including pattern set to No.1.

NOTE:

1. ***Patterns of cycles that do not include any error are not displayed and are replaced with a separator (a blue line). Therefore, the relationship between a pattern preceding a separator and a pattern following the separator is discontinuous.***
2. ***Time-series data indicate values of PRBS patterns included in STM or FLEX patterns.***
3. ***Error free Data is inserted into the patterns that precede the first-recorded error bit and cover down to the initial bit of the cycle. In addition, Data indicating that no error is included are inserted in the patterns that follow the last-recorded error bit and cover up to the end bit of the cycle.***

Statistical data
Bit error counts and bit error rates for the bits in a pattern are indicated as statistical data.
Statistical data consists of the (white-colored) part displaying patterns and error bits and the (yellow-colored) part displaying phases of patterns. Items to be displayed in the (yellow-colored) phase-indicating part depend on pattern types. The following table indicates relationships between pattern types and pattern phase-indicating items.

Pattern type	Pattern phase-indicating parameter	Description
PROG patterns ZSUB patterns	Address	Address
STM patterns	Frame No.	Frame number
	Row	Row in a frame
	Column	Column in a frame
FLEX patterns	Index	Index
	Address	Address

Error rate-dependent colors are used to display error bits. The following indicates relationships between bit error rates and colors used to display error bits.

Bit error rate	Color used in display
$10^{-0} \geq BER > 10^{-2}$	Brown
$10^{-2} \geq BER > 10^{-4}$	Orange
$10^{-4} \geq BER > 10^{-6}$	Ocher
$10^{-6} \geq BER > 10^{-8}$	Yellow
$10^{-8} \geq BER > 10^{-10}$	Yellow-Green
$10^{-10} \geq BER > 0$	Light Blue

NOTE: ***If PRBS patterns are included in STM patterns or FLEX patterns, values of the PRBS patterns are not indicated. Bits in PRBS pattern areas are indicated with *.***

[⤒] The front page of the error phase analysis data is displayed.

[⇞] The displayed page is moved up by one page.

[Jump] The Jump dialog box is displayed. Specify a location to be jumped to with a parameter and performs the jump.

Pattern type	Parameter	Setting range	Setting resolution
PROG patterns ZSUB patterns	Cycle No.	1 to the cycle where the last error occurred	1
	Address	0 to pattern length -1 bit	1 bit
STM patterns	Cycle No.	1 to the cycle where the last error occurred	1
	Frame No.	1 to the number of frames	1
	Row	1 to 9	1
	Column	STM-1: 1 to 1080 bytes STM-16: 1 to 4320 bytes	1 byte
FLEX patterns	Cycle No.	1 to the cycle where the last error occurred	1
	Index	1 to the number of indices	1
	Address	0 to pattern length 1	1 bit

[▼▼] The displayed page is moved down by one page.

[▼] The last page of error phase analysis data is displayed.

[ERR ▲] The cursor is moved to the portion that includes the immediately preceding error.

[▼ ERR] The cursor is moved to the portion that includes the immediately succeeding error.

[Jitter Tolerance] The Jitter tolerance measurement result is displayed. The search mode display or the sweep mode display can be selected.

Display in the search mode

1. Graph area
The X-axis and the Y-axis indicate the jitter frequency and jitter amplitude respectively. Logarithmic scales are used for both axes. Each measurement data is plotted at the corresponding measurement point on the graphs with symbols. Symbols used and their meanings are as follows.

Symbol	Description
△ (blue)	Indicates that the number of errors for the maximum jitter amplitude is less than the error threshold. (When the detected jitter amplitude exceeds the maximum limit, the jitter tolerance point cannot be detected.)
□ (blue)	Indicates that the jitter tolerance point is detected.
▼ (red)	Indicates that the number of errors at the minimum jitter amplitude is equal to or larger than the error threshold. (When a detected jitter amplitude is less than the minimum level, or either an out-of-synchronization or clock-loss has occurred, the jitter tolerance point cannot be detected.)

2. Table area
Tables for jitter frequency, jitter amplitude and evaluation results are provided.
Inequality signs for jitter amplitude are given in the following conditions.

Symbol	Description
>	Indicates that the number of errors at the maximum jitter amplitude is less than the error threshold. (When the detected jitter amplitude exceeds the maximum limit, a jitter tolerance point cannot be detected.)
<	Indicates that the number of errors at the minimum jitter amplitude is equal to or larger than the error threshold. (When a detected jitter amplitude is less than the minimum level, or either an out-of-synchronization or clock-loss has occurred, a jitter tolerance point cannot be detected.))

In addition, evaluation results are indicated with the following.

Indication	Description
OK (blue)	The jitter amplitude at the jitter tolerance point is larger than that in the template.
NG (red)	The jitter amplitude at the jitter tolerance point is equal to or less than that in the template.
FAIL (red)	Measurement is failed. (A synchronization loss or clock-loss state has occurred.)
------ (red)	The template has not been preset or the results are out of the template range.

Display in the sweep mode

1. Graph area
The X-axis and the Y-axis indicate jitter frequency and jitter amplitude, respectively. Logarithmic scales are used for both axes.
Each measurement data is plotted at the corresponding measurement points on the graphs with symbols. Symbols used and their meanings are as follows.

Symbol	Description
○ (blue)	Indicates that the number of errors is less than the error threshold.
× (red)	Indicates that the number of errors is equal to or larger than the error threshold or detection is failed. (A synchronization loss or clock-loss state has occurred.)

2. Table area
Table for jitter frequency, jitter amplitude and evaluation results are provided. Evaluation results are indicated with the following.

Indication	Description
○ (blue)	Indicates that the number of errors is less than the error threshold.
× (red)	Indicates that the number of errors is equal to or larger than the error threshold.
FAIL	Measurement is failed. (A synchronization loss or clock-loss has occurred.)

[Marker] Marker settings are available in this menu.

[Marker...] The Marker dialog box is displayed. The Marker display format can be set. Refer to "4.3.14 Marker Dialog Box" for details.

[Marker 1] Enables to move Marker 1.

[Marker 2] Enables to move Marker 2.

[↑↓] If the data knob is rotated when the Marker mode is set to **[Free]**, the marker moves upwards or downwards.

[⇄] If the data knob is rotated when the Marker mode is set to **[Free]**, the marker moves to the left or to the right.

[Scale] Scale settings can be selected from this menu.

[Auto Scale] Scales are set automatically.

[Scale...] The Scale dialog box is displayed. Scales are set manually. Refer to "4.3.15 Scale Dialog Box" for details.

4.3.5 Settings Window

4.3.5.1 Setting Up the SSG Module

Select **[SSG]** on the Module selection list bar.

CAUTION: ***To take accurate measurements using the built-in SSG module in the D3371, wait at least 30 minutes after the power is turned on for warm-up.***

[Frequency]
Clock source settings are available in this menu.

[Output]
CLOCK OUTPUT on the rear panel of the SSG module is enabled or disabled. Whether the output of clock signal is enabled (when checked) or disabled (when not checked) is selected.

[Frequency]
Sets the frequency. When connected to the PPG module, this setting becomes the pattern generation frequency.

- Setting range: 10,000 kHz to 3,600,000 kHz
- Setting resolution: 1 kHz

[Reference]
An input source for the reference clock is selected.
The reference clock signal is output to the 10 MHz OUTPUT on the rear panel of the SSG module.
If external reference clock is selected, the clock is input to the 10 MHz INPUT, buffered and is then output from the 10 MHz OUTPUT.

- Output frequency: 10 MHz (internal reference clock)
- Output frequency accuracy:
  Within ±2 ppm (internal reference clock)
- Output amplitude: 0 dBm ±5 dB
- Coupling: AC

[Internal]
Uses the internal reference clock.

[External]
Uses the input signal from the 10 MHz INPUT on the rear panel of the SSG module as the reference clock.

- Input level: 0 dBm ±5 dB
- Input frequency: 10 MHz
- Input frequency accuracy required:
  Within ±10 ppm
- Coupling: AC

[Jitter Modulation]
Sets Jitter to ON or OFF. Whether jitter is added (When checked) to the clock or not (When not checked) is selected.

[Frequency] A jitter frequency is set.

Clock frequency	Jitter frequency setting range	Setting Resolution
10 MHz ≤ clock frequency < 175 MHz	10 Hz to 2 MHz	
175 MHz ≤ clock frequency < 800 MHz	10 Hz to 5 MHz	
800 MHz ≤ clock frequency ≤ 3.2 GHz	10 Hz to 20 MHz	10 Hz

[Amplitude] A jitter amplitude is set.

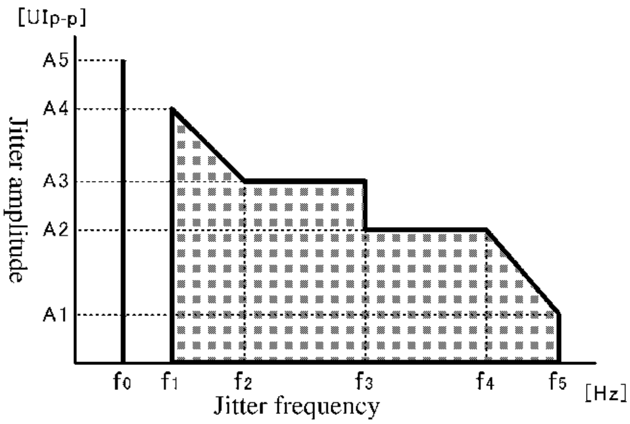


Figure 4-1 Jitter Setting Ranges

Band1 (800 MHz ≤ Clock frequency ≤ 3200 MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 300k	20M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	800	500	50	20	0.3
Band2 (175 MHz ≤ Clock frequency < 800 MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 125k	5M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	800	500	50	20	0.5
Band3 (10 MHz ≤ Clock frequency < 175 MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 200k	2M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	200	120	12	5	0.5

	Jitter amplitude range [UI_{P-P}]	Setting resolution [UI_{P-P}]
Band1 Band2	0 to 5	0.01
	5 to 50	0.1
	50 to 500	1
	500 to 800	2
Band3	0 to 1	0.01
	1 to 10	0.1
	10 to 100	1
	100 to 200	2

4.3.5.2 Setting Up the PPG Module

Select **[PPG]** on the Module selection list bar.

[Data] Group of settings related to data output is in this list bar.

CAUTION: ***Refer to Section 1.6, "Safety precautions when using the D3371," when connecting the UUT or DUT to a connector on the D3371. Always discharge any static electricity before connecting cables or equipment to the I/O connectors. In addition, connect a 50 Ω terminator to the CLOCK OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT, DATA OUTPUT, and $\overline{\text{DATA}}$ OUTPUT connectors that are not used.***

[Track Data] Turns the data output tracking function on or off. When the tracking function is on checked, the **[XDATA]** amplitude, offset reference, offset voltage, termination voltage, cross point, and output on/off settings are linked to **[DATA]**. To set the items individually, turn the tracking function off (unchecked).

NOTE: ***When the tracking function is switched from on to off, the [XDATA] settings do not return to their previous settings.***

[DATA], [XDATA] Selects the DATA OUTPUT connector on the front panel of the PPG module to be set. **[DATA]** corresponds to DATA OUTPUT. **[XDATA]** corresponds to $\overline{\text{DATA}}$ OUTPUT.

[Enable DATA Output], [Enable XDATA Output]
Turns each data output on or off. Selects whether to output a data signal (checked) or not (unchecked). When data output is on, the OUTPUT indicator of each output connector lights.

CAUTION:

1. ***The UUT or DUT may be damaged depending on the settings of the data output interface. Carefully check the settings before turning on the output.***
2. ***No output signal is displayed immediately after power is turned on. When the output is set to off, output is 50 Ω to 0 V. (However, for a frame ground, there can also be a potential difference of several mV.)***

[Cross Point] Sets the cross point of data output.

- Setting range: 20% to 80%
- Setting resolution: 1%

[Termination] The data output termination type is set. The termination type for the load side which is terminated with 50 Ω is used to set.

- Selection items: To GND (0 V), ECL (-2 V), LVPECL (+1.3 V) or CML

[Termination Voltage] A . When the termination setting is set to CML, a termination voltage can be set.

- Voltage range: 0 to 3.50 V
- Setting resolution: 0.05 V

[Amplitude]

Sets the output amplitude of data output.

Termination type	Amplitude setting range	Setting Resolution
to GND(0V)	0.30 V_{P-P} to 2.00 V_{P-P} (2 V output module) 0.30 V_{P-P} to 3.00 V_{P-P} (3 V output module)	0.01 V
ECL(-2V)	0.60 V_{P-P} to 1.00 V_{P-P}	
LVPECL(+1.3V)	0.60 V_{P-P} to 1.00 V_{P-P}	
CML	0.30 V_{P-P} to 1.00 V_{P-P}	

[Offset]

Sets the offset reference and offset voltage. For the offset reference, select high, middle, or low level. If the offset value used as the reference value is changed, the offset values that are not used as reference values are calculated using the formulas below.

High level offset value
= middle level offset value + amplitude/2

= low level offset value + amplitude

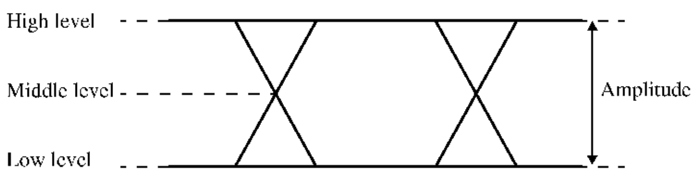
Middle level offset value
= high level offset value - amplitude/2

= low level offset value + amplitude/2

Low level offset value
= high level offset value - amplitude

= middle level offset value - amplitude/2

Offset definition



- Offset reference selection items: **[High]**, **[Middle]** and **[Low]**

- Offset voltage range (Offset reference: in "High" setting)

Termination type	Offset setting range	Setting resolution
to GND(0V)	-2.00V to +2.00V *1	0.01V
ECL(-2V)	-1.00V to -0.60V	
LVPECL(+1.3V)	+2.30V to +2.70V	
CML	Vcc-0.20V to Vcc+0.20V *2	

*1 If an amplitude exceeding 2 V_{P-P} is set for the 3 V output module, the offset setting range is limited to -1.00 V to +1.00 V.
*2 Vcc indicates the CML termination voltage.

[Clock]

A group of settings related to clock output is available in this menu.

CAUTION: ***Refer to Section 1.6, "Safety precautions when using the D3371," when connecting the UUT or DUT to a connector on the D3371. Always discharge any static electricity before connecting cables or equipment to the I/O connectors. In addition, connect a 50 Ω terminator to the CLOCK OUTPUT, $\overline{\text{CLOCK}}$ OUTPUT, DATA OUTPUT, and $\overline{\text{DATA}}$ OUTPUT connectors that are not used.***

[Clock Delay]

Sets the amount of the clock delay.

- Setting range: -1000 ps to +1000 ps
- Setting resolution: 1 ps

[Track Clock]

Turns the clock output tracking function on or off. When the tracking function is on checked, the **[XCLOCK]** amplitude, offset reference, offset voltage, termination voltage, cross point, and output on/off settings are linked to **[CLOCK]**. To set the items individually, turn the tracking function off (unchecked).

NOTE: ***When the tracking function is switched from on to off, the [XCLOCK] settings do not return to their previous settings.***

[CLOCK], [XCLOCK]

Selects the CLOCK OUTPUT connector on the front panel of the PPG module to be set. **[CLOCK]** corresponds to CLOCK OUTPUT. **[XCLOCK]** corresponds to $\overline{\text{CLOCK}}$ OUTPUT.

[Enable CLOCK Output], [Enable XCLOCK Output]

Turns each clock output on or off. Selects whether to output a clock signal (checked) or not (unchecked). When clock output is on, the LED of each output connector lights.

CAUTION:

- ***The UUT or DUT may be damaged if the settings of the clock output interface are incorrect. Carefully check the settings before turning the output on.***
- ***No output signal is displayed immediately after power is turned on. When the Output is set to off, the output is 50 Ω to 0 V. (However, for a frame ground, there can also be a potential difference of several mV.)***

[Termination] The data output termination type is set. Set the termination load to 50 Ω.

- Selection items: To GND (0 V), ECL (-2 V), LVPECL (+1.3 V) or CML

[Termination Voltage] A termination voltage is set. When the termination type is set to CML, this setting is available.

- Setting items: 0 to 3.50 V
- Setting resolution: 0.05 V

[Amplitude] Sets the output amplitude of clock output.

Termination type	Amplitude setting range	Setting Resolution
to GND(0V)	$0.30V_{P-P}$ to $2.00V_{P-P}$	0.01V
ECL(-2V)	$0.60V_{P-P}$ to $1.00V_{P-P}$	
LVPECL(+1.3V)	$0.60V_{P-P}$ to $1.00V_{P-P}$	
CML	$0.30V_{P-P}$ to $1.00V_{P-P}$	

[Offset] Sets the offset reference level and offset voltage. For the offset reference level, select high, middle, or low level. If the offset value used as the reference value is changed, the offset value that is not used as reference value is calculated using the formulas below.

High level offset value
= middle level offset value + amplitude / 2

= low level offset value + amplitude

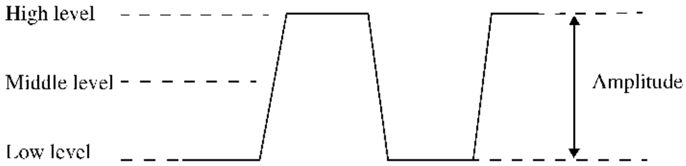
Middle level offset value
= high level offset value - amplitude / 2

= low level offset value + amplitude / 2

Low level offset value
= high level offset value - amplitude

= middle level offset value - amplitude / 2

Offset definition



- Offset reference: **[High]**, **[Middle]** and **[Low]**
- Offset voltage range (Offset reference: in "High" setting)

Termination type	Offset setting range	Setting resolution
to GND(0V)	-2.00V to +2.00V	0.01V
ECL(-2V)	-1.00V to +0.60V	
LVPECL(+1.3V)	+2.30V to +2.70V	
CML	Vcc-0.20V to Vcc+0.20V *1	

*1 Vcc indicates the CML termination voltage.

[Pattern] Group of settings related to the pattern to be generated. For information about each pattern, refer to Chapter 5, "TECHNICAL TERMS AND INFORMATION."

[Pattern Polarity] Sets pattern logic.

[Normal] Sets positive logic.

[Inverted] Sets negative logic.

[Pattern Type] Sets the contents of the data output pattern.

[PRBS] Sets a pseudorandom pattern (PRBS).

[Pattern Length]
Sets the pattern length of the PRBS pattern. The table below lists the PRBS pattern lengths that can be selected, generating polynomials, and reference standards.

PRBS pattern length	Generating polynomial	Reference standard (mark ratio setting)
2^7-1	X^7+X^6+1	ITU-T V.29(1/2)
2^9-1	X^9+X^5+1	ITU-T V.52(1/2)
2^10-1	$X^{10}+X^7+1$	
2^11-1	$X^{11}+X^9+1$	ITU-T O.152(1/2)
2^15-1	$X^{15}+X^{14}+1$	ITU-T O.151($\overline{1/2}$)
2^23-1	$X^{23}+X^{18}+1$	ITU-T O.151($\overline{1/2}$)
2^31-1	$X^{31}+X^{28}+1$	

[Mark Ratio] Sets the mark ratio for PRBS pattern generation.

- Selection range: 0/8, 1/8, 1/4, 1/2, 3/4, 7/8, 8/8, and 1/2B (0/8 and 8/8, 1/8 and 7/8, 1/4 and 3/4, and 1/2 and 1/2B have a logically inverted relationship.)

[ZSUB] Sets a zero substitution (ZSUB) pattern.

[Pattern Length] Sets the pattern length of the ZSUB pattern.

- Selection range: 2^7, 2^9, 2^10, 2^11, and 2^15

[Zero Length] Sets the consecutive zero bit length for ZSUB pattern generation.

- Consecutive zero bit length setting range

ZSUB pattern length	Consecutive zero bit length	Setting resolution
2^7	7 to 127	1
2^9	9 to 511	1
2^10	10 to 1023	1
2^11	11 to 2047	1
2^15	15 to 32767	1

[PROG] Sets a programmable (PROG) pattern.

[Pattern Settings]
Edits the pattern length and contents of the PROG pattern. Displays the Pattern Settings dialog box. For details, refer to Section 4.3.6, "Pattern Settings Window."

The table below lists the pattern lengths and setting resolutions that can be specified for the PROG patterns used with the D3371.

Setting range [bit(s)]	Setting resolution [bit(s)]
1 to 262,144	1
262,146 to 524,288	2
524,292 to 1,048,576	4
1,048,584 to 2,097,152	8
2,097,168 to 4,194,304	16
4,194,336 to 8,388,608	32

[STM] An STM frame (STM) pattern is set.

[Insert PRBS into Payload]
The insertion of PRBS patterns into the payload is enabled (When checked) or disabled (When not checked).

[Pattern Length]
A pattern length of a PRBS pattern is set. Selectable PRBS pattern lengths, generating polynomials and reference standards used are indicated in the following.

PRBS pattern length	Generating polynomial	Reference standard (Mark ratio setting)
2^7-1	X^7+X^6+1	ITU-T V.29(1/2)
2^9-1	X^9+X^5+1	ITU-T V.52(1/2)
2^10-1	$X^{10}+X^7+1$	
2^11-1	$X^{11}+X^9+1$	ITU-T O.152(1/2)
2^15-1	$X^{15}+X^{14}+1$	ITU-T O.151($\overline{1/2}$)
2^23-1	$X^{23}+X^{18}+1$	ITU-T O.151($\overline{1/2}$)
2^31-1	$X^{31}+X^{28}+1$	

[Mark Ratio] A mark ratio used when PRBS patterns are generated is set.

- Selection range: 0/8, 1/8, 1/4, 1/2, 3/4, 7/8, 8/8, or 1/2B (0/8 and 8/8, 1/8 and 7/8, 1/4 and 3/4, or 1/2 and 1/2B are in the relationship that one is obtained by logically reversing the other.)

[Scramble] Scrambling functions complying with the ITU-T-recommendation G.707 specification are enabled (When checked) or disabled (When not checked).

[Insert B1] B1-inserting functions complying with the ITU-T-recommendation G.707 specification are enabled (When checked) or disabled (When not checked).

[Pattern Settings...] SMT pattern lengths and pattern data are edited.
The Pattern Settings dialog box is displayed. Refer to "4.3.6 Pattern Settings Window" for details.
STM pattern lengths and Setting resolution that can be set in the D3371 are as follows.

STM-N	The number of frames [frame(s)]	Setting resolution [frame]
STM-4	1 to 107	1
STM-16	1 to 26	

[FLEX] Flexible (FLEX) patterns are set.

[Pattern Sequence Table...]
Pattern sequence tables are edited. The Pattern Sequence Table dialog box is displayed. Refer to "4.3.16 Pattern Sequence Table Dialog Box" for details.

[PROG] Settings of PROG patterns included in FLEX patterns are put together.

[PROG Pattern No.]

Pattern numbers of the PROG patterns to be edited are specified.

- PROG pattern number selection: 1 to 127
- Setting resolution: 1

[Pattern Settings…]

PROG pattern length and pattern data are edited. The Pattern Settings dialog box is displayed. Refer to "4.3.6 Pattern Settings Window" for details.

[PRBS] Settings of PRBS patterns included in FLEX patterns are put together.

[Pattern Length]

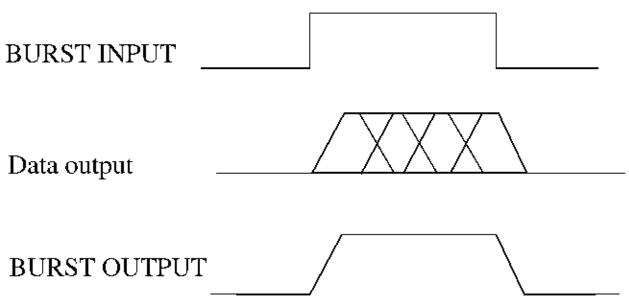
A pattern length of a PRBS pattern is set. Selectable PRBS pattern lengths, generating polynomials and reference standards used are indicated in the following.

PRBS pattern length	Generating polynomial	Reference standard (mark ratio setting)
2^7-1	X^7+X^6+1	ITU-T V.29(1/2)
2^9-1	X^9+X^5+1	ITU-T V.52(1/2)
2^10-1	$X^{10}+X^7+1$	
2^11-1	$X^{11}+X^9+1$	ITU-T O.152(1/2)
2^15-1	$X^{15}+X^{14}+1$	ITU-T O.151($\overline{1/2}$)
2^23-1	$X^{23}+X^{18}+1$	ITU-T O.151($\overline{1/2}$)
2^31-1	$X^{31}+X^{28}+1$	

[Mark Ratio] A mark ratio to be used when PRBS patterns are generated is set.

- Selectable range: 0/8, 1/8, 1/4, 1/2, 3/4, 7/8, 8/8, or 1/2B (0/8 and 8/8, 1/8 and 7/8, 1/4 and 3/4, or 1/2 and 1/2B are in the relationship that one is obtained by logically reversing the other.)

[Burst] The burst mode is a function that inhibits data patterns from being output and generates burst patterns. For information on the burst mode, refer to Section 5.8, "Burst."



When data output is disabled, the output of DATA OUTPUT is set to low and the output of $\overline{\text{DATA OUTPUT}}$ is set to high.

[Burst Mode]

Turns burst mode on or off. Burst mode is set to on when checked and the mode is set to off when unchecked.
When burst mode is set to on, BURST OUTPUT on the front panel of the PPG module is also enabled. For high (output enabled), the output level of BURST OUTPUT is 0 V. At low (output inhibited), the output level of BURST OUTPUT is -1 V.

- Output level: 0 V and -1 V
- Load impedance: 50 Ω to 0 V

[Source]

Selects the burst signal source for controlling burst pattern generation.

[Internal]

Uses an internal signal source.

[Cycle]

Sets the burst cycle of the internal signal source.

- Setting range: 2 μs to 50000 μs
- Setting resolution: 1 μs

[OFF Time]

Sets the OFF time during the burst cycle of the internal signal source.

- Setting range: 1 μs to 49999 μs
- Setting resolution: 1 μs

CAUTION: ***Set the relationship between the burst cycle and OFF time so that the condition [Cycle] > [OFF Time] is satisfied.***

[External]

The external signal input to the BURST INPUT connector on the PPG module rear panel is used as the burst trigger signal. The high level (output enabled) is 0 V, and the low level (output disabled) is -1 V.

- Input level 0 V and -1 V
- Input impedance: 50 Ω (nominal) to 0 V

NOTE: ***Make sure that the relationship between the input pulse width and output inhibit time can satisfy the condition input-pulse-width > output-inhibit-time.***

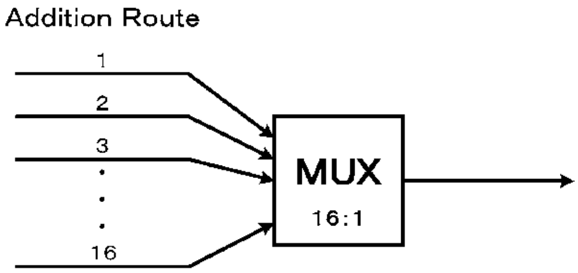
[Error Addition]

Group of settings related to the error addition function. The error addition function adds a bit error to the output pattern. There are three error addition modes: repeat mode, single mode, and external mode. The error addition route can also be set.

[Addition Route]

Sets the error addition route.

- Setting range 1 to 16



[Add Errors]

Turns the error addition function on or off. The error addition is on when checked and off when unchecked

[Single]

Sets single mode. A single-bit error can be added when **[Measurement]-[Single Error Addition]** has been selected on the menu bar or the **[Error]** button on the standard toolbar has been pressed.

[Repeat]

Sets repeat mode. Errors are added at the interval specified by **[Rate]**.

[Rate]

Sets the error addition rate in repeat mode.

- Setting range: 1E-2, 1E-3, 1E-4, 1E-5, 1E-6, 1E-7, 1E-8, and 1E-9

[External]

Inputs the external control signal from the ERROR INPUT connector on the rear panel of the PPG module in external mode. A single-bit error is inserted at the falling edge of the control signal pulse.

- Input pulse cycle: 128 times the clock cycle or greater
- Input pulse width: 64 times the clock cycle or greater
- Input level: 0 V and -1 V
- Input impedance: 50 Ω (nominal) to 0 V

[Trigger/Aux]

Group of settings related to the trigger signal. The trigger signal is used for monitoring waveforms using an oscilloscope. A clock signal divided into 1/8 or 1/32 or a signal synchronized with a pattern can be selected as the trigger signal. When a clock signal is selected for monitoring data output, the waveform is repeated and monitored as an eye pattern. When a pattern-synchronized signal is used as the trigger signal, specific locations within the pattern cycle can be stabilized and monitored.

[Trigger Output] Settings for trigger output and auxiliary output

[Trigger Signal] Selects the source of trigger output. Use the TRIGGER OUTPUT connector on the front panel of the PPG module for trigger output.

- Output level: 0 V or -1 V
- Load impedance: 50 Ω to 0 V

[1/8 Clock] Outputs a clock with a frequency that is 1/8 that of the output clock.

[1/32 Clock] Outputs a clock with a frequency that is 1/32 that of the output clock.

[Pattern] Outputs a trigger synchronized with a pattern. The trigger position can be set as the pattern position.

[PRBS] Sets the position (pattern phase) for outputting the trigger for a PRBS pattern.

- Setting range: 0 to pattern length - 1 bit
- Setting resolution: 1 bit

[PROG] Sets the position (pattern phase) for outputting the trigger for a PROG pattern.

- Setting range: 0 to pattern length - 1 bit
- Setting resolution: 16 bits

[ZSUB] Sets the position (pattern phase) for outputting the trigger for a ZSUB pattern.

- Setting range: 0 to pattern length - 1 bit
- Setting resolution: 16 bits

[STM] Sets a trigger position for the STM pattern.

[Pattern] Outputs one trigger for the entire STM pattern.

[Frame No.] A frame number is specified.

- Setting range: 1 to the number of frames contained
- Setting resolution: 1

[Row] A row is specified.

- Setting range: 1 to 9
- Setting resolution: 1

[Column] A column is specified.

- Setting range for STM-4: 1 to 1079 bytes
- Setting range for STM-16: 1 to 4319 bytes
- Setting resolution: 2 bytes

[Frame] A trigger is output for every frame.

[Row] A row is specified.

- Setting range: 1 to 9
- Setting resolution: 1

[Column] A column is specified.

- Setting range for STM-4: 1 to 1079 bytes
- Setting range for STM-16: 1 to 4319 bytes
- Setting resolution: 2 bytes

[FLEX] Sets a trigger position of the FLEX pattern.

[Index] A pattern in the pattern sequence table is set with an index.

- Setting range: 1 to the final index specified
- Setting resolution: 1

[Address] The address of a pattern specified with the index is set.

- Setting range: 0 to the pattern length -16 bits
- Setting resolution: 16 bits

[FLEX] This setting is available when FLEX patterns are set. A level specified in FLEX Trigger in the pattern sequence table is output.

4.3.5.3 Setting Up the ED Module

Select **[ED]** on the Module selection list bar.

[Data] Group of settings related to data input. To input data, set DATA INPUT on the front panel of the ED module.

[Data Polarity] Sets the data input polarity. Set **[Inverted]** if the same pattern contents are set for the PPG and ED modules and the data logic is inverted internally by the device under test or unit under test, or if the logic is inverted so that XDATA output can be used.

[Normal] Sets normal input.

[Inverted] Sets inverted input.

[Termination] A data output termination type is set. 50 Ω is used for termination.

- Selection items: To GND (0 V), ECL (-2 V), LVPECL (+1.3 V), PECL (+3 V) or CML

[Variable] Whether making termination voltage variable (When checked) or invariable (When not checked) is set.

[Termination Voltage] A termination voltage is set. The setting is possible if the termination type is set to ECL (-2 V), LVPECL (+1.3 V), PECL (+3 V) or CML, and when checked in the [Variable] check box.

Termination type	Termination voltage setting range	Setting resolution
ECL(-2V)	-2.30V to -1.70V	0.05V
LVPECL(+1.3V)	+1.00V to +1.60V	
PECL(+3V)	+2.70V to +3.30V	
CML	0V to +3.50V	

[Threshold Voltage] Data input threshold voltage is set.

Termination type	Threshold voltage setting range	Setting resolution
to GND(0V)	-2.040V to +2.040V	0.01V
ECL(-2V)	-1.850V to -0.750V	
LVPECL(+1.3V)	+1.450V to +2.550V	
PECL(+3V)	+3.150V to +4.250V	
CML	Vcc-1.100V to Vcc+0.100V *1	

*1 Vcc indicates CML termination voltage.

[Clock] Group of settings related to clock input. For clock input, set CLOCK INPUT on the front panel of the ED module.

[Clock Delay] Sets the amount of the clock delay.

- Setting range: -1000 ps to +1000 ps
- Setting resolution: 1 ps

[Clock Polarity] Sets the clock input polarity.

[Normal] Sets normal input.

[Inverted] Sets inverted input.

[Termination] A clock output termination type is set. 50 Ω is used for termination.

- Selection items: To GND (0 V), ECL (-2 V), LVPECL (+1.3 V), PECL (+3 V) or CML

[Variable] Whether making termination voltage variable (When checked) or invariable (When not checked) is set.

[Termination Voltage] A termination voltage is set. The setting is possible if the termination type is set to ECL (-2 V), LVPECL (+1.3 V), PECL (+3 V) or CML, and When checked in the **[Variable]** check box.

Termination type	Termination voltage setting range	Setting resolution
ECL(-2V)	-2.30V to -1.70V	0.05V
LVPECL(+1.3V)	+1.00V to +1.60V	
PECL(+3V)	+2.70V to +3.30V	
CML	0V to +3.50V	

[Pattern] Group of settings related to the pattern to be received.

[Use the same pattern as PPG]
Select if the pattern linkage function is used (the check box is selected) or not (the check box is cleared). When the pattern linkage function is set, the ED module pattern logic and pattern type are linked with those defined in the PPG module.

NOTE:

1. ***If the "use the pattern linkage function" setting is confirmed and then canceled, a dialog box requests confirmation of the change before execution. Click the [Yes] button to cancel the setting. Click the [No] button to confirm the setting.***
2. ***In this case, the ED module pattern logic and pattern type settings made before the pattern linkage function was used cannot be restored.***

[Pattern Polarity] Sets the pattern polarity.

[Normal] Sets positive logic.

[Inverted] Sets negative logic.

[Pattern Type] Sets the contents of the data pattern to be measured. For information on each pattern, refer to Chapter 5, "TECHNICAL TERMS AND INFORMATION."

[PRBS] Sets a pseudorandom pattern (PRBS).

[Pattern Length] Sets the pattern length of the PRBS pattern. The table below lists the PRBS pattern lengths that can be selected, generating polynomials, and reference standards.

PRBS pattern length	Generating polynomial	Standard reference (mark ratio setting)
2^7-1	X^7+X^6+1	ITU-T V.29(1/2)
2^9-1	X^9+X^5+1	ITU-T V.52(1/2)
2^10-1	$X^{10}+X^7+1$	
2^11-1	$X^{11}+X^9+1$	ITU-T O.152(1/2)
2^15-1	$X^{15}+X^{14}+1$	ITU-T O.151($\overline{1/2}$)
2^23-1	$X^{23}+X^{18}+1$	ITU-T O.151($\overline{1/2}$)
2^31-1	$X^{31}+X^{28}+1$	

[Mark Ratio]

Sets the mark ratio of the PRBS pattern.

- Selection range: 0/8, 1/8, 1/4, 1/2, 3/4, 7/8, 8/8, and 1/2B (0/8 and 8/8, 1/8 and 7/8, 1/4 and 3/4, and 1/2 and 1/2B have a logically inverted relationship.)

[ZSUB]

Sets a zero substitution (ZSUB) pattern.

[Pattern Length]

Sets the pattern length of the ZSUB pattern.

- Selection range: 2^7, 2^9, 2^10, 2^11, and 2^15

[Zero Length]

Sets the consecutive zero bit length for ZSUB pattern generation.

- Consecutive zero bit length setting range

ZSUB pattern length	Consecutive zero bit length	Setting resolution
2^7	7 to 127	1
2^9	9 to 511	1
2^10	10 to 1023	1
2^11	11 to 2047	1
2^15	15 to 32767	1

[PROG]

Sets a programmable (PROG) pattern.

[Pattern Settings]

Edits the pattern length and contents of the PROG pattern. Displays the Pattern Settings dialog box. For details, refer to Section 4.3.6, "Pattern Settings Window."

The table below lists the pattern lengths and setting resolutions that can be set for the PROG patterns for the D3371.

Setting range [bit(s)]	Setting resolution [bit(s)]
1 to 262,144	1
262,146 to 524,288	2
524,292 to 1,048,576	4
1,048,584 to 2,097,152	8
2,097,168 to 4,194,304	16
4,194,336 to 8,388,608	32

[STM] An STM frame (STM) pattern is set.

[Insert PRBS into Payload]
The insertion of PRBS patterns into payloads is enabled (When checked) or disabled (When not checked).

[Pattern Length] The pattern length of a PRBS pattern is set. Selectable PRBS pattern lengths, generating polynomials and reference standards used are indicated in the following.

PRBS pattern length	Generating polynomial	Standard reference (Mark ratio setting)
2^7-1	X^7+X^6+1	ITU-T V.29(1/2)
2^9-1	X^9+X^5+1	ITU-T V.52(1/2)
2^10-1	$X^{10}+X^7+1$	
2^11-1	$X^{11}+X^9+1$	ITU-T O.152(1/2)
2^15-1	$X^{15}+X^{14}+1$	ITU-T O.151($\overline{1/2}$)
2^23-1	$X^{23}+X^{18}+1$	ITU-T O.151($\overline{1/2}$)
2^31-1	$X^{31}+X^{28}+1$	

[Mark Ratio] A mark ratio to be used when PRBS patterns are generated is set.

- Selection range:
  0/8, 1/8, 1/4, 1/2, 3/4, 7/8, 8/8, or 1/2B
  (0/8 and 8/8, 1/8 and 7/8, 1/4 and 3/4, or 1/2 and 1/2B are in the relationship that one is obtained by logically reversing the other.)

[Scramble] Scrambling functions complying with the ITU-T-recommendation G.707 specification are enabled (When checked) or disabled (When not checked).

[Insert B1] B1-inserting functions complying with the ITU-T-recommendation G.707 specification are enabled (When checked) or disabled (When not checked).

[Pattern Settings...] SMT pattern lengths and pattern data are edited. The Pattern Settings dialog box is displayed. Refer to "4.3.6 Pattern Settings Window" about details.
STM pattern lengths and Setting resolution that can be set in the D3371 are as follows.

STM-N	The number of frames [frame(s)]	Setting resolution [frame]
STM-4	1 to 107	1
STM-16	1 to 26	

[FLEX] Flexible (FLEX) patterns are set.

[Pattern Sequence Table...]
Pattern sequence tables are edited. The Pattern Sequence Table dialog box is displayed. Refer to "4.3.16 Pattern Sequence Table Dialog Box" for details.

[PROG] Settings of PROG patterns included in FLEX patterns are put together.

[PROG Pattern No.]
Pattern numbers of the PROG patterns to be edited are specified.

- Setting range: 1 to 127
- Setting resolution: 1

[Pattern Settings...]
PROG pattern lengths and pattern data are edited. The Pattern Settings dialog box is displayed. Refer to "4.3.6 Pattern Settings Window" for details.

[PRBS] Settings of PRBS patterns included in FLEX patterns are put together.

[Pattern Length]
The pattern length of a PRBS pattern is set. Selectable PRBS pattern lengths, generating polynomials and reference standards used are indicated in the following.

PRBS pattern length	Generating polynomial	Standards reference (Mark ratio setting)
2^7-1	X^7+X^6+1	ITU-T V.29(1/2)
2^9-1	X^9+X^5+1	ITU-T V.52(1/2)
2^10-1	$X^{10}+X^7+1$	
2^11-1	$X^{11}+X^9+1$	ITU-T O.152(1/2)
2^15-1	$X^{15}+X^{14}+1$	ITU-T O.151($\overline{1/2}$)
2^23-1	$X^{23}+X^{18}+1$	ITU-T O.151($\overline{1/2}$)
2^31-1	$X^{31}+X^{28}+1$	

[Mark Ratio] A mark ratio used when PRBS patterns are generated is set.

- Selection range: 0/8, 1/8, 1/4, 1/2, 3/4, 7/8, 8/8, or 1/2B (0/8 and 8/8, 1/8 and 7/8, 1/4 and 3/4, or 1/2 and 1/2B are in the relationship that one is obtained by logically reversing the other.)

[Sync] Group of settings related to pattern synchronization. In pattern synchronization, the phase of of ED module patterns providing measurement references are matched with that of received patterns input into DATA INPUT. Pattern synchronization must be established before bit errors can be measured. For information about synchronization, refer to Section 5.10, "Synchronization."

[Auto Sync] Turns the automatic pattern synchronization function on or off. This setting specifies whether the automatic pattern synchronization function is set to ON (checked) or OFF (unchecked). If automatic pattern synchronization is set to ON, synchronization is lost (sync loss) if the error rate increases, resulting in detection of the phase in which the input pattern matches the receiver pattern functioning as a reference for measurement. When the patterns match, the synchronization established state will be set. When the automatic pattern synchronization function is off, the synchronization loss state will not be set automatically even if the error rate goes high. The synchronization established state will be retained until **[Measurement]-[ReSync]** on the menu bar is selected to perform synchronization or the **[ReSync]** button on the standard toolbar is pressed.

[Sync Pattern Length] Sets the length of the synchronization pattern used for synchronization pull-in of the PROG pattern.

- Selection range: 8, 16, 24, and 32 bits

NOTE: ***Synchronization patterns of ZSUB patterns, STM patterns, and FLEX patterns are all set to 32 bits fixed.***

[Sync PROG Address] The address indicating the position of the synchronization pattern used to establish synchronization with PROG patterns is set.

- Setting range: 0 to pattern length -1 bit
- Setting resolution: 1 bit

[Sync FLEX Index] This setting is available when using FLEX patterns. An index for synchronization pattern position is set. However, an index of PRBS pattern can not be set.

- Setting range: 1 to the last index
- Setting resolution: 1 bit

[Sync FLEX Address] This setting is available when using FLEX patterns. Sets an address of the synchronous pattern which is set by the Sync FLEX Index.

- Setting range: 0 to pattern length -1 bit
- Setting resolution: 1 bit

[Auto Threshold]

Enables (checked) or disables (unchecked) the automatic setting of synchronization threshold is specified. If enabled, the synchronization threshold to establish synchronization and the synchronization threshold to check synchronization loss are automatically set. Refer to "5.10 Synchronization" for details of synchronization thresholds in the automatic setting.
If the automatic setting of synchronization thresholds is disabled, **[Sync Gain Threshold]**, the threshold to establish synchronization, and **[Sync Loss Threshold]**, the threshold to check synchronization loss, can be set manually.

[Sync Gain Threshold]

A threshold to establish synchronization is set. The establishment of synchronization is determined by comparing an error rate with the threshold to establish synchronization. This setting is enabled when the **[Auto Threshold]** function is off. A threshold set for each pattern.

CAUTION: ***Set the relationship between the threshold for detecting the synchronization pull-in and the threshold for detecting synchronization loss so that the condition [Sync Gain Threshold] ≤ [Sync Loss Threshold] is satisfied.***

Pattern	Synchronization threshold setting range
PRBS patterns PRBS areas in an STM pattern PRBS areas in a FLEX pattern	1E-2, 1E-3, 1E-4, 1E-5, 1E-6, 1E-7
PROG patterns, ZSUB patterns PROG areas in an STM pattern PROG areas in a FLEX pattern	1E-2, 1E-3, 1E-4, 1E-5, 1E-6, 1E-7, 1E-8, 1E-9, 1E-10

[PRBS]

Synchronization thresholds for PRBS patterns, PRBS areas in an STM pattern, and PRBS areas in a FLEX pattern are set.

[Memory]

Synchronization thresholds for PROG patterns, ZSUB patterns, PROG areas in an STM pattern, and PROG areas in a FLEX pattern are set.

[Sync Loss Threshold]

A threshold to check synchronization loss is set. Synchronization is determined by comparing the error rate with the threshold to check synchronization loss. This setting is effective if the **[Auto threshold function]** is disabled. A threshold can be set for each pattern.

Pattern	Synchronization threshold setting range
PRBS patterns PRBS areas in an STM pattern PRBS areas in a FLEX pattern	1E-2, 1E-3, 1E-4, 1E-5, 1E-6, 1E-7
PROG patterns, ZSUB patterns PROG areas in an STM pattern PROG areas in a FLEX pattern	1E-2, 1E-3, 1E-4, 1E-5, 1E-6, 1E-7, 1E-8, 1E-9, 1E-10

[PRBS] Synchronization thresholds for PRBS patterns, PRBS areas in an STM pattern, and PRBS areas in a FLEX pattern are set.

[Memory] Synchronization thresholds for PROG patterns, ZSUB patterns, PROG areas in an STM pattern, and PROG areas in a FLEX pattern are set.

[Auto Search] Group of settings related to the Auto Search function. The Auto Search function automatically adjusts the amount of delay and the input polarity of clock input and the threshold voltage of data input to the optimum measurement values. For a PRBS pattern, this function automatically sets the mark ratio and pattern length. For a PROG pattern, ZSUB pattern, STM pattern or FLEX pattern, this function automatically sets the pattern polarity. These automatic settings can be used individually. To perform the Auto Search function, select **[Measurement] -[Auto Search]** on the menu bar or press the **[A-Search]** button on the standard toolbar. A dialog box displays the execution status during execution. If Auto-search fails to find the optimum value, the settings prior to the execution are restored.

CAUTION: ***If an STM or FLEX pattern includes PRBS patterns, perform auto-search after the pattern length and the mark ratio of the PRBS patterns are specified.***

NOTE: ***Auto-search execution conditions.***

- ***The ED module pattern type must be identical to that of receive patterns.***
- ***For PROG patterns, ZSUB patterns, STM patterns and FLEX patterns, their contents must be identical.***
- ***Input data to ED modules must satisfy the following conditions.***

Termination voltage	*Low level*	*High level*	*Amplitude range*
to GND(0V)	*-2.04 V or higher*	*+2.04 V or lower*	*$0.30V_{P-P}$ to $2.00V_{P-P}$*
ECL(-2V)	*-1.85 V or higher*	*-0.75 V or lower*	*$0.30V_{P-P}$ to $1.00V_{P-P}$*
PECL(+3V)	*+3.15 V or higher*	*+4.25 V or lower*	*$0.30V_{P-P}$ to $1.00V_{P-P}$*
LVPECL(1.3V)	*+1.45 V or higher*	*+2.55 V or lower*	*$0.30V_{P-P}$ to $1.00V_{P-P}$*
CML	*Vcc*-1.1V or higher*	*Vcc*+0.1 V or lower*	*$0.30V_{P-P}$ to $1.00V_{P-P}$*

*: ***Vcc indicates the CML termination voltage.***

[Clock Polarity & Delay] Check this to have the Auto Search function automatically set the amount of delay and the input polarity of clock input.

[Threshold Voltage] Check this to have the Auto Search automatically set the threshold voltage of data input.

[Pattern] Check this to have the Auto Search function automatically set the mark ratio and pattern length for a PRBS pattern. Check this to have the Auto Search function automatically set the pattern polarity for a PROG pattern, ZSUB pattern, STM pattern or FLEX pattern.

CAUTION: ***If an STM or FLEX pattern includes a PRBS pattern, set the PRBS pattern manually in advance.***

NOTE: ***If [Use the same Pattern as PPG] is selected, the Auto-search function checks that only pattern synchronization has been established.***

[Mask] Group of settings related to the measurement route mask. Input data to be excluded from measurement can be specified for each route from 1 to 16. When the device under test or unit under test has parallel circuits such as MUX and DEMUX, this function can be set to locate errors on specific routes.
For details, refer to Section 5.9, "Mask Routes."

[Mask Route] Sets the route to be masked.

- Setting route range: 1 to 16
- Setting unit: Selects whether to mask each route checked or not (unchecked).

NOTE: ***The masked route is excluded from bit error measurement and all measurements of error output.***

[Trigger/Aux] Settings for trigger output and auxiliary output

[Trigger Output] Selects the source of trigger output. Use the TRIGGER OUTPUT connector on the front panel of the ED module for trigger signal output.

- Output level: 0 V or -1 V
- Output impedance: 50 Ω to 0 V

[1/16 Clock] Outputs a clock with a frequency that is 1/16 that of the pattern cycle.

[Pattern] Outputs a trigger for each pattern cycle. The trigger position is the start of the pattern (fixed). However, for STM patterns, the setting of the **[Pattern]** or **[Frame]** option button is possible.

[STM] Settings for STM pattern trigger

[Pattern] A trigger is output at the beginning of the entire pattern.

[Frame] A trigger is output at the beginning of each frame.

[FLEX] This setting is available when the FLEX patterns are set.
A level specified for FLEX Trigger in the pattern sequence table is output.

[AUX] Settings for auxiliary outputs.

[Data Type] A pattern data type is output.

Pattern	Output level
PRBS patterns PRBS areas in an STM pattern PRBS areas in a FLEX pattern	High level (0V)
PROG patterns, ZSUB patterns PROG areas in an STM pattern PROG areas in a FLEX pattern	Low level (-1V)

[Sync State] Outputs the synchronization status.

- Synchronization established:
  High level (0V)
- Synchronization loss:
  Low level (-1V)

[Log] Group of settings related to the log function. The log function records data for the specified measurement items during measurement. The recorded data can be saved to a file after measurement has stopped. For information about saving data to a file, refer to Section 4.3.10, "Save As Dialog Box." Use an application such as WordPad to view the saved data. The time (**[0.1s]** or **[1s]**) specified by **[Condition]-[Interval]** is set as the interval for recording data using this function. The format specified in **[Display Format]** is used in logging.

[Basic Measurement Result] Turns the record log function of the basic measurement result on or off. Selects whether the basic measurement result to a log is recorded (checked) or not (unchecked). This function records only the final measurement result to the log.

[Sync & Clock Loss History] Turns the record history function of synchronization loss and clock loss on or off. Selects whether the record history function used to record the occurrence of synchronization loss and clock loss and the recovery times to the log is on checked or off (unchecked). Only the most recent 1024 data items of the synchronization loss and clock loss data are recorded.

[Measurement Data History] Selects the data items to be recorded in the log. Several data items are available for selection. For all of the selected items, only the most recent 25000 data items are recorded.

[Frequency] Turns the record history function of frequency values on or off. Selects whether the record history function for recording the frequency measurement data is on (checked) or off (unchecked).

[Immediate Error Rate]
Turns the record history function of immediate error rate values on or off. Selects whether the record history function for recording the measurement data of immediate error rate values to a log is on (checked) or off (unchecked).

[Immediate Error Count]
Turns the record history function of immediate error count values on or off. Selects whether the record history function for recording the measurement data of immediate error count values to a log is on (checked) or off (unchecked).

[Error Intervals] Turns the record history function of error interval values on or off. Selects whether the record history function for recording the measurement data of error interval values to a log is on (checked) or off (unchecked).

[Error Free Intervals] Turns the record history function of error-free interval values on or off. Selects whether the record history function for recording the measurement data of error-free interval values to a log is on (checked) or off (unchecked).

[Condition] Group of settings related to the measurement condition.

[Timer Mode] Sets the measurement timer mode. There are three measurement timer modes: single, repeat, and untimed.

[Single] Sets single mode. Measurement is performed only once each measurement period.

[Repeat] Sets repeat mode. Measurement is repeated continually for the measurement period.

[Untimed] Sets untimed mode. Measurement is continued regardless of the measurement period.

[Interval] Sets the measurement interval.

[0.1s] Sets the measurement interval to 0.1 second.

[1s] Sets the measurement interval to 1 second.

[Error Performance Threshold]
Sets the error rate thresholds of the intervals to be included in calculating the Unavailable Seconds (US), Severely Errored Seconds (SES), and Degraded Minutes (DM) for error performance measurement.

[US/SES:1E-3 DM:1E-6]
Sets the US and SES thresholds to 1E-3 and the DM threshold to 1E-6.

[US/SES:1E-4 DM:1E-8]
Sets the US and SES thresholds to 1E-4 and the DM threshold to 1E-8.

[Period] Sets the measurement period. Set the day, hour, minutes, and seconds individually. The range is 1 second to 99 days, 23 hours, 59 minutes, and 59 seconds.

[Day] Sets the days of the measurement period. Range: 0 to 99 days.

[Hour] Sets the hours of the measurement period. Range: 0 to 23 hours.

[Min] Sets the minutes of the measurement period. Range: 0 to 59 minutes.

[Sec] Sets the seconds of the measurement period. Range: 0 to 59 seconds.

[Burst Mode] Turns burst mode on or off. Selects whether burst mode is on (checked) or off (unchecked). When burst mode is on, the external input signal from the BURST INPUT connector on the front panel of the ED module is used as a burst trigger signal. For high (measurement interval), the input level of BURST INPUT is 0 V. For low (measurement stopped), the input level is -1 V. When the burst mode is set, the measurement items for the bit error measurement are: frequency, bit count, error rate, error count, immediate error rate and immediate error count. For information about burst mode, refer to Section 5.8, "Burst."

- Input level: 0 V and -1 V
- Input impedance: 50 Ω (nominal) to 0 V

[Current Data] Turns the intermediate result display on or off. Selects whether the intermediate result display is on (checked) or off (unchecked).

[Evaluate Clock Loss Intervals]
Sets whether to include the clock loss intervals in the measurement. Selects whether to include the clock loss intervals in the measurement (checked) or not (unchecked).
For details, refer to Section 5.11, "Clock Loss and Sync Loss."

[Evaluate Sync Loss Intervals] Sets whether to include the synchronization loss intervals in the measurement. Selects whether to include the synchronization loss intervals in the measurement (checked) or not (unchecked).
For details, refer to Section 5.11, "Clock Loss and Sync Loss."

[Detection Mode] An error detection mode is set.

[Omitting/Inserting/Total]
Omitting errors (Omitting), Insertion errors (Inserting) and Total errors (Total) are displayed in parallel.

[Overhead/Payload/Total]
Errors (Overhead) in Overhead areas, errors (Payload) in Payload areas and total errors (Total) are displayed in parallel. This mode can be selected if an STM pattern is set.

[Specific/Other/Total] Errors (Specific) in specific fields, errors (Other) in non-specific fields, and total errors (Total) are displayed in parallel. Refer to "2.3.8 Specific field measurement" about how to set measurement areas for specific field measurement.

[Error Record] Whether error recording is enabled (When checked) or disabled (When not checked) is set. Refer to "2.3.15 Error phase analysis" and "5.12 Error phase analysis," a technical document.
If the error detection mode is set to **[Specific/Other/Total]**, data whose errors are to be recorded can be set in a specific field. The selection is made by clicking the following option button. (If the error detection mode is set to other than **[Specific/Other/Total]**, all data are covered in error recording.)

[Specific] Error recording is set for a specific field.

[Total] Error recording is set for the entire area.

[Display Format] Group of settings related to the display format for basic measurement.

NOTE: ******** is displayed for items not subject to measurement.***
If the measurement value is undefined (no valid data for some reason), ----- is displayed.
If the measurement value overflows, ##### is displayed.

[Bit Count]	Sets the display format for bit count values.
[Integral]	Displays in integral format.
[Exponential]	Displays in exponential format.
[Error Count]	Sets the display format for error count values.
[Integral]	Displays in integral format.
[Exponential]	Displays in exponential format.
[Immediate Error Count]	Sets the display format for immediate error count values.
[Integral]	Displays in integral format.
[Exponential]	Displays in exponential format.
[Error Intervals]	Sets the display format for error interval values.
[Integral]	Displays in integral format.
[Percent]	Displays in percentage format.
[Error Free Intervals]	Sets the display format for error-free interval values.
[Integral]	Displays in integral format.
[Percent]	Displays in percentage format.
[Threshold EI]	Sets the display format for threshold EI values.
[Integral]	Displays in integral format.
[Percent]	Displays in percentage format.
[Threshold EFI]	Sets the display format for threshold EFI values.
[Integral]	Displays in integral format.
[Percent]	Displays in percentage format.
[Error Performance]	Sets the display format for error performance values.
[Integral]	Displays in integral format.
[Percent]	Displays in percentage format.
[Buzzer]	Sets when the buzzer is sounded.
[Error]	Check this to sound the buzzer when a bit error occurs.
[Alarm]	Check this to sound the buzzer when an alarm (synchronization loss or clock loss) occurs.
[Jitter Tolerance]	Settings for jitter tolerance measurement (jitter tolerance options). Refer to "5.11 Jitter tolerance measurement," a technical document, for details of jitter tolerance measurement.

[New...]

The Jitter Tolerance Parameters dialog box is displayed. Refer to "4.2.18 Jitter Tolerance Parameters dialog box" for details.
New measurement points are specified. Newly specified settings are inserted into indices selected in the jitter tolerance parameter table.

[Edit...]

The Jitter Tolerance Parameters dialog box is displayed. Refer to "4.2.18 Jitter Tolerance Parameters Dialog Box" for details.
Measurement points are edited. The editing operation is performed for settings selected in the jitter tolerance parameter table.

[Remove]

Measurement points are removed. The removal operation is performed for settings selected in the jitter tolerance parameter table.

[Remove All]

All measurement points are removed.

[Measurement Mode]

A measurement mode is set. Measurement modes include the search mode and the sweep mode.

[Search]

The search mode is set.
At a jitter frequency set in the jitter tolerance parameter table, the maximum jitter amplitude that produces an error rate less than the set error threshold is searched for. The search is performed for jitter amplitudes between the minimum and the maximum jitter amplitudes set in the jitter tolerance parameter table. If templates are set, an evaluation of the result, success or failure is also made in comparison with them.

[Sweep]

The sweep mode is set.
Bit errors are measured for every combination of the jitter frequency and jitter amplitudes set in the jitter modulation table. Then, an evaluation of the result, success or failure, is made in comparison with set thresholds.

[Auto Search]

At the start of jitter tolerance measurement, the enabling (When checked) or disabling (When not checked) of the auto-search function is specified. The execution of the auto-search function enables input clock phase and threshold voltage for input data to be optimized automatically. Refer to "2.3.10 Auto-search" for details of the auto-search function.

[Clock Frequency]

Clock frequency is set.

- Setting range: 10 MHz to 3.2 GHz
- Setting resolution: 1 kHz

[Settling Time]

Settling time is set.
Settling time indicates the time for which the start of measurement must wait after jitter measurement for each measurement point is completed.

- Settling range: 0 to 100 sec
- Setting resolution: 0.1 sec

[Period]

Measurement time for a measurement point is input.

- Setting range: 0 to 1000 sec
- Setting resolution: 1 sec

[Error Threshold]

An error threshold is set.
If the number of bit errors within a set measurement time is less than the number set for the error threshold, the evaluation is "OK," while "NG" if it is equal to or larger than the set number.

- Setting range: 1 to 1,000 ,000 bit(s)
- Setting resolution: 1 bit

[Display Measurement Data]

Enables (When checked) or disables (When not checked) of the displaying of measurement result lists is set.
If enabled, a measurement result list is displayed on the Jitter Tolerance screen.

[Template Type]

A template is selected from the list. The template selected is displayed in a graph on the Jitter Tolerance screen. If NONE is selected, no template is displayed.
The following are default templates provided. Edited templates can also be registered.

Template	Jitter frequency (kHz)						Jitter amplitude (UI_{P-P})		
	f_0	f_1	f_2	f_3	f_4	f_5	A1	A2	A3
OC/STS-1 *1	0.01	0.03	0.3	2	20	400	0.15	1.5	15
OC/STS-3 *1	0.01	0.03	0.3	6.5	65	1,300	0.15	1.5	15
OC/STS-12 *1	0.01	0.03	0.3	25	250	5,000	0.15	1.5	15
OC/STS-48 *1	0.01	0.6	6	100	1,000	20,000	0.15	1.5	15
STM-1 (A) *2	-	-	0.5	6.5	65	1,300	0.15	1.5	-
STM-4 (A) *2	-	-	1	25	250	5,000	0.15	1.5	-
STM-16 (A) *2	-	-	5	100	1,000	20,000	0.15	1.5	-
STM-1 (B) *2	-	-	0.01	1.2	12	1,300	0.15	1.5	-
STM-4 (B) *2	-	-	0.01	1.2	12	5,000	0.15	1.5	-
STM-16 (B) *2	-	-	0.01	1.2	12	20,000	0.15	1.5	-

*1: A reference specification: Bellcore GR-253
*2: A reference specification: ITU-T G. 958

[Edit Template...]

The Jitter Tolerance Template dialog box is displayed. The Jitter Tolerance Template dialog box is used to edit templates. Refer to "4.2.19 Jitter Tolerance Template Dialog Box" for details.

[Specific Field] Settings for specific field

NOTE:

1. ***Measurement in specific fields is performed for patterns meeting the conditions below.***

   Patterns: PROG, ZSUB, STM, FLEX

   Pattern lengths: 256 bits or longer and an integral multiple of 32 bits

2. ***In performing measurement in specific fields, the error detection mode must be set to [Specific/Other/Total]. Refer to "2.4.1 Settings of measurement conditions" for how to set [Specific/Other/Total].***

[PROG] Settings for PROG patterns are put together.

[Start Address] The start address of a specific field is input.

- Setting range: 0 to the pattern length -1 bit
- Setting resolution: 1 bit

[End Address] Enter the end address of a specific field.

- Setting range: 0 to the pattern length -1 bit
- Setting resolution: 1 bit

[ZSUB] Settings for ZSUB patterns

[Start Address] Enter the start address of a specific field.

- Setting range: 0 to the pattern length -1 bit
- Setting resolution: 1 bit

[End Address] Enter the end address of a specific field.

- Setting range: 0 to the pattern length -1 bit
- Setting resolution: 1 bit

[STM] Settings for STM patterns

[Pattern] Specific fields are set for the entire STM pattern.

[Frame] A specific field is set for each frame.

[Start Frame No.] The start frame of a specific field is set. The setting becomes effective if **[Pattern]** is set.

- Setting range: 1 to the number of the frames
- Setting resolution: 1

[End Frame No.] The end frame of a specific field is set. The setting becomes effective if **[Pattern]** is set.

- Setting range: 1 to the number of the frames
- Setting resolution: 1

[Start Row] The start row of a specific field is set.

- Setting range: 1 to 9
- Setting resolution: 1

[End Row] The end row of a specific field is set.

- Setting range: 1 to 9
- Setting resolution: 1

[Start Column] The start column of a specific field is set.

- Setting range for STM-4: 1 to 1080 bytes
- Setting range for STM-16: 1 to 4320 bytes
- Setting resolution: 1 byte

[End Column] The end column of a specific field is set.

- Setting range for STM-4: 1 to 1080 bytes
- Setting range for STM-16: 1 to 4320 bytes
- Setting resolution: 1 byte

[FLEX] Settings for FLEX patterns

[Start Index] The start index for a specific field is set.

- Setting range: 1 to the number of the last index
- Setting resolution: 1

[End Index] The end index for a specific field is set.

- Setting range: 1 to the number of the last index
- Setting resolution: 1

[Start Address] The start address of a pattern set with [Start Index] is specified.

- Setting range: 0 to the pattern length -1 bit
- Setting resolution: 1 bit

[End Address] The end address of a pattern set with **[End Index]** is specified.

- Setting range: 0 to the pattern length -1 bit
- Setting resolution: 1 bit

4.3.5.4 SYSTEM Setup

Select **[System]** on the Module selection list bar.

[System] Group of settings related to the system such as the remote interface and current date and time settings.

[Remote Interface] Sets up the remote interface function. The D3371 has a GPIB interface installed as standard.

[GPIB] Sets up the GPIB interface.

[Address] Selects the GPIB address of the D3371.

- Selection range: 1 to 30

[Virtual Keyboard] Turns the virtual keyboard function on or off.

[Use Virtual Keyboard]
Selects whether or not the Virtual Keyboard is used(checked or unchecked).

[Date & Time] Sets the current date and time.

NOTE:

1. ***If the date and time are changed during a measurement, the change will not affect the log data recording time during measurement. The elapsed time from the start of measurement is used.***
2. ***Setting the date and time also updates the clock managed by Windows***

[Date] Used to set the current date.

[Year] Used to set the current year.

[Month] Used to set the current month.

[Day] Used to set the current day.

[Time] Used to set the current time.

[Hour] Used to set the current hour.

[Min] Used to set the current minutes.

[Sec] Used to set the current seconds.

4.3.5.5 Other items

[OK] Applies the settings and closes the Settings window.

[Cancel] Restores the previous settings and closes the Settings window.

NOTE: If the [Apply] button has been clicked, clicking the [Cancel] button will not restore the previous settings.

[Apply] Applies the settings, but does not close the Settings window.

4.3.6 Pattern Settings Window

CAUTION:

1. ***If contents of a pattern have been updated, they must be set in the pattern memory. If the setting operation is not performed, the update is not set as a pattern to be generated by D3371 or a receive pattern. If contents of a pattern are updated, the selection of the [Set Pattern Memory] button is enabled.***
2. ***Patterns generated and received by the D3371 are set in the pattern memory. If edited patterns are to be set as generated or received patterns, click the [Set Pattern Memory] button.***
3. ***Saving or opening of files is disabled while measurement is in progress.***

[Open...]

The Open dialog box is displayed. Refer to "4.3.9 Open Dialog Box". Data in the pattern data file is read to the pattern memory of the D3371.

[Set Pattern Memory]

Sets the contents of the edited pattern in the D3371 pattern memory.

CAUTION: ***This button is enabled when the pattern contents have been edited.***

[Save As...]

Saves the contents of the D3371 pattern memory to file. The Save As dialog box is displayed. Refer to Section 4.3.10, "Save As Dialog Box."

CAUTION: ***If the [Save As...] button has been disabled and cannot be clicked, click the [Set Pattern Memory] button to set the edited pattern in pattern memory.***

[Jump...]

The Jump dialog box is displayed. The cursor moves to a specified position. Refer to "4.3.22 Jump Dialog Box" for details.
For PROG patterns or PROG patterns in FLEX patterns, addresses are used for the setting.

Pattern type	Setting range	Setting resolution
PROG pattern	0 to pattern length - 1 bit	1 bit
FLEX in PROG pattern		

Refer to "4.3.22 Jump Dialog Box" for how to set STM patterns.

- Address range: 0 to pattern length - 1 bit

[Input Format...]

Selects the input format of the pattern data.

[Binary]

Inputs the data in binary format.

[Hex]

Inputs the data in hexadecimal format.

[Pattern Length...]

The Pattern Length dialog box is displayed. Pattern lengths are set. For PROG patterns or PROG patterns in FLEX patterns, the number of bits is used for the setting.

Pattern type	Setting range [bit(s)]	Setting resolution [bit(s)]
PROG pattern	1 to 262,144	1
	262,146 to 524,288	2
	524,292 to 1,048,576	4
	1,048,584 to 2,097,152	8
	2,097,168 to 4,194,304	16
	4,194,336 to 8,388,608	32
FLEX in PROG pattern	128 to 65,536	64

For STM patterns, the number of frames is used for the setting.

STM-N	The number of frames [frame(s)]	Setting resolution [frame]
STM-4	1 to 107	1
STM-16	1 to 26	

CAUTION:

1. ***If the length of the newly set pattern is greater than the length of the previous pattern, the pattern memory contents will be displayed.***
2. ***If the length of the newly set pattern is less than length of the previous pattern, the part of the pattern exceeding the specified length will be truncated.***

[Fill Pattern...]

Repeatedly inputs the same pattern. Enter the pattern data in the **[Pattern]** text box. Enter the repeat number in the **[Repeat Number]** text box.

[Close]

Exits editing and closes the Pattern Settings window.

NOTE: ***The [Apply] dialog box is displayed if the pattern contents have been edited, but have not been set in the pattern memory yet. To save the changes without making any more new changes, click the [Yes] button. To discard the changes, click the [No] button. To cancel, click the [Cancel] button.***

4.3.7 Information Window

[Options]	Displays information related to the system and modules of the D3371.
[Diagnostics]	Displays the results of the D3371 self-test. The self-test is performed automatically when the D3371 Transmission Analyzer application for the D3371 is started.
[OK]	Closes the Information window.

4.3.8 Exit Dialog Box

[Exit D3371 Transmission Analyzer]	Select this to close the D3371 program and return to the Windows Desktop.
[Shutdown Windows98]	Select this to shut down the D3371 and turn off the power. When selected, shutdown is performed and the POWER indicator goes off. Make sure that the POWER indicator has gone off before turning off the POWER switch.
[OK]	Performs the selected procedure.
[Cancel]	Cancels the operation. Closes the Exit dialog box.

4.3.9 Open Dialog Box

CAUTION: Data cannot be opened during measurements.

[Look in] (ListBox) Specifies the drive and directory path to the saved file.

[Up One Level] Moves the directory up one level.

[View Desktop] Switches to the Desktop.

[Create New Folder] Creates a new folder.

[List] Displays a list of files.

[Details] Displays the details of the files (file names, sizes, file types, and date and time modified).

[File name] Enter the file name.

[Files of type] The type of a file to be read is specified. Refer to "2.7.1 Setting/ data files" for details on the setting of the D3371/data files.
The following file types are provided.

File type	Extension	Description
D3371 Setup	tas	Setting files for the D3371 are opened in combination with setting files for SSG Setup, PPG Setup and ED Setup.
SSG Setup	sgs	Setting files for SSG modules are opened.
PPG Setup	pgs	Setting files for PPG modules are opened.
ED Setup	eds	Setting files for ED modules are opened.
PPG PROG Pattern	prp	Pattern data files for PROG patterns of PPG modules are opened.
ED PROG Pattern	prp	Pattern data files for PROG patterns of ED modules are opened.
PPG STM Pattern	stp	Pattern data files for STM patterns of PPG modules are opened.
ED STM Pattern	stp	Pattern data files for STM patterns of ED modules are opened.
PPG FLEX Pattern	flp	Pattern data files for FLEX patterns of PPG modules are opened.
ED FLEX Pattern	flp	Pattern data files for FLEX patterns of ED modules are opened.
Jitter Tolerance Data	Jid	Jitter tolerance measurement result data files are opened.

[Open] loads data from the file for the D3371. Closes the Open dialog box.

[Cancel] Cancels the operation. Closes the Open dialog box.

4.3.10 Save As Dialog Box

CAUTION: Data cannot be saved during measurements.

[Save in] (ListBox) Specifies the drive and directory path used when the file is saved.

[Up One Level] Moves up one level in the directory.

[View Desktop] Switches to the Desktop.

[Create New Folder] Creates a new folder.

[List] Displays a list of files.

[Details] Displays information on the files (file names, sizes, file types, and date and time modified).

[File name] Enter the file name.

[Save as type] A type of a file used for saving is specified. Refer to "2.7.1 Setting/data files" for details on the setting of D3371/data files.
The following file types are provided.

File type	Extension	Description
D3371 Setup	tas	Setting files for the D3371 are saved in combination with setting files for SSG Setup, PPG Setup and ED Setup.
SSG Setup	sgs	Setting files for SSG modules are saved.
PPG Setup	pgs	Setting files for PPG modules are saved.
ED Setup	eds	Setting files for ED modules are saved.
PPG PROG Pattern	prp	Pattern data files for PROG patterns of PPG modules are saved.
ED PROG Pattern	prp	Pattern data files for PROG patterns of ED modules are saved.
PPG STM Pattern	stp	Pattern data files for STM patterns of PPG modules are saved.
ED STM Pattern	stp	Pattern data files for STM patterns of ED modules are saved.
PPG FLEX Pattern	flp	Pattern data files for FLEX patterns of PPG modules are saved.

File type	Extension	Description
Basic Measurement Data Log	txt	Basic measurement log data files are saved.
Error Phase Analysis Time Series	txt	Time-series error analysis data files are saved.
Error Phase Analysis Statistics	txt	Statistical error analysis data files are saved.
Jitter Tolerance Text Data	txt	Jitter tolerance measurement data files are saved.
Jitter Tolerance Data	jid	Jitter tolerance measurement data files are saved.
Jitter Tolerance Graph BMP	Bmp	Jitter tolerance measurement graphic data files are saved with a BMP format.
Jitter Tolerance Graph EMF	emf	Jitter tolerance measurement graphic data files are saved with an EMF format.

[Save] Saves the analyzer settings or measurement data to the file. Closes the Save As dialog box.

[Cancel] Cancels the operation. Closes the Save As dialog box.

4.3.11 Print Dialog Box

[Printer] Selects the printer. The printer can be selected from the printer drivers installed on the D3371.

[OK] Prints. Closes the Print dialog box.

[Cancel] Cancels the operation. Closes the Print dialog box.

4.3.12 Auto Search Dialog Box

The search functions being performed by Auto Search are displayed. In addition, Auto Search can be canceled.

[Cancel] Cancels Auto Search. When Auto Search is canceled, the amount of delay, input polarity, and threshold voltage are restored to their previous values. In addition, for a PRBS pattern, the mark ratio and pattern length are restored to their previous values. For a PROG or ZSUB pattern, the pattern polarity is restored to its previous value.

4.3.13 About D3371 Transmission Analyzer Dialog Box

[OK] A software revision and a serial number appear. Click it. Then the dialog box closes.

4.3.14 Marker Dialog Box

[Marker 1] Settings for Marker 1 are put together.

- **[Display Marker]** Enables (When checked) or disables (When not checked) marker display.
- **[Marker Mode]** A marker mode is set.
  - **[Free]** The marker mode is set to the free mode. The marker moves regardless of measurement points.
  - **[Fix]** The marker mode is set to the fixed mode. The marker moves with the measurement points.
- **[Line Color]** A line color is set.
  - **[...]** The Color dialog box is displayed. Select a line color.
  - **[Define Custom Colors]** The custom color-defining area is displayed on the right of the Color dialog box.
  - **[Add to Custom Colors]** Add customized colors.
  - **[Line Style]** Select a line style.
    - **[Solid]** A solid line is set.
    - **[LongDash]** A dashed line set.
    - **[Dotted]** A dotted line is set.
    - **[DashDot]** A dash/dot-alternating line is set.
  - **[Preview]** A preview of lines is displayed.

[Marker 2] Settings for Marker 2 are put together.

- **[Display Marker]** Enabling (When checked) or disabling (When not checked) the displaying of the marker is set.
- **[Marker Mode]** A marker mode is set.
  - **[Free]** The marker mode is set to the free mode. The marker moves regardless of measurement points.
  - **[Fix]** The marker mode is set to the fixed mode. The marker moves with the measurement points.
- **[Line Color]** The Color dialog box is displayed. Select a line color.
  - **[Define Custom Colors]** The custom color-defining area is displayed on the right of the Color dialog box.
  - **[Add to Custom Colors]** Add customized colors.
- **[Line Style]** Select a line style.

[Solid] A solid line is set.

[LongDash] A dashed line set.

[Dotted] A dotted line is set.

[DashDot] A dash/dot-alternating line is set.

[Preview] A preview of lines is displayed.

4.3.15 Scale Dialog Box

[Jitter Frequency] Settings for jitter frequency are put together.

[Minimum] A minimum jitter frequency is set.

- Setting range: 0.01, 0.1, 1, 10, 100, 1000, 10000 kHz

[Maximum] A maximum jitter frequency is set. Make the setting so that the maximum jitter frequency > the minimum jitter frequency.

- Setting range: 0.1, 1, 10, 100, 1000, 10000, 100000 kHz

[Jitter Amplitude] Settings for jitter amplitude are put together.

[Minimum] A minimum jitter amplitude is set.

- Setting range: 0.01, 0.1, 1, 10, 100 UI_{P-P}

[Maximum] A maximum jitter amplitude is set. Make the setting so that the maximum jitter amplitude > the minimum jitter amplitude.

- Settng range: 0.1, 1, 10, 100, 1000 UI_{P-P}

4.3.16 Pattern Sequence Table Dialog Box

[Open...] The open dialog box is displayed. Refer to "4.3.9 Open Dialog Box" for details. The FLEX pattern setting file is opened. The FLEX pattern setting file contains the pattern sequence table, PROG patterns used in FLEX patterns, and pattern lengths and mark ratios of PRBS patterns.

[Set Seq. Memory] The edited pattern sequence table is set in the pattern sequence table memory.

CAUTION: ***The selection becomes possible, if the pattern sequence table is updated.***

[Save As...] The Save As dialog box is displayed. Refer to "4.3.10 Save As Dialog Box" for details. The FLEX pattern setting file is saved. If the pattern sequence table is saved, PROG patterns used in FLEX patterns, and data on pattern lengths and mark ratios of PRBS patterns are saved simultaneously.

CAUTION: ***If the [Save As...] button is disabled and cannot be clicked, click the [Set Seq. Memory] button and set updated patterns in the pattern sequence table memory.***

[New]

The Pattern dialog box is displayed. Refer to "4.3.17 Pattern Dialog Box" for details. Patterns are added. The following number of patterns can be included in the pattern sequence table.

- The permissible number of patterns: 1 to 1024

[Edit]

The Pattern dialog box is displayed. Patterns are modified.

NOTE: ***A PRBS pattern cannot be set to the first pattern in the pattern sequence table.***

[Remove]

Patterns are removed.

NOTE:

1. ***If the pattern sequence table contains only one pattern, it cannot be removed.***
2. ***If Index-2 patterns are PRBS patterns, Index-1 patterns cannot be removed.***

[Default]

An initial value is set. The initial value is set to the 128-bit pattern, "AAAA AAAA AAAA AAAA AAAA AAAA AAAA AAAA."

[Close]

Editing operations are terminated. The pattern Sequence Table dialog box closes

NOTE: ***If patterns are updated but the updated patterns are not set in the pattern sequence table memory, the confirmation dialog box is displayed. Click the [Yes] button if they are to be set to the memory. Click the [No] button if the pattern sequence table memory is not updated. Click the [Cancel] button for cancellation.***

4.3.17 Pattern Dialog Box

[Index] The order number of a pattern in FLEX patterns is indicated. An index is specified (highlighted) depending on the location of a selected pattern.

[Pattern] Settings for patterns are put together.

[PROG Pattern] A PROG pattern is selected.

[Pattern No.] A pattern number is set.

- Setting range: 1 to 127

[PRBS Pattern] A PRBS pattern is set.

[Length] A pattern length is set.

- Setting range: 128 to 2,097,152 bits
- Setting resolution: 64 bits

NOTE: ***The length set here is not 2^n-1, which is used for a PRBS pattern cycle length.***

[FLEX Trigger] A FLEX trigger level is set.

[High] The High level is set.

[Low] The Low level is set.

4.3.18 Jitter Tolerance Parameters Dialog Box

[Jitter Frequency] A jitter frequency is set.

Clock frequency	Jitter frequency range	Setting resolution
10 MHz ≤ clock frequency < 175 MHz	10 Hz to 2 MHz	10 Hz
175 MHz ≤ clock frequency < 800 MHz	10 Hz to 5 MHz	
800 MHz ≤ clock frequency ≤ 3.2 GHz	10 Hz to 20 MHz	

[Jitter Amplitude] Settings for jitter amplitude are put together.

[Minimum] The minimum jitter amplitude is set.

[Maximum] The maximum jitter amplitude is set.

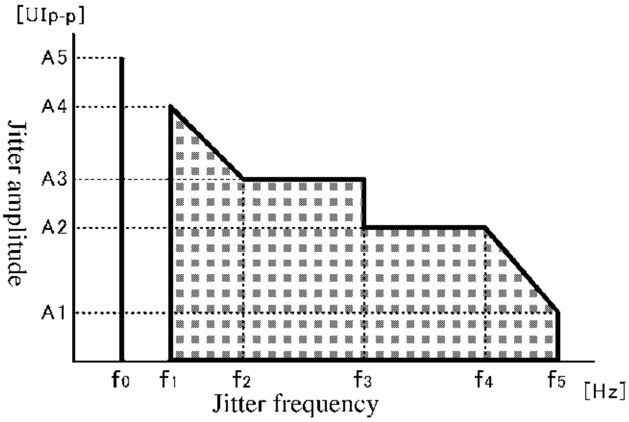


Figure 4-2 Jitter Setting Ranges

Band1 (800 MHz ≤ clock frequency ≤ 3200 MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 300k	20M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	800	500	50	20	0.3
Band2 (175MHz ≤ clock frequency < 800MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 200k	5M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	800	500	50	20	0.5
Band3 (10MHz ≤ clock frequency < 175MHz)					
Jitter frequency [Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 200k	2M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	200	120	12	5	0.5

	Jitter amplitude setting range [UI_{P-P}]	Setting resolution [UI_{P-P}]
Band1 Band2	0.01 to 5	0.01
	5 to 50	0.1
	50 to 500	1
	500 to 800	2
Band3	0.01 to 1	0.01
	1 to 10	0.1
	10 to 100	1
	100 to 200	2

[Points]

The number of measurement points for jitter frequency.

- Setting range: 1 to 40
- Setting resolution: 1

NOTE: ***If "1" is set as the number of measurement points, the maximum jitter amplitude is selected for the jitter amplitude. If "2" or a larger number is specified as the number of measurement points, points that are placed between the maximum and the minimum jitter amplitudes at a logarithmically equal distance are specified. The jitter amplitudes are specified starting with the maximum jitter amplitude, followed by amplitudes calculated by the following equation.***

$$A_i = A_{i-1} \bullet 10^{((\log A_{min} - \log A_{max}) / (N_m - 1))}$$

A_i: ***The jitter amplitude to be set***
A_{i-1}: ***The jitter amplitude set for the preceding point***
A_{max}: ***The maximum jitter amplitude***
A_{min}: ***The minimum jitter amplitude***
N_m: ***The number of measurement points***

4.3.19 Jitter Tolerance Template Dialog Box

[New...]
The Template dialog box is displayed. A new template is created. Refer to "4.3.20 Template Dialog Box" about details.

[Edit...]
The Template dialog box is displayed. Templates are edited. Refer to "4.3.20 Template Dialog Box" for details.

[Remove]
Templates are removed.

4.3.20 Template Dialog Box

[Template Name] A template name is input.

[f0] A jitter frequency is input. There are restrictions on template creation. Refer to "CAUTION" described later for details.

[f1] As above

[f2] As above

[f3] As above

[f4] As above

[f5] As above

[A1] A jitter amplitude is input. Jitter frequency (f0 to f5) and jitter amplitudes (A1, A2 and A3) have the following relationships.

- The jitter amplitude A1:
  Used for jitter frequency between f4 and f5.
- The jitter amplitude A2:
  Used for jitter frequency between f2 and f3.
- The jitter amplitude A3:
  Used for jitter frequency between f0 and f1.

There are restrictions on template creation. Refer to "CAUTION" described later for details.

[A2] Ditto.

[A3] Ditto.

CAUTION:

Jitter frequency and jitter amplitudes to be set must satisfy the following conditions.

- ***The jitter frequency (f0, f1, f2, f3, f4 and f5) must be 10 Hz or higher and 20 MHz or lower.***
- ***The jitter frequency must have the relationships of f0 ≤ f1 ≤ f2 ≤ f3 ≤ f4 ≤ f5.***
- ***The jitter amplitudes (A1, A2 and A3) must be 0.01 [UI_{P-P}] or larger and 800 [UI_{P-P}] or smaller.***
- ***The jitter amplitudes must have the relationships of A1 ≤ A2 ≤ A3.***
- ***Two or more jitter frequency points must be specified.***
- ***The numbers of set jitter frequency numbers for which f0 to f5 are specified (or the underlined numbers) must be consecutive.***

4.3.21 Jitter Tolerance Dialog Box

Intermediate states (jitter frequency, jitter amplitudes and evaluation results) of jitter tolerance measurement are displayed.

[STOP] Jitter tolerance measurement is stopped.

4.3.22 Jump Dialog Box

[Jump Position] Settings for jump destinations are put together.

[Absolute] A jump destination is specified with a bit-address for all patterns.

[Address] Jump destination addresses are specified.

- Setting range: 0 to pattern length - 1 bit
- Setting resolution: 1 bit

[Relative] A jump destination is specified with a frame number, row and column.

[Area] The overhead area or a payload area is specified.

[OH] The overhead area is specified.

[Payload] The payload area is specified.

[Frame No.] A frame number is specified.

- Setting range: 1 to the number of the frames
- Setting resolution: 1

[Row] A row is specified.

- Setting range: 1 to 9
- Setting resolution: 1

[Column] A column is specified.

STM-N	Column setting range [byte]	
	OH range	Payload range
STM-4	1 to 36	1 to 1044
STM-16	1 to 144	1 to 4176

4.3.23 Warning Dialog Box

[OK] Warning messages are displayed. Refer to "A.3 Messages" for details. Click the **[OK]** button. Then, the dialog box closes.

4.4 Menu Bar Correspondence

This section explains the correspondence between the toolbars, list bars, panel keys, and menu bars.

4.4.1 Standard Toolbar

Standard toolbar	Menu bar
[Open]	**[File]-[Open... Ctrl+O]**
[Save As]	**[File]-[Save As... Ctrl+S]**
[Print]	**[File]-[Print... Ctrl+P]**
[Start]	**[Measurement]-[Start F5]**
[Stop]	**[Measurement]-[Stop Shift+F5]**
[A-Search]	**[Measurement]-[Auto Search... F6]**
[Output]	**[Measurement]-[Output Clock & Data Ctrl+U]**
[Error]	**[Measurement]-[Single Error Addition]**
[ReSync]	**[Measurement]-[ReSync]**
[Buzzer]	**[Measurement]-[Buzzer]**
[Settings]	**[Measurement]-[Measurement Settings... Ctrl+T]**
[Warning]	**[View]-[Warning...]**

4.4.2 Monitor Toolbar

Monitor Toolbar	Menu bar
[Time Type ▶]	**[View]-[Time Type ▶]**
[Clear History]	**[Measurement]-[Clear History]**

4.4.3 Functions Bar

Functions bar	Menu bar
[Basic Measurement]	**[View]-[Go To ▶]-[Basic Measurement]**
[Quick Operation]	**[View]-[Go To ▶]-[Quick Operation]**

4.4.4 Panel Key

Panel Key	Menu bar
A-SER (SHIFT-A)	**[Measurement]-[Auto Search… F6]**
START (SHIFT-B)	**[Measurement]-[Start F5]**
SET (SHIFT-C)	**[Measurement]-[Measurement Settings… Ctrl+T]**
OUTPUT (SHIFT-D)	**[Measurement]-[Output Clock & Data Ctrl+U]**
STOP (SHIFT-E)	**[Measurement]-[Stop Shift+F5]**
MENU (SHIFT-F)	**[File]-[Open… Ctrl+O]**
F8 (SHIFT-8)	**[Tools]-[Touch Panel Calibration… F8]**

4.5 Panel Key and Keyboard Correspondence

This section describes the relationship between the panel keys and the keyboard.

4.5.1 DATA ENTRY Section

Panel Key	Keyboard
0 to **9**, **A** to **F**	**0** to **9**, **A** to **F** *1
. (Decimal point button)	**.**
- (Minus key)	**-**
BS	**Back space**
ENTER	**Enter**
OUTPUT (SHIFT-D)	**Ctrl+U**
STOP (SHIFT-E)	**Shift+F5**
MENU (SHIFT-F)	**Alt+F**
A-SER (SHIFT-A)	**F6**
START (SHIFT-B)	**F5**
SET (SHIFT-C)	**Ctrl+T**
TASK (SHIFT-7)	**Alt+Shift+Tab**
F8 (SHIFT-8)	**F8**
WIN (SHIFT-9)	**Ctrl+Esc**
F1 (SHIFT-1)	**F1**
F2 (SHIFT-2)	**F2**
DEL (SHIFT-BS)	**Delete**
SEL (SHIFT-ENTER)	**Space**

*1: The shift state cannot be changed for the panel keys. When a keyboard is used, the Shift key of the keyboard can be used to also toggle input of the panel keys between uppercase and lowercase. When power to the D3371 is turned on, input is in lowercase.

4.5.2 OPERATE Section

Panel Key	Keyboard
SHIFT (Hold down for at least 5 seconds.)	**Ctrl+Alt+Delete**
TAB	**Tab**
ESC	**Esc**
▲ ▼ ► ◄	↑, ↓, →, ←
data knob	↑, ↓
S-TAB (SHIFT-TAB)	**Shift+Tab**
EXIT (SHIFT-ESC)	**Alt+F4**

4.6 Settings

This section describes the parameters and settings that are initialized when **[Measurement]-[Set Installation Defaults]** on the menu bar is selected.

4.6.1 SSG Module

Table 4-1 SSG Module Default Values

Setting item			Default
Frequency	Output		ON (☑)
	Frequency		2,500,000 kHz
	Reference		Internal signal (Internal)
	Jitter Modulation		OFF (☐)
		Frequency	10Hz
		Amplitude	$0.00UI_{P-P}$

4.6.2 PPG Module

Table 4-2 PPG Module Default Settings

Setting item			Default
Data	Track Data		OFF (☐)
	DATA	Enable DATA Output	OFF (☐)
		Cross Point	50%
		Termination	to GND
		Termination Voltage (CML termination)	0.00V
		Amplitude (GND termination)	$1.00\ V_{P-P}$
		Amplitude (ECL termination)	$0.80\ V_{P-P}$
		Amplitude (LVPECL termination)	$0.40\ V_{P-P}$
		Amplitude (CML termination)	$0.40\ V_{P-P}$
		Offset High (GND termination)	0.00 V
		Offset Middle (GND termination)	-0.50 V
		Offset Low (GND termination)	-1.00 V

Table 4-2 PPG Module Default Settings

Setting item			Default
Data	DATA	Offset High (ECL termination)	-0.90 V
		Offset Middle (ECL termination)	-1.30 V
		Offset Low (ECL termination)	-1.70 V
		Offset High (LVPECL termination)	2.40 V
		Offset Middle (LVPECL termination)	2.00 V
		Offset Low (LVPECL termination)	1.60 V
		Offset High (CML termination)	0.00 V
		Offset Middle (CML termination)	-0.20 V
		Offset Low (CML termination)	-0.40 V
	XDATA	Enable XDATA Output	OFF (☐)
		Cross Point	50%
		Termination	to GND
		Termination Voltage (CML termination)	0.00 V
		Amplitude (GND termination)	1.00 V_{P-P}
		Amplitude (ECL termination)	0.80 V_{P-P}
		Amplitude (LVPECL termination)	0.80 V_{P-P}
		Amplitude (CML termination)	0.40 V_{P-P}
		Offset High (GND termination)	0.00 V
		Offset Middle (GND termination)	-0.50 V
		Offset Low (GND termination)	-1.00 V
		Offset High (ECL termination)	-0.90 V
		Offset Middle (ECL termination)	-1.30 V
		Offset Low (ECL termination)	-1.70 V
		Offset High (LVPECL termination)	2.40 V
		Offset Middle (LVPECL termination)	2.00 V
		Offset Low (LVPECL termination)	1.60 V
		Offset High (CML termination)	0.00 V
		Offset Middle (CML termination)	-0.20 V
		Offset Low (CML termination)	-0.40 V

Table 4-2 PPG Module Default Settings

Setting item			Default
Clock	Clock Delay		0 ps
	Track Clock		OFF (☐)
	CLOCK	Enable CLOCK Output	OFF (☐)
		Termination	to GND
		Termination Voltage (CML termination)	0.00 V
		Amplitude (GND termination)	1.00 V_{P-P}
		Amplitude (ECL termination)	0.80 V_{P-P}
		Amplitude (LVPECL termination)	0.80 V_{P-P}
		Amplitude (CML termination)	0.40 V_{P-P}
		Offset High (GND termination)	0.00 V
		Offset Middle (GND termination)	-0.50 V
		Offset Low (GND termination)	-1.00 V
		Offset High (ECL termination)	-0.90 V
		Offset Middle (ECL termination)	-1.30 V
		Offset Low (ECL termination)	-1.70 V
		Offset High (LVPECL termination)	2.40 V
		Offset Middle (LVPECL termination)	2.00 V
		Offset Low (LVPECL termination)	1.60 V
		Offset High (CML termination)	0.00 V
		Offset Middle (CML termination)	-0.20 V
		Offset Low (CML termination)	-0.40 V
	XCLOCK	Enable XCLOCK Output	OFF (☐)
		Termination	to GND
		Termination Voltage (CML termination)	0.00 V
		Amplitude (GND termination)	1.00 V_{P-P}
		Amplitude (ECL termination)	0.80 V_{P-P}
		Amplitude (LVPECL termination)	0.80 V_{P-P}
		Amplitude (CML termination)	0.40 V_{P-P}
		Offset High (GND termination)	0.00 V
		Offset Middle (GND termination)	-0.50

Table 4-2 PPG Module Default Settings

Setting item				Default
Clock	XCLOCK	Offset Low (GND termination)		-1.00
		Offset High (ECL termination)		-0.90 V
		Offset Middle (ECL termination)		-1.30 V
		Offset Low (ECL termination)		-1.70 V
		Offset High (LVPECL termination)		2.40 V
		Offset Middle (LVPECL termination)		2.00 V
		Offset Low (LVPECL termination)		1.60 V
		Offset High (CML termination)		0.00 V
		Offset Middle (CML termination)		-0.20 V
		Offset Low (CML termination)		-0.40 V
Pattern	Pattern Polarity			Normal
	Pattern Type			PRBS
	PRBS	Pattern Length		2^15-1 bits
		Mark Ratio		1/2
	ZSUB	Pattern Length		2^7 bits
		Zero Length		7 bits
	PROG	Pattern Length		16 bits
		PROG Pattern		1010 1010 1010 1010 (binary)
	STM	Insert PRBS into Payload		OFF
			Pattern Length	2^15-1 bits
			Mark Ratio	1/2
		Scramble		OFF
		Insert B1		OFF (□)
		STM Pattern		Refer to Section 4.6.6, "STM Patterns."
	FLEX	Pattern Sequence Table		Refer to Section 4.6.7, "FLEX Patterns."
		PROG Pattern No.		Refer to Section 4.6.7, "FLEX Patterns."
		FLEX pattern		1
		PRBS	Pattern Length	2^15-1 bits
			Mark Ratio	1/2

Table 4-2 PPG Module Default Settings

Setting item				Default
Burst	Burst Mode			OFF (☐)
	Source			Internal
	Internal	Cycle		1000 μs
		OFF Time		500 μs
Error Addition	Addition Route			1
	Add Errors			ON (☑)
	Error addition mode			Single
	Repeat	Rate		1E-8
Trigger/Aux	Trigger Output			1/8 Clock
	Position	PRBS		0 bit
		ZSUB		0 bit
		PROG		0 bit
		STM	Trigger output mode	Pattern
			Frame No.	1
			Row	1 byte
			Column	1
		FLEX	Index	1
			Address	0 bit

4.6.3 ED Module

Table 4-3 ED Module Default Settings

Setting item		Default
Data	Data Polarity	Normal
	Termination	to GND
	Variable (ECL termination)	OFF (☐)
	Variable (LVPECL termination)	OFF (☐)
	Variable (PECL termination)	OFF (☐)
	Variable (CML termination)	OFF (☐)
	Termination Voltage (ECL termination)	-2.00V
	Termination Voltage (LVPECL termination)	+1.30V
	Termination Voltage (PECL termination)	+3.00V
	Termination Voltage (CML termination)	0.00V
	Threshold Voltage (GND termination)	-0.500V
	Threshold Voltage (ECL termination)	-1.300V
	Threshold Voltage (LVPECL termination)	2.000V
	Threshold Voltage (PECL termination)	3.700V
	Threshold Voltage (CML termination)	-0.200V
Clock	Clock Delay	0ps
	Clock Polarity	Normal
	Termination	to GND
	Variable (ECL termination)	OFF (☐)
	Variable (LVPECL termination)	OFF (☐)
	Variable (PECL termination)	OFF (☐)
	Variable (CML termination)	OFF (☐)
	Termination Voltage (ECL termination)	-2.00V
	Termination Voltage (LVPECL termination)	+1.30V
	Termination Voltage (PECL termination)	+3.00V
	Termination Voltage (CML termination)	0.00V

Table 4-3 ED Module Default Settings

Setting item				Default
Pattern	Use the same Pattern as PPG			OFF (☐)
	Pattern Polarity			Normal
	Pattern Type			PRBS
	PRBS	Pattern Length		2^15-1 bits
		Mark Ratio		1/2
	ZSUB	Pattern Length		2^7 bits
		Zero Length		7 bits
	PROG	Pattern Length		16 bits
		PROG Pattern		1010 1010 1010 1010 (binary)
	STM	Insert PRBS into Payload		OFF
		Pattern Length		2^15-1 bits
		Mark Ratio		1/2
			Scramble	OFF (☐)
			Insert B1	OFF (☐)
		STM pattern		Refer to Section 4.6.6, "STM Patterns."
	FLEX	Pattern Sequence table		Refer to Section 4.6.7, "FLEX Patterns."
		PROG Pattern No.		1
		FLEX pattern		Refer to Section 4.6.7, "FLEX Patterns."
		PRBS	Pattern Length	2^15-1 bits
			Mark Ratio	1/2
Sync	Auto Sync			ON (☑)
	Sync Pattern Length			32 bits
	Sync PROG Address			0 bit
	Sync FLEX Index			1
	Sync FLEX Address			0 bit
	Auto Threshold			ON (☑)
	Sync Gain Threshold	PRBS		1E-2
		Memory		1E-4
	Sync Loss Threshold	PRBS		1E-2
		Memory		1E-4

Table 4-3 ED Module Default Settings

Setting item			Default
Auto Search	Clock Polarity & Delay		ON (☑)
	Threshold Voltage		ON (☑)
	Pattern		ON (☑)
Mask	Mask Route		OFF for all route (☐)
Trigger/Aux	Trigger Output		1/16 Clock
	STM	Tigger Output mode	Pattern
	AUX		Data Type
Log	Basic Measurement Results		ON (☑)
	Sync & Clock Loss History		ON (☑)
	Measure-ment Data History	Frequency	ON (☑)
		Immediate Error Rate	ON (☑)
		Immediate Error Count	ON (☑)
		Error Intervals	ON (☑)
		Error Free Intervals	ON (☑)
Condition	Timer Mode		Untimed
	Interval		0.1 s
	Error Performance Threshold		US/SES:1E-3 DM:1E-6
	Period	Day	0
		Hour	0
		Min	0
		Sec	10
	Burst Mode		OFF (☐)
	Current Data		ON (☑)
	Evaluate Clock Loss Intervals		ON (☑)
	Evaluate Sync Loss Intervals		ON (☑)
	Error Record		ON (☑)
	Error-recording fields		Total

Table 4-3 ED Module Default Settings

Setting item		Default
Display Format	Bit Count	Exponential
	Error Count	Exponential
	Immediate Error Count	Exponential
	Error Intervals	Percent
	Error Free Intervals	Percent
	Threshold EI	Percent
	Threshold EFI	Percent
	Error Performance	Percent
Buzzer	Error	OFF (☐)
	Alarm	OFF (☐)
Jitter Tolerance	Jitter Tolerance Table	Refer to Section 4.6.8, "Jitter Tolerance Parameter TableJitter Tolerance Parameter Table."
	Measurement Mode	Search
	Display Measurement Data	ON (☑)
	Template Type	STM-16(A)
	Template	Refer to Section 4.6.9, "Jitter Tolerance Measurement Template."
	Auto Search	ON (☑)
	Clock Frequency	2,488,320 kHz
	Settling Time	0 s
	Period	1 s
	Error Threshold	1 bit

Table 4-3 ED Module Default Settings

Setting item			Default
Specific Field	PROG	Start Address	0 bit
		End Address	0 bit
	ZSUB	Start Address	0 bit
		End Address	0 bit
	STM	Measurement-for-specific-field mode	Pattern
		Start Frame No.	1
		Start Row	1
		Start Column	1 byte
		End Frame No.	1
		End Row	1
		End Column	1 byte
	FLEX	Start Index	1
		Start Address	0 it
		End Index	1
		End Address	0 bit

4.6.4 System

Table 4-4 System Default Settings

Setting item			Default
Utility	Remote Interface		GPIB
	GPIB	Address	1
	Virtual Keyboard		ON (☑)
	Date & Time		Not initialized

4.6.5 Pattern Settings Window

4.6.5.1 PROG Pattern

Table 4-5 Pattern Settings (PROG) Window Default Setting

Setting item	Default
Input Format	Hex

4.6.5.2 STM Pattern

Table 4-6 Pattern Settings (STM) Window Default Setting

Setting item	Default
Input Format	Hex

4.6.5.3 FLEX Pattern

Table 4-7 Pattern Settings (FLEX) Window Default Setting

Setting item	Default
Input Format	Hex

4.6.6 STM Patterns

STM patterns can be initialized with the following one-frame STM-16 pattern.

4.6.6.1 Overhead

Table 4-8 Default STM-16 Overhead Pattern

144 bytes

15 bytes

9 rows

F6	F6	F6	F6	F6	F6	28	28	28	28	28	28	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

4.6.6.2 Payload

Table 4-9 Default STM-16 Payload Pattern

The number of rows	9
The number of columns	4176 bytes
Pattern	A pattern generated by using the binary 1010 1010 pattern repeatedly

4.6.7 FLEX Patterns

4.6.7.1 The Pattern Sequence Table

Table 4-10 Default Pattern Sequence Table

Index	Pattern	Length	FLEX Trigger
1	PROG001	128 bits	Low

4.6.7.2 PROG Patterns

All of the PROG patterns, PROG No. 1 to PROG No. 127, used in FLEX patterns are initialized with the following default pattern.

Table 4-11 Default PROG Pattern Used in FLEX Patterns

Pattern No.	Pattern Length	Pattern
1 to 127	128 bits	A pattern generated by using the binary 1010 1010 pattern repeatedly

4.6.8 Jitter Tolerance Parameter Table

Table 4-12 Defaults for Jitter Tolerance Parameter Table

Index	Jitter frequency	Jitter amplitude		
		Minimum	Maximum	The number of measurement points
1	10 Hz	1.50 UI_{P-P}	800.00 UI_{P-P}	5
2	100 Hz	1.50 UI_{P-P}	100.00 UI_{P-P}	5
3	1,000 Hz	1.50 UI_{P-P}	50.00 UI_{P-P}	5
4	5,000 Hz	1.50 UI_{P-P}	50.00 UI_{P-P}	5
5	10,000 Hz	1.50 UI_{P-P}	20.00 UI_{P-P}	5
6	20,000 Hz	1.50 UI_{P-P}	20.00 UI_{P-P}	5
7	50,000 Hz	1.50 UI_{P-P}	20.00 UI_{P-P}	5
8	100,000 Hz	1.50 UI_{P-P}	20.00 UI_{P-P}	10
9	200,000 Hz	0.75 UI_{P-P}	20.00 UI_{P-P}	10
10	500,000 Hz	0.30 UI_{P-P}	12.00 UI_{P-P}	10
11	1,000,000 Hz	0.15 UI_{P-P}	6.00 UI_{P-P}	10
12	2,000,000 Hz	0.15 UI_{P-P}	3.00 UI_{P-P}	10
13	5,000,000 Hz	0.15 UI_{P-P}	1.20UI_{P-P}	10
14	10,000,000 Hz	0.15 UI_{P-P}	0.60 UI_{P-P}	5
15	20,000,000 Hz	0.15 UI_{P-P}	0.30 UI_{P-P}	5

4.6.9 Jitter Tolerance Measurement Template

Table 4-13 Jitter Tolerance Measurement Template

Template name	Jitter frequency (kHz)						Jitter amplitude (UI_{P-P})		
	f_0	f_1	f_2	f_3	f_4	f_5	A1	A2	A3
OC/STS-1 *1	0.01	0.03	0.3	2	20	400	0.15	1.5	15
OC/STS-3 *1	0.01	0.03	0.3	6.5	65	1,300	0.15	1.5	15
OC/STS-12 *1	0.01	0.03	0.3	25	250	5,000	0.15	1.5	15
OC/STS-48 *1	0.01	0.6	6	100	1,000	20,000	0.15	1.5	15
STM-1 (A) *2	-	-	0.5	6.5	65	1,300	0.15	1.5	-
STM-4 (A) *2	-	-	1	25	250	5,000	0.15	1.5	-
STM-16 (A) *2	-	-	5	100	1,000	20,000	0.15	1.5	-
STM-1 (B) *2	-	-	0.01	1.2	12	1,300	0.15	1.5	-
STM-4 (B) *2	-	-	0.01	1.2	12	5,000	0.15	1.5	-
STM-16 (B) *2	-	-	0.01	1.2	12	20,000	0.15	1.5	-

*1: A reference specification: Bellcore GR-253
*2: A reference specification: ITU-T G. 958

4.7 Re-measurement Conditions

This section lists the conditions for re-measurement. Current measurement results are cleared and re-measurement by the D3371 is performed automatically when any of the following executions or setting changes is performed.

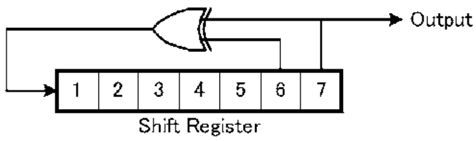
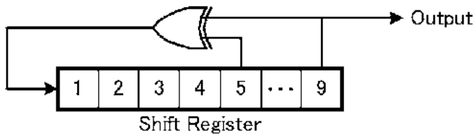
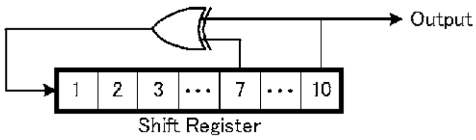
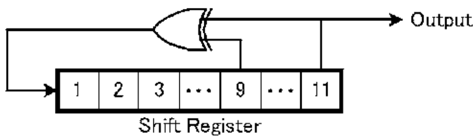
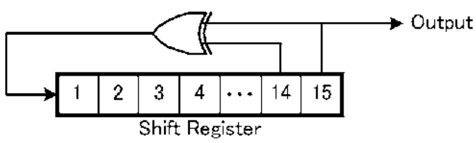
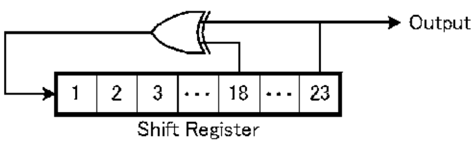
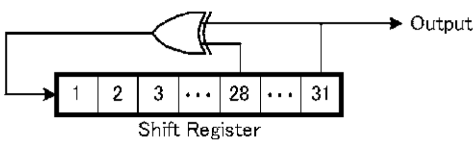
1. Auto search execution
2. Measurement start execution
3. Re-synchronization execution
4. Pattern change of ED modules (Settings in the **[Settings]-[Pattern]**)
5. Synchronization condition change (Settings in the **[Settings]-[Sync]**)
6. Measurement condition change (Settings in the **[Settings]-[Condition]**)
7. Mask route change (Settings in the **[Settings]-[Mask]**)
8. Log acquisition condition change (Settings in the **[Settings]-[Log]**)

5. TECHNICAL TERMS AND INFORMATION

5.1 Pseudorandom (PRBS) Pattern

Pseudorandom (PRBS) pattern are pseudorandom patterns which have a 2^N - 1 bit cycle (N: number of PRBS steps). Table 5-1 lists the seven types of steps (N = 7, 9, 10, 11, 15, 23, and 31) that are available. In addition, the mark ratio generator can be used to generate PRBS pattern mark ratios (allocation of logic 1 bits within all patterns) using 1/2 1/4 18 0/8 and $\overline{1/2}$ 3/4 7/8 8/8.

Table 5-1 PRBS Patterns

PRBS step	Pattern length	Generation polynomial	PRBS pattern generator	Standard reference
7	2^7-1	X^7+X^6+1		ITU-T V.29
9	2^9-1	$X^9+ X^5+1$		ITU-T V.52
10	2^{10}-1	$X^{10}+ X^7+1$		
11	2^{11}-1	$X^{11}+ X^9+1$		ITU-T O.152
15	2^{15}-1	$X^{15}+ X^{14}+1$		ITU-T O.151($\overline{1/2}$)
23	2^{23}-1	$X^{23}+X^{18}+1$		ITU-T O.151($\overline{1/2}$)
31	2^{31}-1	$X^{31}+X^{28}+1$		

PRBS pattern mark ratio	Explanation
0/8	Pattern of all logic 0 bits
1/8	Pattern of logical AND of three contiguous bits
1/4	Pattern of logical AND of two contiguous bits
1/2	PRBS pattern of positive logic
1/2B	Inverted pattern of mark ratio 1/2
3/4	Inverted pattern of mark ratio 1/4
7/8	Inverted pattern of mark ratio 1/8
8/8	Pattern of all logic bits 1

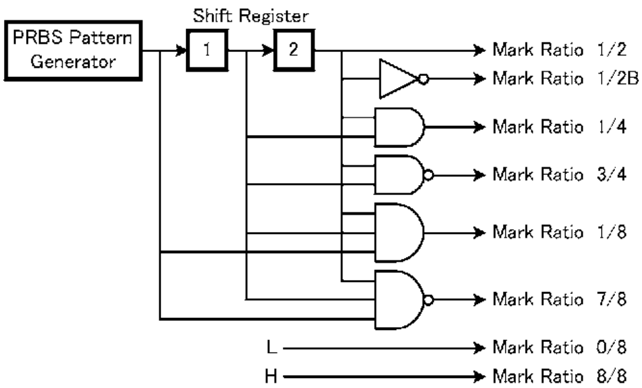


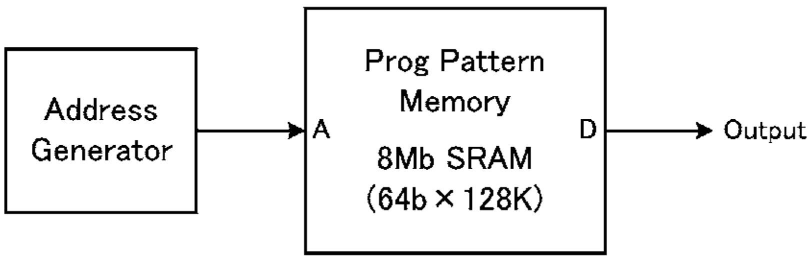
Figure 5-1 Mark Ratios and Generation Circuit Diagram

5.2 Programmable (PROG) Pattern

The contents of programmable patterns can be set as desired. The programmable patterns are generated in memory. Up to 8,388,608 bits can be generated for a programmable pattern. However, the number of steps that can be set depends on the length of the pattern.

Table 5-2 Pattern Lengths and Steps

Pattern length [bit(s)]	Step [bit(s)]
1 to 262,144	1
262,146 to 524,288	2
524,292 to 1,048,576	4
1,048,584 to 2,097,152	8
2,097,168 to 4,194,304	16
4,194,336 to 8,388,608	32

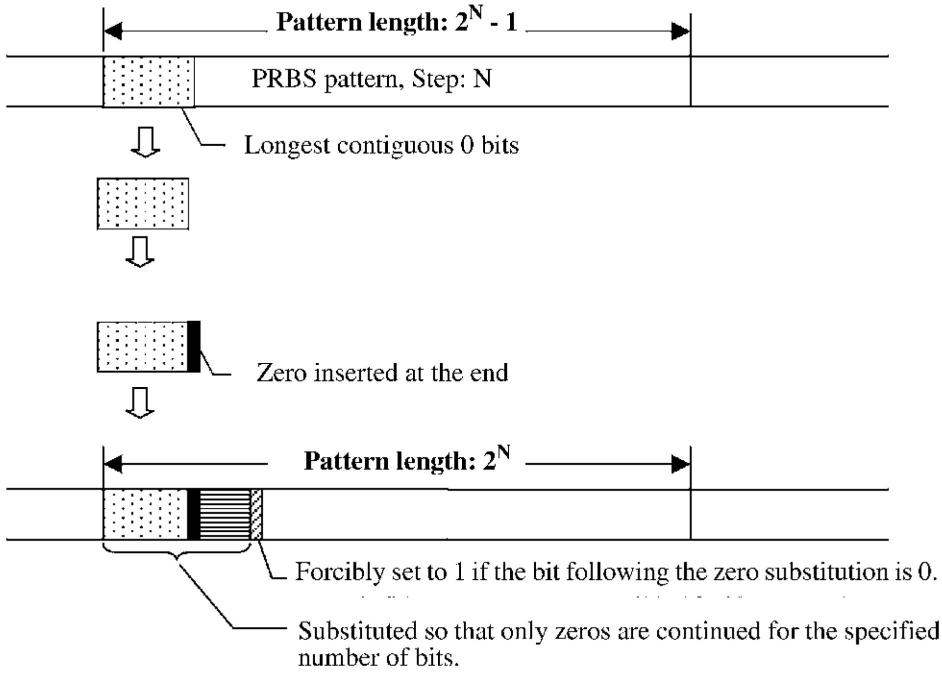


Programmable Pattern Generator

5.3 Zero substitution (ZSUB) Pattern

For a PRBS pattern, the zero substitution pattern is obtained by inserting a zero at the end of the bit string that has the longest contiguous string of zeros and then substituting so that only zeros are continued for the specified number of bits. At this time, if the bit following the zero substitution is 0, it will be forcibly set to "1." In addition, the pattern length will be 2^N bits because the zero has been inserted.

The amount of consecutive zero bits ranges from N to 2^N - 1. In addition, up to 15 steps can be set for a PRBS pattern. For information about PRBS patterns, refer to Section 5.1, "Pseudorandom (PRBS) Pattern."

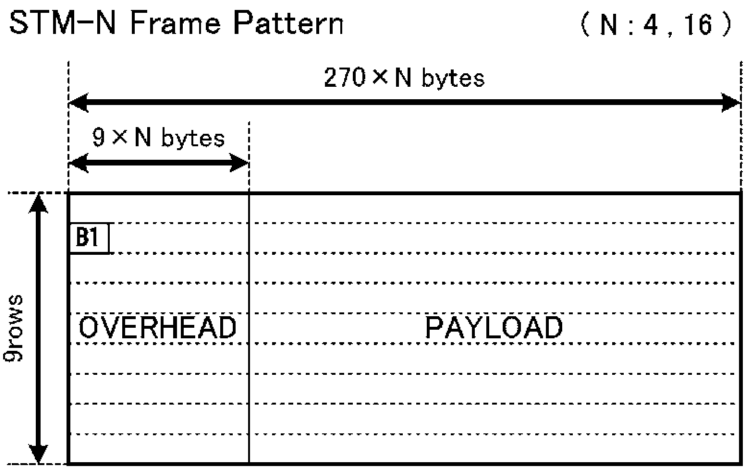


5.4 STM Frame (STM) Patterns

5.4.1 STM Patterns

The STM pattern (pattern option) has a frame structure that complies with the ITU-T recommendation G.707. The OVERHEAD field is provided with programmable patterns. Either the programmable pattern or PRBS pattern can be selected for the PAYLOAD field.

In addition, B1 that is conforming to the ITU-T recommendation G.707 and scrambling may also be added to the pattern system.



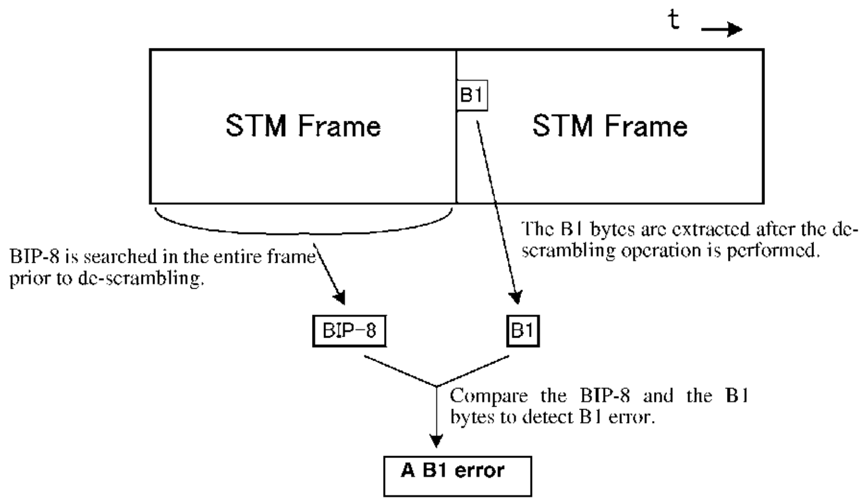
5.4.2 B1 Error Measurement

The B1 error measurement is a bit error measurement performed by the ITU-T recommendation G.707 compliant B1 byte.
Bit Errors is detected per frame by the comparison of the BIP-8 in the receiving frame with the B1 byte.

Number of B1 errors = The number of B1 errors in STM frames counted in each predetermined period.

$$\text{B1 error ratio} \quad \frac{\text{The number of B1 errors in the counted STM frames}}{\text{The number of bits in the counted STM frames}}$$

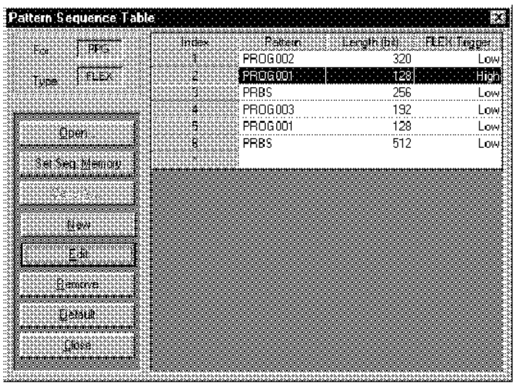
5.4.2 B1 Error Measurement

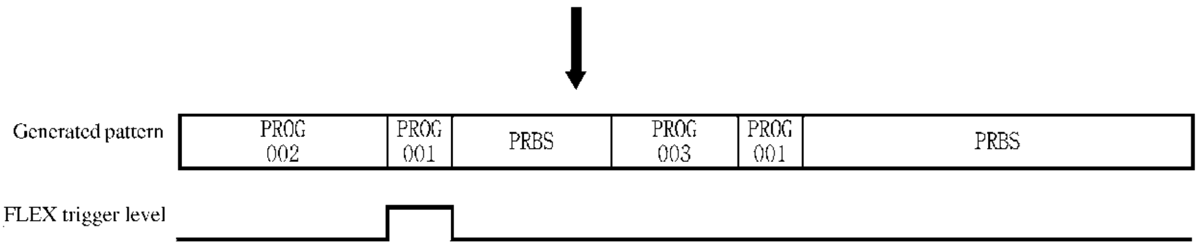


5.5 Flexible (FLEX) Patterns

Flexible patterns are combined patterns of programmable patterns and a PRBS pattern. Any of 127 programmable patterns and one PRBS pattern, 128 types of patterns in all, can be combined. Any flexible patterns are generated by arranging these patterns.

Item	Description
Index	Used to indicate the pattern number given in the order of its generation. The setting range is 1 to 1024. A PRBS pattern cannot be set to index No. 1.
Pattern	Programmable patterns: 127 types (PROG001 to PROG127)
	PRBS patterns: 1 type (PRBS)
Pattern length	Programmable patterns: 128 bits to 65,536 bits (setting resolution: 64 bits) A pattern length is specified in the Pattern Settings window. A pattern length is set to each pattern.
	PRBS patterns: 128 bits to 2,097,125 bits (setting resolution: 64 bits) A pattern length is specified for each index in the pattern sequence table.
FLEX trigger	The trigger level can be set to either the Low level or the High level for each index.





5.6 Measurement in Specific Fields

"Measurement in specific fields" indicates the function to measure bit errors in the field specified by a measurement start bit and a measurement termination bit.

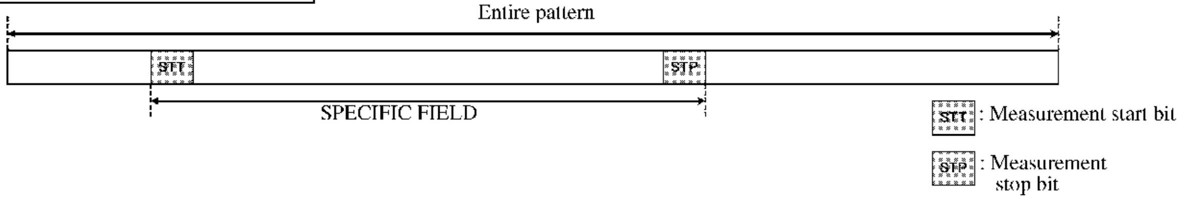
The measurement start bit and the measurement termination bit can be set to any bit in the entire pattern.

For STM patterns, frame-based specific fields can also be specified.

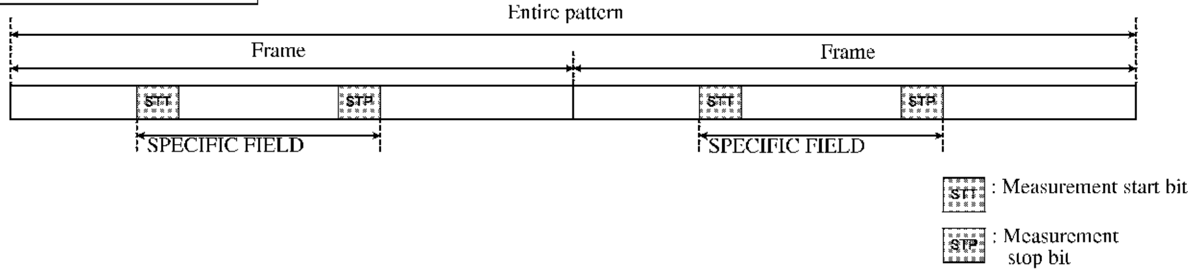
NOTE: Specific fields can be set only for patterns meeting the following conditions.

- ***Patterns: PROG, ZSUB, STM, FLEX***
- ***Pattern lengths: 256 bits or longer and an integral multiple of 32 bits***

In specification for the entire pattern



In frame-based specification



5.7 Error Detection Mode

There are three error detection modes. A bit error measurement is performed by selecting one of the three modes.

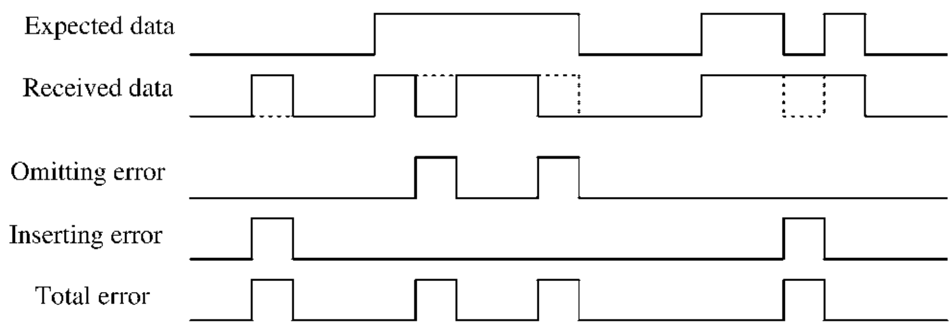
- Omitting/Inserting/Total
- Overhead/Payload/Total
- Specific/Other/Total

NOTE:The Specific/Other/Total error detection mode can be set only for patterns satisfying the following conditions.

- ***Patterns: PROG, ZSUB, STM, FLEX***
- ***Pattern lengths: 256 bits or longer and integral multiples of 32 bits***

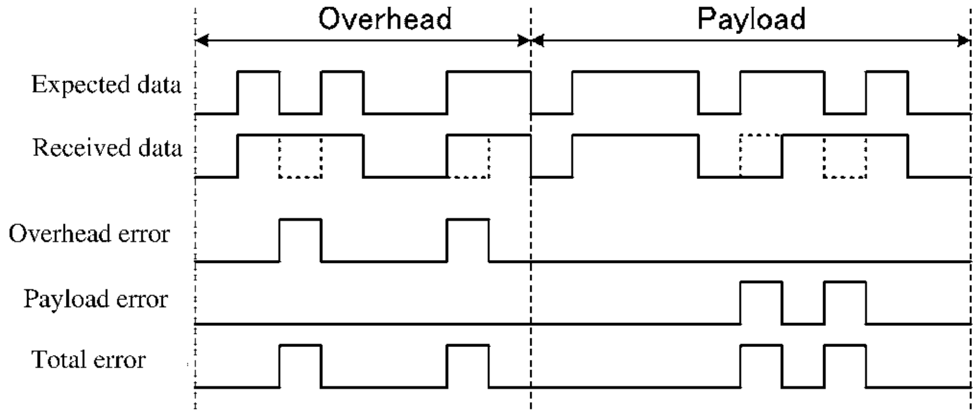
1. Omitting/Inserting/Total

Omitting error:	An omitting error (1→0) occuring when logical 0 is entered for expected data of logical 1.
Inserting error:	An inserting error (0→1) occuring when logical 1 is entered for expected data of logical 0.
Total errors:	The sum of Omitting and Inserting errors



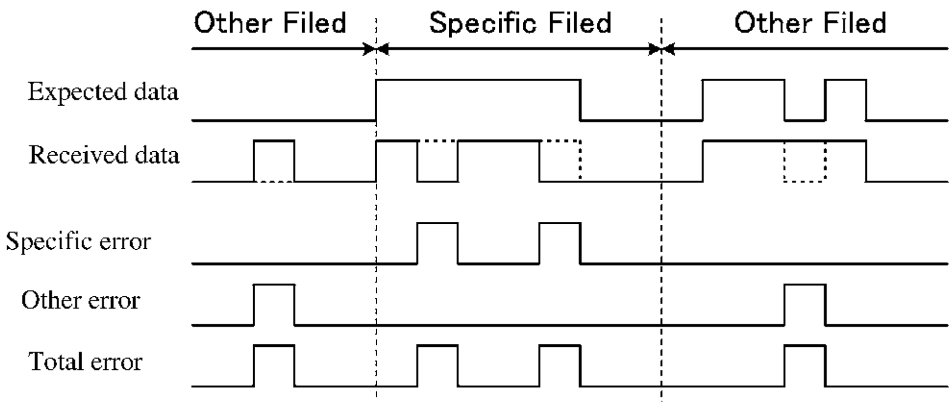
2. Overhead/Payload/Total

Overhead error:	Bit error generated in Overhead fields of STM frames
Payload error:	Bit error generated in Payload fields of STM frames
Total error:	The sum of Overhead and Payload errors



3. Specific/Other/Total

Specific error:	Bit error generated in a specific field
Other error:	Bit errors generated in a non-specific field
Total error:	The sum of Specific and Other errors



5.8 Burst

1. PPG module

   Burst function of the PPG module is used to gate the internal data generated by the PPG module. This function gates the data generated either internally or externally by the external burst signal. Furthermore, it outputs the burst control signal simultaneously with the gated PPG module data.

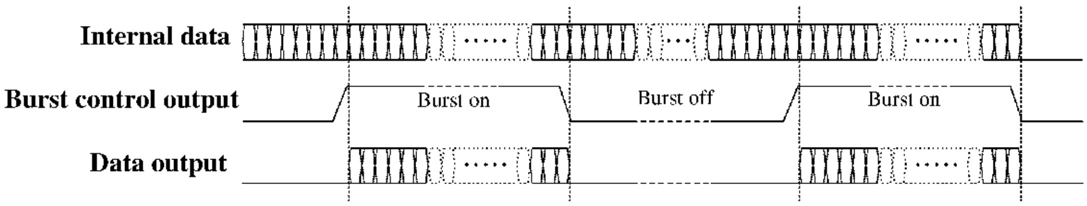


Figure 5-2 PPG Module Burst Pattern Method

2. ED module

   The ED module function measures the data during the ON section of the burst trigger entered in the ED module.

   If Auto Sync is set to on, a synchronization pull-in is performed when burst switches to the ON state, and the data is measured only when synchronization is established.

   If Auto Sync is set to off, measurements are performed using the previous synchronization state when burst switches to the ON state.

   If the previous synchronization state is the synchronization established state, measurements are continued as is. If the previous synchronization state is the synchronization loss state, a synchronization pull-in is performed and the data is measured only when synchronization is established.

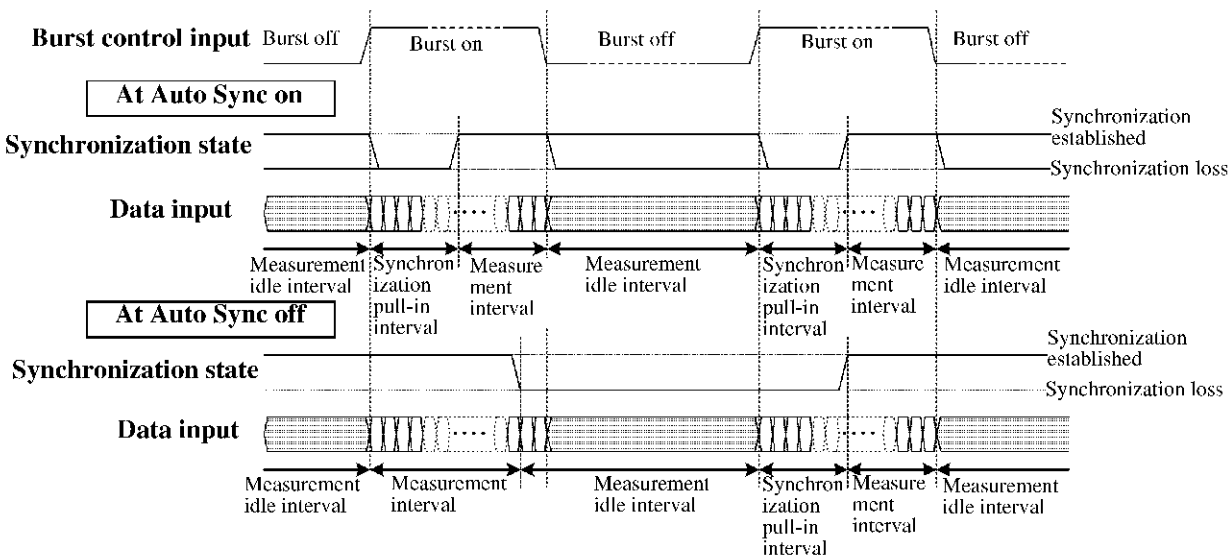


Figure 5-3 ED Module Burst Pattern Method

5.9 Mask Routes

The mask function is used to specify receiving data to be excluded from a measurement for each route of parallel data obtained by reducing the speed using the 1:16 DEMUX. The mask function can specify each route of parallel data at a 1/16 rate. The routes that are masked are excluded from measurement. The mask function is invalid for synchronous processing.

This mask function is effective for locating errors on each route in the target under test.

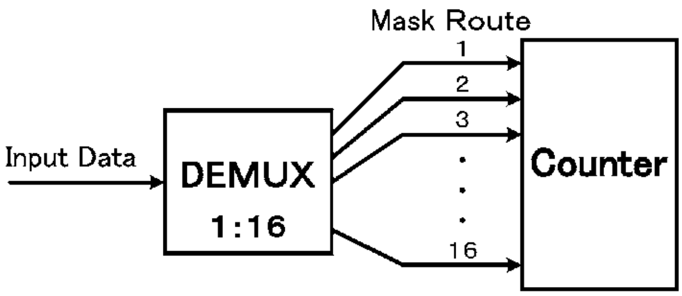


Figure 5-4 Mask Routes

The measurement results of the bit count, error count, and error rate depend on the masked route.

For example, masking routes 1 to 8 results in the following measurements:

Bit count = Number of bits for routes 9 to 16

Error count = Number of errors for routes 9 to 16

Error rate = Number of errors for routes 9 to 16/Number of bits for routes 9 to 16

5.10 Synchronization

Before the D3371 starts an bit error measurement, the input and reference data must be synchronized. Normally, the input data and reference data are synchronized automatically however, if the settings of the input data is different from the ED module settings, a synchronization loss (SYN lights in red) may oocure. If synchronization loss occurs, synchronize the input data with reference data by excuting the auto-search.

1. Synchronization threshold

   Synchronization threshold is set to PRBS pattern field and memory pattern field separately. Table 5-1 indicates their relationships of patterns with the synchronization thresholds.

Table 5-1 Relationship Between Pattern and Synchronization Threshold

	Pattern
Synchronization threshold for PRBS pattern field	PRBS pattern PRBS pattern within STM pattern PRBS pattern within FLEX pattern
Synchronization threshold for memory pattern field	PROG pattern ZSUB pattern Programmable pattern with STM pattern Programmable patterns within FLEX pattern

The table below lists the synchronization threshold of the D3371 with the automatic synchronization threshold (Auto Threshold: On).

Table 5-2 PRBS Pattern Area Synchronization Threshold

PRBS steps	Mark ratio 0/8, 8/8		Mark ratio 1/2, $\overline{1/2}$		Mark ratio 1/4, 3/4		Mark ratio 1/8, 7/8	
	Sync Gain Threshold	Sync Loss Threshold	Sync Gain Threshold	Sync Loss Threshold	Sync Gain Threshold	Sync Loss Threshold	Sync Gain Threshold	Sync Loss Threshold
7	1/64	1/64	1/64	1/64	1/64	1/64	1/64	1/64
9	1/64	1/64	1/64	1/64	1/64	1/64	1/128	1/64
10	1/64	1/64	1/64	1/64	1/128	1/64	1/256	1/128
11	1/64	1/64	1/64	1/64	1/128	1/64	1/256	1/128
15	1/64	1/64	1/64	1/64	1/256	1/128	1/256	1/128
23	1/64	1/64	1/64	1/64	1/512	1/256	1/1024	1/512
31	1/64	1/64	1/64	1/64	1/1024	1/512	1/2048	1/1024

Table 5-3 Memory Pattern Area Synchronizing Threshold

Pattern length *	Sync Gain Threshold	Sync Loss Threshold
1 to 64	1/128	1/64
65 or greater	1/(2 × pattern length *)	1/pattern length *

*: Total number of bits in the Memory pattern area only

If the automatic synchronization threshold is not appropriate, turn Auto Threshold off and set the synchronization threshold. This can improve the speed of synchronization and prevents an incorrect synchronization from occurring.

Select the synchronization threshold value from the following Table 5-4 and Table 5-5.

For the Sync Gain Threshold, select the reciprocal of the number of bits that can be used to determine that the phases of the input data and reference data match (synchronization established). For a pattern where partial bit strings have a high level of uniqueness, such as a PRBS pattern (pattern where the autocorrelation is low), a large synchronization threshold value can be set to reduce the time for synchronization.

Conversely, for a pattern where partial bit strings have a low level of uniqueness (pattern where the autocorrelation is high), a smaller synchronization threshold value must be set. As a result, the time for synchronization become longer.

For the Sync Loss Threshold, it is recommended that the reciprocal of the number of bits that can be used to determine that the phases of the input data and reference data match be selected in the same way as the Sync Gain Threshold to prevent incorrect synchronization.

The synchronization method of this function has a high level of tolerance for burst errors. As long as bit errors exceeding the specified Sync Loss Threshold do not occur continuously, measurement can be continued without synchronization loss occurring.

Table 5-4 PRBS Pattern Area Synchronization Threshold

Sync Gain Threshold	10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7}
Sync Loss Threshold	10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7}

Table 5-5 Memory Pattern Area Synchronization Threshold

Sync Gain Threshold	10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7}, 10^{-8}, 10^{-9}, 10^{-10}
Sync Loss Threshold	10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7}, 10^{-8}, 10^{-9}, 10^{-10}

2. Synchronization time optimization

   The time required to establish synchronization varies according to the contents of the pattern. However, if a test data contains a unique pattern, the time for synchronization can be optimized.

   The time for synchronization can be optimized by setting a large value for a Sync Gain Threshold together with the settings of the unique pattern position and length to the Sync PROG Address and Sync Pattern length.

5.11 Clock Loss and Sync Loss

This section explains how to calculate the measurement result when Clock Loss or Sync Loss occurs during a measurement.

1. When the measurement items are Bit Count, Error Rate, Error Count, Immediate Error Rate and Immediate Error Count:

   The measurement result is calculated at the time interval (0.1 or 1 second) specified by **[Interval]** in the **[Condition]** tab of the Settings window ED module. Data obtained from the time interval where Clock Loss or Sync Loss occurs is excluded from the measurement result calculation target.

2. When the measurement items are Error Intervals, Error Free Intervals, Threshold EI, Threshold EFI and Error Performance, the measurement calculation method changes according to whether or not the data obtained from the time interval where Clock Loss or Sync Loss occurs in the measurement result calculation is included.

   Only the measurement items indicated by ✓ in Table 5-6 below are calculated.

   - Select the **[Evaluate Clock Loss Intervals]** check box in the **[Condition]** tab of the Settings window of the ED module, to include the data obtained from the Clock Loss interval in the calculation.
   - Select the **[Evaluate Sync Loss Intervals]** check box in the **[Condition]** tab of the Settings window of the ED module, to include the data obtained from the Sync Loss interval in the calculation.

Table 5-6 Calculation Conditions Used When Clock Loss or Sync Loss Occurs

Measurement item	Clock Loss		Sync Loss	
	exclude	include	exclude	include
Error Intervals	-	-	-	-
Error Free Intervals	-	-	-	-
Threshold EIs	-	-	-	-
Threshold EFIs	-	-	-	-
Measurement Intervals	-	✓	-	✓
Clock Loss Intervals	✓	✓	-	-
Sync Loss Intervals	-	-	✓	✓
Error Performance	- *2	✓ *1	- *3	✓ *1

*1: The interval data is unavailable and the error seconds are only calculated for the interval.
*2: When recovered from the Clock Loss status, the measurement status is initialized.
*3: When recovered from the Sync Loss status, the measurement status is initialized.

5.12 Jitter Tolerance Measurement

Jitter tolerance measurement is used to measure how much the device under test can perform correctly without errors by applying a jitter modulated sine wave signal (phase-modulated) and changing its jitter frequency and amplitude.

A controlled jitter modulated sine wave signal is generated using the built-in SSG module. Error measurement is performed using the built-in ED module.

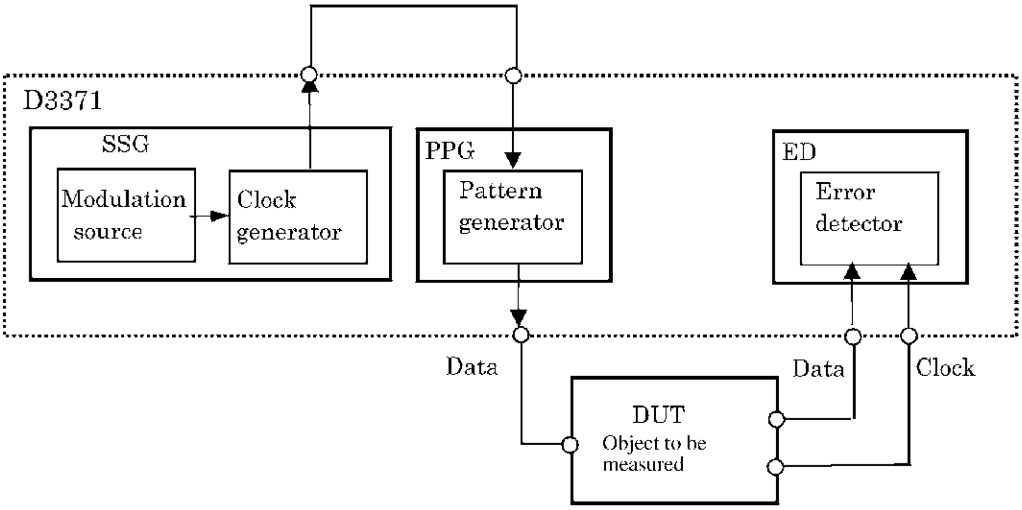


Figure 5-5 Jitter Tolerance Measurement Block Diagram

The amount of jitter is defined as the size of phase variation relative to the jitter-free reference signal.

Unit Interval (UI) is used as a unit, and 1 UI is defined as one cycle of the bit clock. Figure 5-6 shows the relationship using an example clock signal.

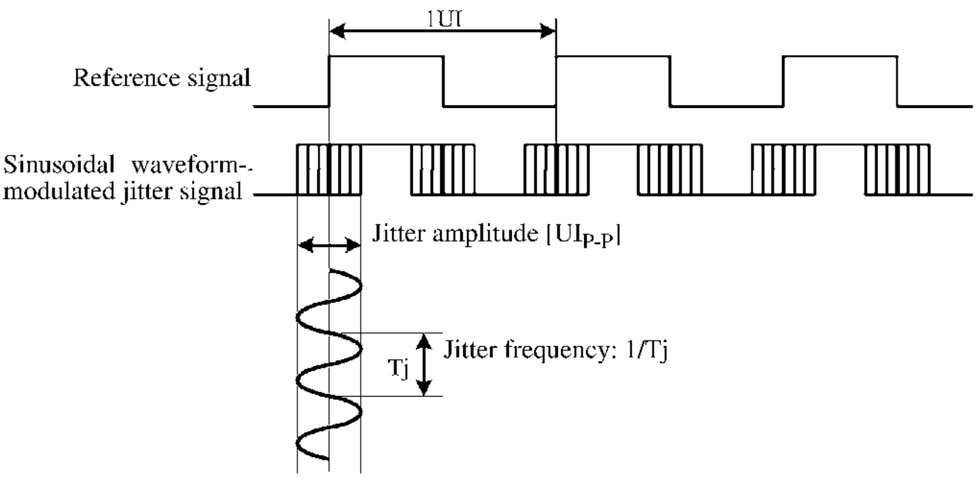


Figure 5-6 Definition for Amount of Jitter

5.13 Error Phase Analysis

Error phase analysis is used to consecutively record locations where bit errors occurred and display the error bits with the pattern.

There are two display formats.

- Time-series display

  Error bits are displayed in the order that they are recorded.

- Statistical display

  Bit errors are collected for each bit of patterns, and are displayed in colors defined for the error rate. Furthermore, the error phase analysis can also be performed by only recording bit errors in the Specific Field.

1. Time-series display

   Time-series display is used to display patterns and their phase information, and error bits.

   With time-series display, the relationship between error bits and patterns, and the error bits in time-series can be monitored.

   The time-series display can be used to display PRBS pattern values even if they are included in STM patterns or FLEX patterns. This is because phase information of recorded error bits includes phase information of PRBS patterns as well.

   Patterns in a cycle with no error bits are not displayed. Instead, a separator (a blue-colored line) is displayed for that cycle. Therefore, the preceding and succeeding patterns where the separator is inserted are observed as a discontinuity.

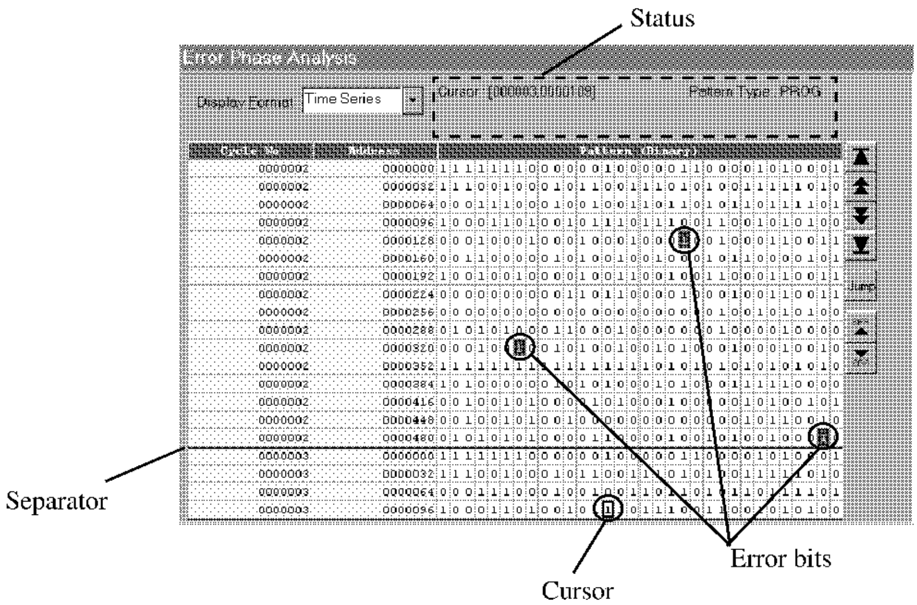


Figure 5-7 Time-series Display

2. Statistical display

   The statistical display is used to display patterns, their phase data, and error bits defined in colors for the error rate.

   With the statistical display, the relationship between error bits and patterns, and bit-by-bit error occurances can be monitored.

   PRBS pattern values cannot be displayed if they are included in STM patterns or FLEX patterns. Bits in the PRBS pattern field are indicated with an * mark.

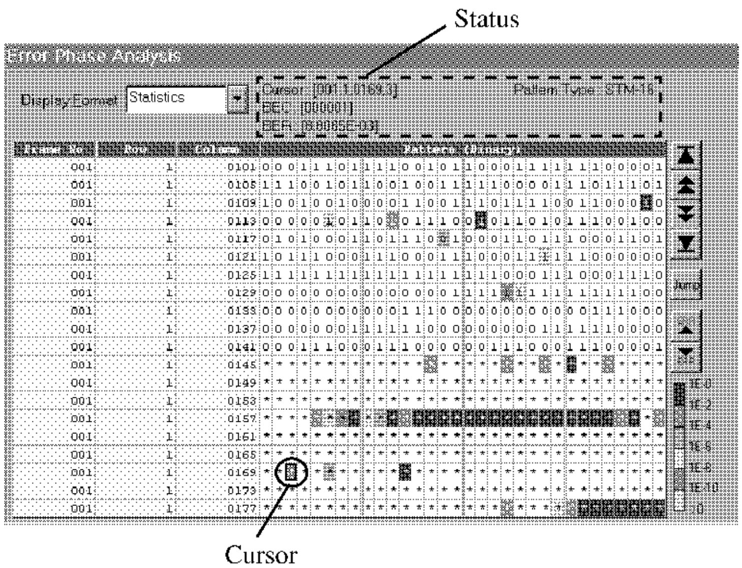


Figure 5-8 Time-series Display

6. SPECIFICATIONS

6.1 D3371 Main Unit

- System Functions

Item	Specification
OS	Microsoft Windows 98 Second Edition (English version)
Main memory	128 MB
Display unit	10.4-inch TFT LCD Color Display with the touch panel function 800 × 600 pixels, with a backlight *1
Floppy disk drive	3.5-inch in two modes (720 KB and 1.44 MB)
Hard disk	3.5-inch (6 GB or more)
User interface	Panel keys and the touch screen
Remote control	GPIB compliant with IEEE488.2
Measurement time base accuracy	±10 ppm

*1 The color LCD may have some slight inconsistencies or some defective pixels in the display, but they can not be seen and should not considered to be true defects .

- Input and Output

Item	Specification
PARALLEL connector	D-sub 25 pin
USB connector	Type A connector, 2 channels installed for the keyboard and mouse
ETHERNET connector	10Base-T
GPIB connector	IEEE-488.2 bus connector

- General Specifications

Item	Specification
Operating environment range	+5°C to +40°C Relative humidity: 40% to 85% (Without condensation)
Storage environment range	-20°C to +70°C Relative humidity: 30% to 85% (Without condensation)
AC input power source	The 100 VAC and 200 VAC systems are switched automatically. 100 VAC system operation: 100 V to 120 V, 50 Hz/60 Hz 200 VAC system operation: 220 V to 240 V, 50 Hz/60 Hz
Power consumption	160 VA or below
Mass	21 kg or less (Not including extensions such as modules, and accessories.)
Dimensions	Approximately 424 (W) × 221 (H) × 500 (D) mm (Not including protrusions such as the rear feet and connectors.)

6.2 3.6 G Synthesizer Module (SSG Module)

- Clock Source

Item	Specification
Generated frequency range	10 MHz to 3.6 GHz
Frequency setting resolution	1 kHz
Frequency accuracy	Within ±2 ppm
SSB phase noise	-85 dBc/Hz or less (10 kHz offset)
External reference synchronization	Available

- Clock output

Item	Specification
Output amplitude	$1.2 \pm 0.6 V_{P-P}$ (175 MHz ≤ f ≤ 3.6 MHz) $0.7 \pm 0.4 V_{P-P}$ (10 MHz ≤ f < 175 MHz)
Output waveform	Sine wave (175 MHz ≤ f ≤ 3.6 MHz) Rectangular wave (10 MHz ≤ f < 175 MHz)
Load impedance	50Ω
Connector	SMA female

- 10 MHz Output (when outputting the internal reference signal)

Item	Specification
Frequency	10 MHz
Frequency accuracy	Within ±2 ppm
Output frequency	0 dBm ±5 dB
Coupling	AC
Connector	SMA female

- 10 MHz Input (when inputting the external reference signal)

Item	Specification
Frequency	10 MHz
Frequency accuracy	Within ±10 ppm
Input level	0 dBm ±5 dB
Coupling	AC
Connector	SMA female

- General Specifications

Item	Specification
Operating environment range	+5°C to +40°C Relative humidity: 40% to 85% (Without condensation)
Storage environment range	-20°C to +70°C Relative humidity: 30% to 85% (Without condensation)
Power consumption	80 VA or below
Mass	3.5 kg or less

6.3 2 V or 3 V Output Module of the Pulse Pattern Generator (PPG Module)

- Generated Patterns

<table>
<tr><th colspan="2">Item</th><th>Specification</th></tr>
<tr><td rowspan="4">Pseudorandom binary sequence (PRBS) pattern</td><td>Pattern length</td><td>Pattern length: 2^n - 1 (n: 7, 9, 10, 11, 15, 23 or 31)</td></tr>
<tr><td>Number of steps, and generating function</td><td>
<table>
<tr><th>Number of steps</th><th>Generating polynomial</th><th>Reference standards (mark ratio setting)</th></tr>
<tr><td>7</td><td>X^7+X^6+1</td><td>ITU-T Recommendation V.29 (1/2)</td></tr>
<tr><td>9</td><td>X^9+X^5+1</td><td>ITU-T Recommendation V.52 (1/2)</td></tr>
<tr><td>10</td><td>$X^{10}+X^7+1$</td><td></td></tr>
<tr><td>11</td><td>$X^{11}+X^9+1$</td><td>ITU-T Recommendation 0.152 (1/2)</td></tr>
<tr><td>15</td><td>$X^{15}+X^{14}+1$</td><td>ITU-T Recommendation 0.151 ($\overline{1/2}$)</td></tr>
<tr><td>23</td><td>$X^{23}+X^{18}+1$</td><td>ITU-T Recommendation 0.151 ($\overline{1/2}$)</td></tr>
<tr><td>31</td><td>$X^{31}+X^{28}+1$</td><td></td></tr>
</table>
</td></tr>
<tr><td>Mark ratio (variable)</td><td>1/2,1/4,1/8,0/8,$\overline{1/2}$,3/4,7/8,8/8</td></tr>
<tr><td>AND bit shift number of mark ratio</td><td>1 bit</td></tr>
<tr><td rowspan="2">Programmable (PROG) pattern</td><td>Pattern length</td><td>1 to 8,388,608 (2^{23}) bits</td></tr>
<tr><td>Pattern length and setting resolution</td><td>
<table>
<tr><th>Pattern length range (bits)</th><th>Setting resolution (bits)</th></tr>
<tr><td>1 to 262,144</td><td>1</td></tr>
<tr><td>262,146 to 524,288</td><td>2</td></tr>
<tr><td>524,292 to 1,048,576</td><td>4</td></tr>
<tr><td>1,048,584 to 2,097,152</td><td>8</td></tr>
<tr><td>2,097,168 to 4,194,304</td><td>16</td></tr>
<tr><td>4,194,336 to 8,388,608</td><td>32</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th colspan="2">Item</th><th>Specification</th></tr>
<tr><td rowspan="2">Zero substitution (ZSUB) pattern</td><td>Pattern length</td><td>2^n (n: bit7, 9, 11 or 15)</td></tr>
<tr><td>Bit length of continuous zeros and setting resolution</td><td><table>
<tr><th>ZSUB pattern length</th><th>Continuous zero bit length</th><th>Setting resolution</th></tr>
<tr><td>2^7</td><td>7 to 127</td><td>1</td></tr>
<tr><td>2^9</td><td>9 to 511</td><td>1</td></tr>
<tr><td>2^10</td><td>10 to 1023</td><td>1</td></tr>
<tr><td>2^11</td><td>11 to 2047</td><td>1</td></tr>
<tr><td>2^15</td><td>15 to 32767</td><td>1</td></tr>
</table></td></tr>
<tr><td rowspan="5">STM frame (STM) pattern (OPT 71)</td><td>Frame structure</td><td>STM-4, STM-16</td></tr>
<tr><td>Number of frames</td><td>STM-4: 1 frame to 107 frames
STM-16: 1 frame to 26 frames</td></tr>
<tr><td>Payload types</td><td>Selection is made from the following patterns
Programmable (PROG)pattern
Pseudo random binary sequence (PRBS)pattern</td></tr>
<tr><td>Scrambling</td><td>Can be provided</td></tr>
<tr><td>B1 byte</td><td>Can be provided</td></tr>
<tr><td rowspan="3">Flexible (FLEX) pattern (OPT 71)</td><td>Number of patterns</td><td>Programmable (PROG)pattern: 127 types
Pseudo random binary sequence (PRBS)pattern: 1 type</td></tr>
<tr><td>Pattern length</td><td>PROG: 128 to 65,536 bits (setting resolution: 64 bits)
PRBS: 128 to 2,097,152 bits (setting resolution: 64 bits)</td></tr>
<tr><td>Number of combined patterns</td><td>1 pattern to 1024 patterns</td></tr>
<tr><td colspan="2">Pattern logic</td><td>Can be logically inverted</td></tr>
</table>

- Error Addition

Item	Specification
Mode	Repeat, Single and External
Repeat	Bit error is added at specified intervals for an error rate of 1×10^{-n} (n: 2 thru 9).
Single	An error of 1 bit is added for each error addition command.
External	Error addition is available.
Error addition route	Route:1 to 16

- Burst

Item	Specification
Mode	Internal generation burst, and external burst

- Trigger

Item		Specification
Mode		Can be selected from the 1/8 clock, 1/32 clock, Pattern phase, Frames (OPT 71) and Flexible (OPT 71)
Pattern phase	PRBS pattern	Output position can be varied in increments of 1 bit.
	PROG pattern	Output position can be varied in increments of 16 bit.
	ZSUB pattern	Output position can be varied in increments of 16 bit.
Frames (OPT 71)		Output positions can be set for each frame separately on a 16-bit basis.
Flexible (OPT 71)		The Low level or High level can be set for each pattern.

- AUX

Item	Specification
Data types	The Low level is output for programmable patterns, while the High level is output for PRBS patterns.

- Clock input

Item	Specification
Input amplitude	0.5 V_{P-P} to 2 V_{P-P}
Input waveform	Sine wave or Rectangular wave (175 MHz to 3.6 GHz) Rectangular wave (10 MHz to 175 MHz)
Duty ratio	50%±5%
Input impedance	50Ω (Nominal) to 0 V
Connector	SMA female

- Data Output

Item		Specification
Frequency		10 MHz to 3.6 GHz
Number of output paths		2 paths (DATA and /$\overline{\text{DATA}}$, independent)
Mode		NRZ
Coupling		DC
Amplitude range 2 V output module 3 V output module		to GND: 0.3 V_{P-P} to 2 V_{P-P} setting resolution: 10mV (OPT10) : 0.3V_{P-P} to 3V_{P-P} setting resolution: 10mV (OPT 11) ECL(to -2V): 0.6V_{P-P} to 1V_{P-P} setting resolution: 10mV LVPECL(to +1.3V): 0.6V_{P-P} to 1V_{P-P} setting resolution: 10mV CML(to Vcc): 0.3V_{P-P} to 1V_{P-P} setting resolution: 10mV Exception; Vcc (termination voltage) is set between 0 V and 3.5 V in 50 mV setting resolution.
Offset range		to GND: -2.0V to +2.0V(High) setting resolution: 10mV ECL(to -2V): -1.0V to -0.6V(High) setting resolution: 10mV LVPECL(to +1.3V): +2.3V to +2.7V(High) setting resolution: 10mV CML(to Vcc): Vcc-0.2V to Vcc+0.2V(High) setting resolution: 10mV Exception; Vcc (termination voltage) is set between 0 V and 3.5 V in 50 mV setting resolution.
	Display	Can be switched to High, Middle or Low.
Rise/fall time		60 ps or less (between 10 to 90%) (Output amplitude ≥ 0.5 V_{P-P}) 80 ps or less (between 10 to 90%) (Output amplitude < 0.5 V_{P-P})
DATA/$\overline{\text{DATA}}$ tracking function		Available
Variable cross-point		Available
Load impedance		50Ω
Connector		SMA female

*1 When the amplitude setting exceeds 2 V_{P-P} for the 3 V output module, the offset range is -1.0 V to +1.0 V (High) setting resolution: 10 mV (to 0 V).

- Clock Output

Item		Specification
Number of output paths		2 paths (Each of CLOCK and /$\overline{\text{CLOCK}}$)
Coupling		DC
Amplitude range		to GND: 0.3 V_{P-P} to 2 V_{P-P} setting resolution: 10mV (OPT10) : 0.3V_{P-P} to 3V_{P-P} setting resolution: 10mV (OPT 11) ECL(to -2V): 0.6V_{P-P} to 1V_{P-P} setting resolution: 10mV LVPECL(to +1.3V): 0.6V_{P-P} to 1V_{P-P} setting resolution: 10mV CML(to Vcc): 0.3V_{P-P} to 1V_{P-P} setting resolution: 10mV Exception; Vcc (termination voltage) is set between 0 V and 3.5 V in 50 mV setting resolution.
Offset range		to GND: -2.0V to +2.0V(High) setting resolution: 10mV ECL(to -2V): -1.0V to -0.6V(High) setting resolution: 10mV LVPECL(to +1.3V): +2.3V to +2.7V(High) setting resolution: 10mV CML(to Vcc): Vcc-0.2V to Vcc+0.2V(High) setting resolution: 10mV Exception; Vcc (termination voltage) is set between 0 V and 3.5 V in 50 mV setting resolution.
	Display	Can be switched to High, Middle or Low.
Rise/fall times		60 ps or less (between 10 to 90%) (Output amplitude $\geq$ 0.5 V_{P-P}) 80 ps or less (between 10 to 90%) (Output amplitude < 0.5 V_{P-P})
Clock delay		$\pm$1 ns (setting resolution: 1 ps)
Load impedance		50Ω
Connector		SMA female

- Burst Input

Item	Specification
Input level	0/-1 V
Input impedance	50Ω (Nominal) to 0 V
Connector	SMA female

- Burst Output

Item	Specification
Input level	0/-1 V
Input impedance	50Ω to 0 V
Connector	SMA female

- Error Input

Item	Specification
Input level	0/-1 V
Input impedance	50Ω (Nominal) to 0 V
Connector	SMA female

- Trigger Output

Item	Specification
Output level	0/-1 V
Load impedance	50Ω to 0 V
Connector	SMA female

- General Specifications

Item	Specification
Operating environment range	+5°C to +40°C Relative humidity: 40% to 85% (Without condensation)
Storage environment range	-20°C to +70°C Relative humidity: 30% to 85% (Without condensation)
Power consumption	120 VA or below
Mass	6.0 kg or less

6.4 Error Detector Module (ED Module)

- Measurement

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Error rate</td><td>0.0000×10^{-17} to 1.0000×10^{-0}</td></tr>
<tr><td>Error count</td><td>0 to 4294967294 (Integral format)
0 to 9.9999×10^{16} (Exponential format)</td></tr>
<tr><td>Error interval (EI)</td><td>0 to 4294967294 (Integral format)
0.0000 to 100.0000% (Percentage format)</td></tr>
<tr><td>Error free interval (EFI)</td><td>0 to 4294967294 (Integral format)
0.0000 to 100.0000% (Percentage format)</td></tr>
<tr><td>Frequency measurement (Input clock)
Accuracy</td><td>10,000,000 Hz to 3,600,000,000 Hz

10 ppm ±1 kHz</td></tr>
<tr><td>Error performance</td><td>ES :Errored Seconds
EFS :Error Free Seconds
SES :Severely Errored Seconds
US :Unavailable Seconds
DM :Degraded Minutes</td></tr>
<tr><td>Threshold EI/EFI</td><td><table>
<tr><th></th><th colspan="7">Threshold</th></tr>
<tr><td>Average error rate per second</td><td>$> 10^{-3}$</td><td>$> 10^{-4}$</td><td>$> 10^{-5}$</td><td>$> 10^{-6}$</td><td>$> 10^{-7}$</td><td>$> 10^{-8}$</td><td>$\leq 10^{-8}$ *</td></tr>
</table>
*: When the error rate is 0, it is calculated as a threshold EFI.</td></tr>
<tr><td>B1 error (OPT71)</td><td>Available</td></tr>
</table>

- Measurement timer

Item		Specification
Timer mode	SINGLE	A measurement is forcibly terminated when the specified measurement time elapses after the measurement has been started.
	REPEAT	If the specified measurement time elapses after measurement has started, the next measurement starts as soon as the measurement already started terminates. Measurement continues until it is instructed to stop.
	UNTIMED	After a measurement has started, it continues until it is instructed to stop.
Timer measurement period		00 days 00 hours 00 minutes 01 seconds to 99 days 23 hours 59 minutes 59 seconds
Measurement interval time		0.1 or 1 sec
Measurement time base		±10 ppm (Supplied by the D3371 main unit)

- Error analysis (OPT 72)

Item	Specification
Number of recording iterations	1 to 131,071 [point(s)]
Result display format	Time-series display (list format), statistics display (list format)

- Auto search

Item	Specification
Target characteristics	The amount of delay, the input polarity of clock input and the threshold voltage of data input are adjusted automatically. For a PRBS pattern, the mark ratio and pattern length are set automatically. For a PROG or ZSUB pattern, the pattern polarity is set automatically.

- Synchronization

Item		Specification
Synchronization threshold	Mode	Automatic/Manual
	Manual setting range	PROG pattern: 10^{-n} (n = 2, 3, 4, 5, 6, 7, 8, 9, 10) PRBS pattern: 10^{-n} (n = 2, 3, 4, 5, 6, 7)
Automatic synchronization		Available
Re-synchronization (Manual)		Available

- Error detection

Item	Specification
Display mode	Omitting error (Omitting), Inserting error (Inserting), Total error Overhead error, Payload error, Total error (OPT71) Specific field error, Not specific field error, Total error

- Measurement mask

Item	Specification
Mask route	1 to 16 (Can be set to any value on a 1/16-bit route basis.)

- Received Patterns

Item	Specification
Frequency	10 MHz to 3.6 GHz

<table>
<tr><th colspan="2">Item</th><th>Specification</th></tr>
<tr><td rowspan="4">Pseudo random binary sequence (PRBS) pattern</td><td>Pattern length</td><td>Pattern length: $2^n - 1$ (n: 7, 9, 10, 11, 15, 23 or 31)</td></tr>
<tr><td>Number of steps, and generating function</td><td>
<table>
<tr><th>Number of steps</th><th>Generating polynomial</th><th>Reference standards (mark ratio setting)</th></tr>
<tr><td>7</td><td>X^7+X^6+1</td><td>ITU-T Recommendation V.29 (1/2)</td></tr>
<tr><td>9</td><td>X^9+X^5+1</td><td>ITU-T Recommendation V.52 (1/2)</td></tr>
<tr><td>10</td><td>$X^{10}+X^7+1$</td><td></td></tr>
<tr><td>11</td><td>$X^{11}+X^9+1$</td><td>ITU-T Recommendation 0.152 (1/2)</td></tr>
<tr><td>15</td><td>$X^{15}+X^{14}+1$</td><td>ITU-T Recommendation 0.151 ($\overline{1/2}$)</td></tr>
<tr><td>23</td><td>$X^{23}+X^{18}+1$</td><td>ITU-T Recommendation 0.151 ($\overline{1/2}$)</td></tr>
<tr><td>31</td><td>$X^{31}+X^{28}+1$</td><td></td></tr>
</table>
</td></tr>
<tr><td>Mark ratio (variable)</td><td>1/2,1/4,1/8,0/8,$\overline{1/2}$,3/4,7/8,8/8</td></tr>
<tr><td>AND bit shift number of mark ratio</td><td>1 bit</td></tr>
<tr><td rowspan="2">Programmable (PROG) pattern</td><td>Pattern length</td><td>1 bit to 8,388,608 (2^{23}) bits</td></tr>
<tr><td>Pattern length and setting resolution</td><td>
<table>
<tr><th>Pattern length range [bit(s)]</th><th>Setting resolution [bit(s)]</th></tr>
<tr><td>1 to 262,144</td><td>1</td></tr>
<tr><td>262,146 to 524,288</td><td>2</td></tr>
<tr><td>524,292 to 1,048,576</td><td>4</td></tr>
<tr><td>1,048,584 to 2,097,152</td><td>8</td></tr>
<tr><td>2,097,168 to 4,194,304</td><td>16</td></tr>
<tr><td>4,194,336 to 8,388,608</td><td>32</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th colspan="2">Item</th><th>Specification</th></tr>
<tr><td rowspan="2">Zero substitution (ZSUB) pattern</td><td>Pattern length</td><td>2^n (n: bit7, 9, 11 or 15)</td></tr>
<tr><td>Bit length of continuous zeros and setting resolution</td><td><table>
<tr><th>ZSUB pattern length</th><th>Continuous zero bit length</th><th>Setting resolution</th></tr>
<tr><td>2^7</td><td>7 to 127</td><td>1</td></tr>
<tr><td>2^9</td><td>9 to 511</td><td>1</td></tr>
<tr><td>2^10</td><td>10 to 1023</td><td>1</td></tr>
<tr><td>2^11</td><td>11 to 2047</td><td>1</td></tr>
<tr><td>2^15</td><td>15 to 32767</td><td>1</td></tr>
</table></td></tr>
<tr><td rowspan="5">STM frame (STM) patterns (OPT 71)</td><td>Frame structure</td><td>STM-4
STM-16</td></tr>
<tr><td>Number of frames</td><td>STM-4: 1 frame to 107 frames
STM-16: 1 frame to 26 frames</td></tr>
<tr><td>Payload types</td><td>A selection is made from the following patterns.
Programmable (PROG) pattern
Pseudo random binary sequence (PRBS) pattern</td></tr>
<tr><td>Scrambling</td><td>Can be provided.</td></tr>
<tr><td>B1 byte</td><td>Can be provided.</td></tr>
<tr><td rowspan="3">Flexible (FLEX) patterns (OPT 71)</td><td>Number of patterns</td><td>Programmable (PROG) pattern: 127 types
Pseudo random binary sequence (PRBS) pattern: 1 type</td></tr>
<tr><td>Pattern length</td><td>PROG: 128 to 65,536 bits (setting resolution: 64 bits)
PRBS: 128 to 2,097,152 bits (setting resolution: 64 bits)</td></tr>
<tr><td>Number of combined patterns</td><td>1 pattern to 1024 patterns</td></tr>
<tr><td colspan="2">Pattern logic</td><td>Can be logically inverted.</td></tr>
</table>

- Burst

Item	Specification
Mode	External (The burst input is available)

- Trigger

Item	Specification
Modes	Can be selected from 1/16 Clock, Pattern Phase (Fixed), Frame (OPT 71), Flexible (OPT 71).
Flexible (Option 71)	The Low level or the High level can be set for each pattern.

- AUX

Item	Specification
Mode	Make a selection from the following signals. Data type, Synchronized status
Data type	Outputs the High level at PRBS pattern and the Low level at Pro-gramable pattern.

- Clock Input

Item	Specification
Frequency	10 MHz to 3.6 GHz
Termination and Coupling	DC termination and AC coupling
Input amplitude range	0.3 V_{P-P} to 2 V_{P-P}
Input waveform	Sine wave or Rectangular wave (175 MHz to 3.6 GHz) Rectangular wave (10 MHz to 175 MHz)
Duty ratio	50% ±5%
Clock delay	±1 ns (setting resolution: 1 ps)
Input impedance	50Ω
Termination voltage (Variable)	to GND: 0V ECL(to -2V): -2.3V to -1.7V setting resolution: 50mV PECL(to +3V): +2.7V to +3.3V setting resolution: 50mV LVPECL(to +1.3V): +1V to +1.6V setting resolution: 50mV CML(to Vcc): 0V to 3.5V setting resolution: 50mV
Polarity	Can be inverted.
Connector	SMA female

- Data Input

Item	Specification
Frequency	10 MHz to 3.6 GHz
Mode	NRZ
Termination and Coupling	DC termination and AC coupling
Input amplitude range	0.3 V_{P-P} to 2 V_{P-P}
Threshold voltage	to GND: -2.040 V to +2.040 V setting resolution: 1mV ECL(to -2V): -1.850 V to -0.750 V setting resolution: 1mV PECL(to +3V): +3.150 to +4.250 V LVPECL(to +1.3V): +3.150 V to +4.250 V setting resolution: 1mV CML(to Vcc): Vcc-1.1 V to Vcc+0.1 V setting resolution: 1mV (Vcc: Termination voltage)
Termination voltage (Variable)	to GND: 0V ECL(to -2V): -2.3V to -1.7V setting resolution: 50mV PECL(to +3V): +2.7V to +3.3V setting resolution: 50mV LVPECL(to +1.3V): +1V to +1.6V setting resolution: 50mV CML(to Vcc): 0V to 3.5V setting resolution: 50mV
Input impedance	50Ω (Nominal)
Polarity	Can be inverted.
Connector	SMA female

- Burst Input

Item	Specification
Input level	0/-1 V
Input impedance	50Ω (Nominal) to 0 V
Connector	SMA female

- Error Output

Item	Specification
Output level	0/-1 V
Load impedance	50Ω to 0 V
Connector	SMA female

- Trigger Output

Item	Specification
Output level	0/-1 V
Load impedance	50Ω to 0 V
Connector	SMA female

- General Specifications

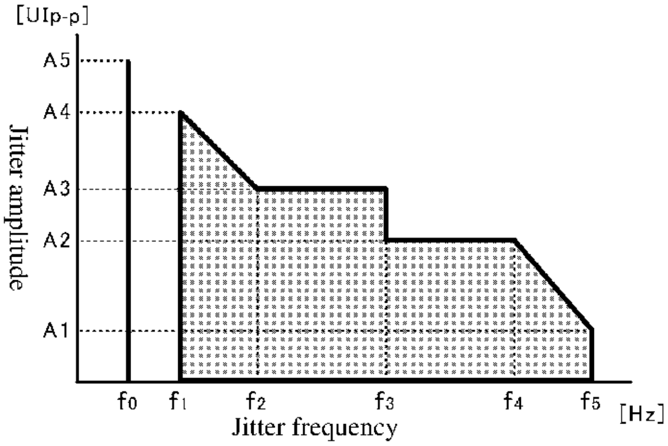
Item	Specification
Operating environment range	+5°C to +40°C Relative humidity: 40% to 85% (Without condensation)
Storage environment range	-20°C to +70°C Relative humidity: 30% to 85% (Without condensation)
Power consumption	90 VA or below
Mass	6 kg or less

6.5 Jitter Tolerance Option (OPT70)

- Jitter Generation

Item	Specification
Clock frequency range	10 MHz to 3200 MHz Band1: 800 MHz ≤ clock frequency ≤ 3200 MHz Band2: 175 MHz ≤ clock frequency < 800 MHz Band3: 10 MHz ≤ clock frequency < 175 MHz
Clock frequency setting resolution	1 kHz
Jitter frequency range	10 Hz to 20 MHz (Band1) 10 Hz to 5 MHz (Band2) 10 Hz to 2 MHz (Band3)
Jitter frequency setting resolution	10 Hz

Item	Specification
Jitter amplitude range	0 to 800UI_{P-P} (Band1, Band2) 0 to 200UI_{P-P} (Band3)
Jitter amplitude accuracy	A reference standard: ITU-T O.172



Band1 (800MHz ≤ clock frequency ≤ 3200MHz)					
Jitter frequency[Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 300k	20M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	800	500	50	20	0.3
Band2 (175MHz ≤ clock frequency < 800MHz)					
Jitter frequency[Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 125k	5M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	800	500	50	20	0.5
Band3 (10MHz ≤ clock frequency < 175MHz)					
Jitter frequency[Hz]	f_0	f_1	f_2 to f_3	f_3 to f_4	f_5
	10	20	200 to 5k	5k to 200k	2M
The maximum jitter amplitude [UI_{P-P}]	A5	A4	A3	A2	A1
	200	120	12	5	0.5

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Jitter amplitude setting resolution</td><td>
<table>
<tr><th></th><th>Jitter amplitude setting range</th><th>Setting Resolution</th></tr>
<tr><td rowspan="4">Band1
Band2</td><td>$0UI_{p-p}$ to $5UI_{p-p}$</td><td>$0.01UI_{p-p}$</td></tr>
<tr><td>$5UI_{p-p}$ to $50UI_{p-p}$</td><td>$0.1UI_{p-p}$</td></tr>
<tr><td>$50UI_{p-p}$ to $500UI_{p-p}$</td><td>$1UI_{p-p}$</td></tr>
<tr><td>$500UI_{p-p}$ to $800UI_{p-p}$</td><td>$2UI_{p-p}$</td></tr>
<tr><td rowspan="4">Band3</td><td>$0UI_{p-p}$ to $1UI_{p-p}$</td><td>$0.01UI_{p-p}$</td></tr>
<tr><td>$1UI_{p-p}$ to $10UI_{p-p}$</td><td>$0.1UI_{p-p}$</td></tr>
<tr><td>$10UI_{p-p}$ to $100UI_{p-p}$</td><td>$1UI_{p-p}$</td></tr>
<tr><td>$100UI_{p-p}$ to $200UI_{p-p}$</td><td>$2UI_{p-p}$</td></tr>
</table>
</td></tr>
</table>

- Jitter tolerance measurement

Item	Specification
Measurement mode	Make a selection from the following modes. Search mode: Jitter tolerance points are searched automatically. Sweep mode: Jitter tolerances at specified points are measured.

APPENDIX

A.1 Trouble Shooting

If a problem with the D3371 occurs, make the following checks before requesting repair. If you still cannot solve the problem, contact the nearest ADVANTEST Field Office or representative. Addresses and telephone numbers are provided at the end of this manual. There will be charges for any repairs, as indicated in the table.

Symptom	Suspected cause	Solution
There is no power.	The power switch or a circuit breaker has not been turned on.	Turn on the circuit breaker on the rear panel and the **POWER** switch on the front panel.
	The power cord has not been connected.	Turn off the **POWER** switch on the front panel and then connect the power cord to the AC power connector on the D3371. Next, connect the power cord to the outlet (refer to Section 1.5.4).
	The circuit breaker has tripped.	Check the circuit breaker (refer to Section 1.5.3). If the circuit breaker has tripped, an analyzer fault may have occurred. Contact the nearest ADVANTEST Field Office or representative to repair the D3371.
	The **POWER** switch was turned on and off too quickly.	Wait for at least 30 seconds before turning the **POWER** switch on and off.
The power is on, but the Advantest logo is not being displayed.	The BIOS settings are incorrect or the analyzer is faulty.	Contact the nearest ADVANTEST Field Office or representative to repair the D3371.
After the power has been turned on and the Advantest logo displayed, an error message is displayed and operation has stopped.	The backup lithium battery of the analyzer has reached the end of its life span.	Contact the nearest ADVANTEST Field Office or representative to repair the D3371.
The system startup screen has still not been displayed and five minutes have passed since the power was turned on.	A hard disk error has occurred or there is a problem with a Windows 98 system file.	Contact the nearest ADVANTEST Field Office or representative to repair the D3371.

Symptom	Suspected cause	Solution
Windows started in safe mode.	When the D3371 was turned off, the power was turned off without following the proper power-off procedure. Alternatively, Windows was not shut down properly.	If Windows has started in safe mode, select **[Start]-[Shut Down...]** and then **[Restart]** to restart Windows. If Windows still does not start normally, contact the nearest ADVANTEST Field Office or representative to repair the D3371.
When the D3371 was shut down, the **POWER** indicator did not go off even though the correct power-off procedure was used to turn off the power.	Windows was not shut down normally.	Wait five minutes, forcibly turn off the power with the **POWER** switch, and then turn the power back on (refer to Section 1.8.1). If the D3371 starts correctly, shut it down and turn off the power again.
The touch screen and panel keys do not operate.	GPIB remote control mode has been set.	If a program is being executed, stop the program and then press the LOCAL key.
Touch screen entry is out of position.	The touch screen calibration was not performed correctly.	Try to calibrate the touch panel (Refer to Section 2.4.6).
The panel key extended functions do not operate.	Another program is being executed or the Settings window or a dialog box is open.	If another program is being executed, stop the program. If the Settings window or a dialog box is being used, close the window or dialog box.
Data cannot be loaded from the floppy disk.	There is a problem with the floppy disk.	Use a different floppy disk to check operation.
	The disk drive is faulty.	Contact the nearest ADVANTEST Field Office or representative to repair the D3371.
Data cannot be saved to the floppy disk.	The floppy disk is write-protected.	Unlock the write protection.
	The floppy disk has not been formatted.	Format the floppy disk (refer to Section 2.7.3).
	The floppy disk does not have enough free space.	Use a different floppy disk.

A.2 SYSTEM RECOVERY

This section explains how to perform a system recovery.

The D3371 performs measurement functions using a Windows application run on Microsoft Windows 98. The system files necessary to operate the analyzer are stored on the C drive hard disk.

The D3371 may not work properly if one of the system files is corrupt. If this occurs, the contents of the C drive can be restored to the initial factory setup by using the System Recovery disk supplied with the D3371.

CAUTION:

1. ***The data on the C drive is totally erased when a recovery operation is performed. As a result, the files you created or saved on the C drive after you received the analyzer should be backed up on floppy disks or other media.***
2. ***Set the write protection tab to the write position before installing the recovery software.***
3. ***You are prompted to enter the product key that is written in the "Certificate of Authenticity" (in the Windows license) during a system restart after the recovery operation has been completed. You should know the product key before you start the recovery operation (refer to Section 1.3, "Accessories").***
4. ***The recovery operation for the analyzer cannot be performed if the disk partition information is corrupt or the disk drive is defective. If this happens, contact an ADVANTEST sales representative.***

NOTE: The contents of the files on the D drive, the user disk, are not changed or deleted by the recovery operation.

Starting recovery

1. Confirm that the power switch on the front panel is turned off.
2. Connect the supplied power cable to the AC power supply connector on the rear panel.
3. Insert the analyzer floppy disk into the drive with the label surface of the "System Recovery Disk 1" on the right side when the floppy disk is viewed from the front of the drive.
4. Turn on the power switch on the front panel.
   The drive indicator is turned on and the recovery software is loaded from the floppy disk.
   The message "Please Insert System Recovery Disk 2" is displayed.

   CAUTION: While the drive indicator is lit, do not press the Eject button because the floppy disk is in use.

5. Press the eject button on the floppy disk drive to remove System Recovery Disk 1.
6. Insert System Recovery Disk 2 into the floppy disk drive, and press the **ENTER** key.
   The recovery software starts.

Figure A-1 System Recovery Software Startup Screen

7. To continue the recovery operation, select the **[Continue]** button using the cursor keys (↑ ↓) and press **ENTER**.
   A dialog box used to confirm whether or not the recovery operation continues is displayed.

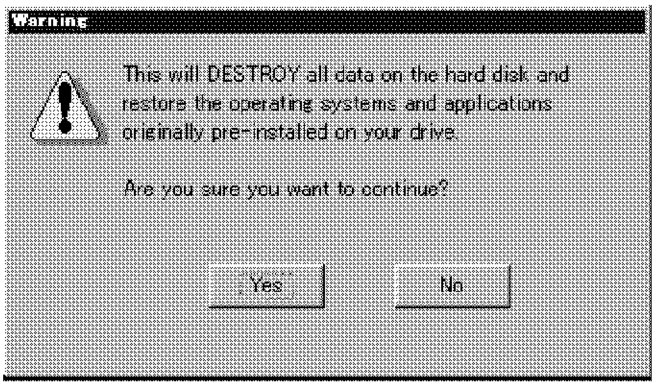


Figure A-2 Warning Dialog Box

8. To continue the recovery operation, select the **[Yes]** button using the cursor keys (← →) and press **ENTER**.

NOTE: If you have selected the continuation option, copying the target files for the recovery operation will begin now.

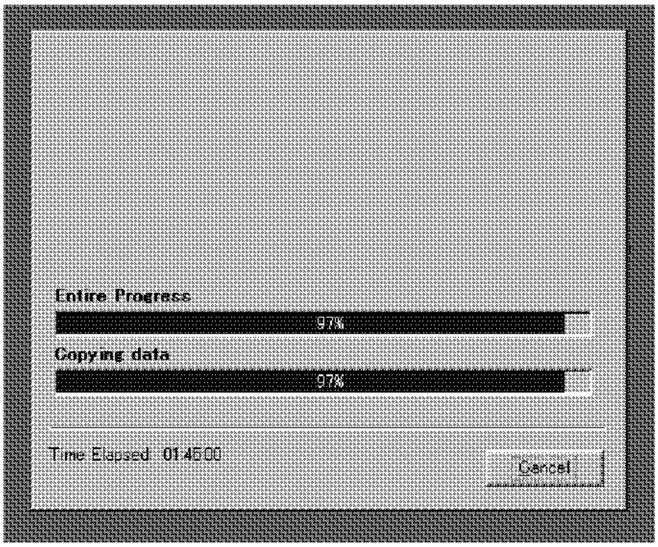


Figure A-3 Files Are Being Copied

The [Reboot] dialog box is displayed after all files have been copied.

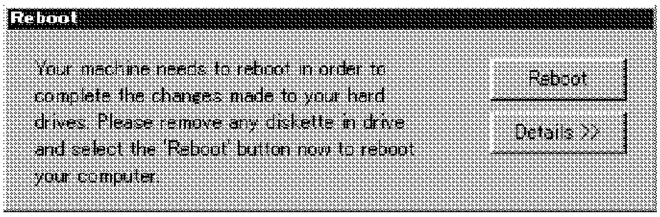


Figure A-4 Reboot Dialog Box

9. Press the Eject button on the floppy disk drive to remove the System Recovery disk 2.
10. Select **[Reboot]** using the cursors (↑ ↓), and press **ENTER** to restart the D3371.

The User Information window is displayed after the D3371 has been restarted and then Windows 98 Setup Wizard starts.

Figure A-5 User Information Window

11. Click the **[Next]** button to display the "License Agreement."

NOTE: Use the touch screen to operate Windows 98 Setup Wizard.

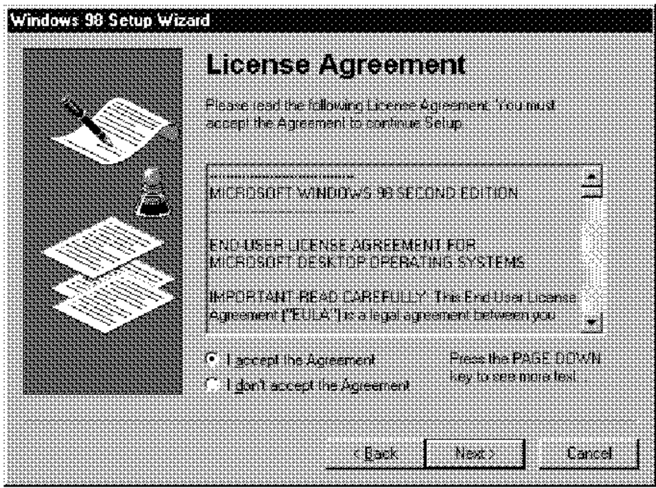


Figure A-6 License Agreement Window

12. If you accept the license agreement, click the **[I accept the Agreement]** option button. After you have accepted the license agreement, press the **[Next]** button to display the Windows Product Key window.

Figure A-7　Windows Product Key Window

13. Press the **[Help]** button.
    The [Product Key] dialog box is displayed.

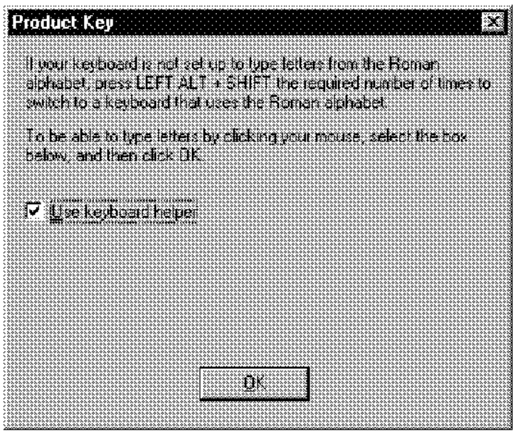


Figure A-8　Product Key Dialog Box

14. Click the **[User keyboard helper]** check box to set it, and press the **[OK]** button.

NOTE: ***Setting [Use keyboard helper] allows you to enter a product key through the touch screen.***

Figure A-9 Product Key Entry Window

15. Enter the product key shown in the Certificate of Authenticity (Window license) and click the **[Next]** button.
    The Wizard window is displayed.

Figure A-10 Start Wizard Window

16. Press the **[Finish]** button.
    The recovery operation finishes, and the D3371 application starts.

A.3 Messages

1. Status Bar Messages

- Status messages

Displayed character string	Display conditions
Auto Search is running…	Auto Search is being performed.
Measurement is running	Measurement is being performed.
Jitter Tolerance is running	The indication is given while jitter tolerance measurement is under way.
Jitter Tolerance … Fail.	This message is displayed when the Jitter Tolerance measurement could not be performed.
Auto Search … Not found.	The optimum measurement value cannot be found.
Auto Search … Fail.	Displayed if Auto Search cannot be continued because an error (e.g., clock loss, ED Delay Trouble) has been detected during Auto Search.
Delay (blinking)	Blinks during delay line operation.

- Progress messages

Operation	Explanation
Auto Search is being performed.	The search progress is displayed.
Jitter tolerance measurement is being performed.	States of jitter tolerance measurement are indicated.
Basic measurement is being performed.	While the measurement is being performed, partial results of the measurements are displayed. Nothing is displayed, however, if untimed has been set for the measurement timer mode.

2. Warning messages

Error information	Explanation
SSG PLL Unlock	The PLL circuit of the SSG module has been unlocked.
PPG Delay Trouble	The delay line used to adjust the amount of the PPG module clock delay does not operate normally. *
PPG Clock Loss	The clock has not been input to the PPG module.
ED Delay Trouble	The delay line of the ED module did not operate normally. *

*: When this error message is displayed, the clock delay setting has been disabled. In this case, turn the power off, wait at least 30 seconds and then turn the power on again. If this error message occurs frequently however, there is a possibility that some kind of delay line failure is occurring, or that delay line is at the end of its life cycle. (For more information, refer to Section 1.13, "Replacing Parts with Limited Life."

A.4 Explanation of Terms

Bit Count

The bit count is the number of input bits within the measurement time.

Error Count

The error count is the number of error bits within the measurement time.

Immediate Error Count

The immediate error count indicates the number of error bits within the measurement interval.

Error Rate

The error rate is calculated using the formula below from the number of input bits and number of error bits since the measurement started.

$$\text{Error rate} = \frac{\text{Number of error bits}}{\text{Number of input bits (number of input pulses)}}$$

Immediate Error Rate

The immediate error rate is the error rate calculated from the number of input bits and number of error bits within the measurement interval.

Error Intervals

The number of error intervals is the number of intervals that include error bits within the measurement interval. The error interval rate is calculated using the formula below.

$$\text{Error interval rate} = \frac{\text{Number of error intervals}}{\text{Number of measurement intervals}} \times 100(\%)$$

Error Free Intervals

The number of error-free intervals is the number of intervals that do not include error bits within the measurement interval. The error-free interval rate is calculated using the formula below.

$$\text{Error-free interval rate} = \frac{\text{Number of error-free intervals}}{\text{Number of measurement intervals}} \times 100(\%)$$

Threshold EI Count (See Table A-1.)

The threshold EI count is the number of intervals for which the average error rate per interval satisfies the threshold.

Threshold EI Rate (See Table A-1.)

$$\text{Threshold EI rate} = \frac{\text{Threshold EI count}}{\text{Number of measurement intervals}} \times 100(\%)$$

Threshold EFI Count (See Table A-1.)

The threshold EFI count is the number of intervals for which the average error rate per interval does not satisfy the threshold.

Threshold EFI Rate (See Table A-1.)

$$\text{Threshold EFI rate} = \frac{\text{Threshold EFI count}}{\text{Number of measurement intervals}} \times 100(\%)$$

Table A-1 Threshold Range

	Threshold						
Average error rate per second	$> 10^{-3}$	$> 10^{-4}$	$> 10^{-5}$	$> 10^{-6}$	$> 10^{-7}$	$> 10^{-8}$	$\leq 10^{-8}$ *

*: When the error rate is 0, it is calculated as a threshold EFI.

Clock Loss Intervals

The clock loss intervals are the number of intervals in which clock loss occurred.

Sync Loss Intervals

The sync loss intervals are the number of intervals in which sync loss occurred.

Error Performance

Error performance evaluates transmission lines that conform to ITU-T G.821, where one second from the start of measurement to the stop of measurement is one interval. The table below lists the items that are measured by error performance.

Measurement item	Explanation
Error Seconds	Number of intervals in which error bits occurred during the operating time
Error Free Seconds	Number of intervals in which error bits did not occur during the operating time
Severely Errored Seconds	Number of intervals in which error bits exceeding the unavailable threshold occurred during the operating time
Unavailable Seconds	Unavailable time
Degraded Minutes	Number of packets for which the error rate exceeded the DM threshold (A packet consists of 60 intervals.)

As listed in the table below, two types of error rates can be selected for Severely Errored Seconds, Unavailable Seconds, and Degraded Minutes.

Severely Errored Seconds and Unavailable Seconds	Degraded Minutes
1×10^{-3}	1×10^{-6}
1×10^{-4}	1×10^{-8}

Omitting Error

An omitting error (1→0) occurs when logical 0 is entered for an expected value of logical 1.

Inserting Error

An inserting error (0→1) occurs when logical 1 is entered for an expected value of logical 0.

The table below shows the relationship between the logic values and input levels.

Input polarity	Input level	Logic value
Positive logic normal	High	“1”
	Low	“0”
Negative logic inverse	High	“0”
	Low	“1”

A.5 Example of Measurement Result Printout

Here, examples of prints provided when the **[Print]** button is clicked in the measurement screen are described.

1. The following is an example of printed basic measurement results.

ADVANTEST D3371 3.6G Transmission Analyzer

Basic Measurement

Start: 2000/12/21 02:17:37 Stop: 2000/12/21 02:19:37

Basic Results

Results	Omitting	Inserting	Total
Bit Count	1.3759E+11	1.4608E+11	2.8367E+11
Error Rate	0.0000E−11	1.3518E−06	6.9610E−07
Error Count	0.0000E+00	1.9746E+05	1.9746E+05
Immediate Error Rate	0.0000E−09	1.9417E−06	9.9987E−07
Immediate Error Count	0.0000E+00	2.4880E+03	2.4880E+03
Error Intervals	0.0000%	66.6667%	66.6667%
Error Free Intervals	95.0000%	28.3333%	28.3333%
Frequency			2,488,322,560
Clock Loss Intervals			0
Sync Loss Intervals			6

Threshold Results

Threshold	Threshold EI	Threshold EFI
> 1E − 3	0.0000%	95.0000%
> 1E − 4	0.0000%	95.0000%
> 1E − 5	0.0000%	95.0000%
> 1E − 6	20.8333%	74.1667%
> 1E − 7	66.6667%	28.3333%
> 1E − 8	66.6667%	28.3333%
<= 1E − 8	0.0000%	28.3333%

Error Performance

Performance	Total
Error Se conds	71.6667%
Error Free Seconds	28.3333%
Severely Errored Seconds	0.0000%
Unavailable Seconds	0.0000%
Degraded Minutes	0.0000%

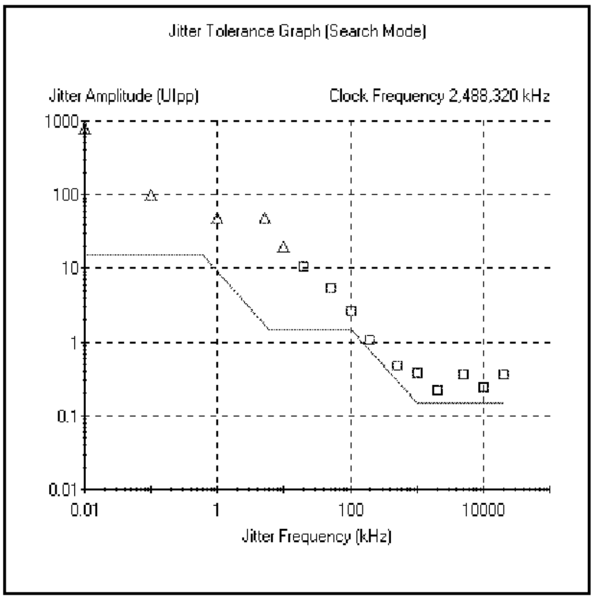
B1 Error

Results	Total
Bit Count	2.8367E+11
Error Rate	6.9610E−07
Error Count	1.9746E+05

2. The following is an example of printed jitter tolerance measurement results.

ADVANTEST D3371 3.6G Transmission Analyzer
Jitter Tolerance Measurement
Start Time: 2001/10/10 11:04:00

Jitter Tolerance Graph



Measurement Data

Frequency [kHz]	Amplitude [UIpp]	Result
0.010	> 800.00	OK
0.100	> 100.00	OK
1.000	> 50.00	OK
5.000	> 50.00	OK
10.000	> 20.00	OK
20.000	10.500	OK
50.000	5.500	OK
100.000	2.670	OK
200.000	1.080	OK
500.000	0.480	OK
1,000.000	0.380	OK
2,000.000	0.220	OK
5,000.000	0.360	OK
10,000.000	0.240	OK
20,000.000	0.370	OK

A.6 Data Files

1. An example: Basic Measurement Log(*.txt)

ADVANTEST D3371 3.6G Transmission Analyzer
Basic Measurement

Start	2000/12/21	02:17:37
Stop	2000/12/21	02:19:37

[Basic Items]

Results	Omitting	Inserting	Total
Bit Count	1.4545E+11	1.4544E+11	2.9088E+11
Error Rate	2.7005E-05	2.7005E-05	2.7005E-05
Error Count	3.9278E+06	3.9275E+06	7.8553E+06
Immediate Error Rate	0.0000E-08	0.0000E-08	0.0000E-08
Immediate Error Count	0.0000E+00	0.0000E+00	0.0000E+00
Error Intervals	11.7500%	11.7500%	11.9167%
Error Free Intervals	85.6667%	85.6667%	85.5000%
Frequency			2488321824
Clock Loss Intervals			0
Sync Loss Intervals			31

[Threshold EI & EFI]

Threshold	ThresholdEI	ThresholdEFI
>1E-3	0.0000%	97.4167%
>1E-4	2.6667%	94.7500%
>1E-5	3.9167%	93.5000%
>1E-6	6.8333%	90.5833%
>1E-7	11.0000%	86.4167%
>1E-8	11.5833%	85.8333%
<=1E-8	0.3333%	85.5000%

[Error Performance]

Results	Total
Error Seconds	19.1667%
Error Free Seconds	80.8333%
Severely Errored Seconds	0.0000%
Unavailable Seconds	0.0000%
Degraded Minutes	50.0000%

[Sync & Clock Loss History]

Date	Time	Sync	Clock
2000/12/21	02:18:07	Loss	
2000/12/21	02:18:10	Recovery	

[Measurement Data History]

Date	Time	Immediate Error Rate	Immediate Error Count	Error Intervals	Error Free Intervals	Frequency
2000/12/21	02:17:37	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321856
2000/12/21	02:17:38	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321792
2000/12/21	02:17:39	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321792
2000/12/21	02:17:40	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321824
2000/12/21	02:17:41	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321792
2000/12/21	02:17:42	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321792
2000/12/21	02:17:43	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321792
2000/12/21	02:17:44	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321856
2000/12/21	02:17:45	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321792
2000/12/21	02:17:46	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321792
2000/12/21	02:17:47	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321792
2000/12/21	02:17:48	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321856
2000/12/21	02:17:49	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321792
2000/12/21	02:17:50	0.0000E-08	0.0000E+00	0.0000%	100.0000%	2488321792
2000/12/21	02:17:51	0.0000E-08	0.0000E+00	0.7092%	99.2908%	2488321856
2000/12/21	02:17:52	0.0000E-08	0.0000E+00	0.6623%	99.3377%	2488321792
2000/12/21	02:17:53	0.0000E-08	0.0000E+00	0.6211%	99.3789%	2488321792
2000/12/21	02:17:54	0.0000E-08	0.0000E+00	0.5848%	99.4152%	2488321824
2000/12/21	02:17:55	0.0000E-08	0.0000E+00	0.5525%	99.4475%	2488321792
2000/12/21	02:17:56	0.0000E-08	0.0000E+00	0.5236%	99.4764%	2488321792
2000/12/21	02:17:57	0.0000E-08	0.0000E+00	0.4975%	99.5025%	2488321856
2000/12/21	02:17:58	0.0000E-08	0.0000E+00	0.9479%	99.0521%	2488321792
2000/12/21	02:17:59	0.0000E-08	0.0000E+00	0.9050%	99.0950%	2488321792
2000/12/21	02:18:00	0.0000E-08	0.0000E+00	0.8658%	99.1342%	2488321824
2000/12/21	02:18:01	0.0000E-08	0.0000E+00	0.8299%	99.1701%	2488321792
2000/12/21	02:18:02	0.0000E-08	0.0000E+00	0.7968%	99.2032%	2488321792
2000/12/21	02:18:03	0.0000E-08	0.0000E+00	0.7663%	99.2337%	2488321856
2000/12/21	02:18:04	0.0000E-08	0.0000E+00	0.7380%	99.2620%	2488321792
2000/12/21	02:18:05	0.0000E-08	0.0000E+00	0.7117%	99.2883%	2488321792
2000/12/21	02:18:06	0.0000E-08	0.0000E+00	0.6873%	99.3127%	2488321856
2000/12/21	02:18:07	-----	-----	-----	-----	1222180096
2000/12/21	02:18:08	-----	-----	-----	-----	453660416
2000/12/21	02:18:09	-----	-----	-----	-----	453699392
2000/12/21	02:18:10	0.0000E-08	0.0000E+00	0.6042%	90.0302%	1786665440
2000/12/21	02:18:11	0.0000E-08	0.0000E+00	0.5865%	90.3226%	2488321792
2000/12/21	02:18:12	0.0000E-08	0.0000E+00	0.5698%	90.5983%	2488321824

:
:
Omitted
:
:

2000/12/21	02:19:26	0.0000E-08	0.0000E+00	13.1072%	84.0513%	2488321824
2000/12/21	02:19:27	0.0000E-08	0.0000E+00	12.9882%	84.1962%	2488321792
2000/12/21	02:19:28	0.0000E-08	0.0000E+00	12.8713%	84.3384%	2488321824
2000/12/21	02:19:29	0.0000E-08	0.0000E+00	12.7565%	84.4781%	2488321856
2000/12/21	02:19:30	0.0000E-08	0.0000E+00	12.6437%	84.6154%	2488321792
2000/12/21	02:19:31	0.0000E-08	0.0000E+00	12.5329%	84.7502%	2488321824
2000/12/21	02:19:32	0.0000E-08	0.0000E+00	12.4240%	84.8827%	2488321856
2000/12/21	02:19:33	0.0000E-08	0.0000E+00	12.3170%	85.0129%	2488321760
2000/12/21	02:19:34	0.0000E-08	0.0000E+00	12.2118%	85.1409%	2488321856
2000/12/21	02:19:35	0.0000E-08	0.0000E+00	12.1084%	85.2667%	2488321824
2000/12/21	02:19:36	0.0000E-08	0.0000E+00	12.0067%	85.3904%	2488321792
2000/12/21	02:19:37	0.0000E-08	0.0000E+00	11.9167%	85.5000%	2488321824

2. An example: Error Phase Analysis Time Series (*.txt)

```
ADVANTEST D3371 3.6G Transmission Analyzer
Error Phase Analysis
Start        2001/10/18    19:05:56

Format                     Time Series
Pattern Type                   PROG

CN -- Cycle No.
A -- Address[bit]
P -- Pattern[Hex]
EB -- Error Bit[Hex]

    CN          A          P               EB
000001  0000896  A9062113          00000002
000002  0000896  A9062113          00000002
000003  0000896  A9062113          00000002
000004  0000640  9220C7AC          02000000
000004  0000896  A9062113          00000002
000005  0000032  007C001F          00080000
000005  0000672  706444F9          00000080
000005  0000896  A9062113          00000002
000006  0000608  38825A51          00000200
000006  0000640  9220C7AC          02000000
```

3. An example: Error Phase Analysis Time Series (*.txt)

```
ADVANTEST D3371 3.6G Transmission Analyzer
Error Phase Analysis
Start        2001/10/18    19:10:44

Format                          Time Series
Pattern Type                         ZSUB11

CN -- Cycle No.
A -- Address[bit]
P -- Pattern[Hex]
EB -- Error Bit[Hex]

    CN          A          P                EB
000001  0001568  0925B66D        00200000
000002  0001568  0925B66D        00200000
000003  0000096  1448AD43        00080000
000003  0000960  4128B14E        00200000
000003  0001568  0925B66D        00200000
000004  0000096  1448AD43        00080000
000004  0001568  0925B66D        00200000
000005  0000032  42A901A0        00010000
000005  0000096  1448AD43        00080000
000005  0000960  4128B14E        00200000
```

4. An example: Error Phase Analysis Time Series (*.txt)

```
ADVANTEST D3371 3.6G Transmission Analyzer
Error Phase Analysis
Start        2001/10/18    19:17:12

Format                          Time Series
Pattern Type                         STM-4

CN -- Cycle No.
FN -- Frame No.
R -- Row
C -- Column[byte]
P -- Pattern[Hex]
EB -- Error Bit[Hex]

    CN    FN       R          C          P            EB
000001   001       6       0241   A95D65F6      01000000
000001   001       6       0365   7BB300A9      00000001
000001   001       6       0557   300A95D6      00001000
000001   001       6       0601   8B93C226      00000004
000001   001       6       0621   00A95D65      00010000
000001   001       6       0653   02A57597      00040000
000001   001       6       0685   0A95D65F      00100000
000001   001       6       0717   2A57597D      00400000
000001   001       6       0749   A95D65F6      01000000
000001   001       6       0781   A57597DA      04000000
```

5. An example: Error Phase Analysis Time Series (*.txt)

```
ADVANTEST D3371 3.6G Transmission Analyzer
Error Phase Analysis
Start      2001/10/18      19:22:15

Format                          Time Series
Pattern Type                           FLEX

CN -- Cycle No.
I -- Index
A -- Address[bit]
P -- Pattern[Hex]
EB -- Error Bit[Hex]

    CN      I          A          P              EB
000001  0003    1588672  ABF81061        80000000
000002  0003    0646816  3E87126D        40000000
000003  0003    1383936  C0830A3C        00400000
000004  0003    1529568  459D4FA1        00400000
000005  0003    1427584  36B7B1A5        00080000
000006  0003    2096352  8936B7B1        00000800
000007  0003    0658592  36B7B1A5        00080000
000007  0003    1014176  438936B7        00000008
000008  0003    1030816  38936B7B        00000080
000009  0003    1892512  8936B7B1        00000800
```

6. An example: Error Phase Analysis Statistics (*.txt)

```
ADVANTEST D3371 3.6G Transmission Analyzer
Error Phase Analysis
Start       2001/10/18      19:05:56

Format                          Statistics
Pattern Type                         PROG
Total Measured Bits           14057493504
Pattern Length[bit]                  1024

A -- Address[bit]
BEC -- Bit Error Count

      A      BEC
0000012 000001
0000041 000011
0000043 000001
0000044 000027
0000045 000011
0000059 000012
0000062 000022
0000063 000006
0000066 000001
0000080 000020
0000081 000006
```

7. An example: Error Phase Analysis Statistics (*.txt)

```
ADVANTEST D3371 3.6G Transmission Analyzer
Error Phase Analysis
Start       2001/10/18     19:10:44

Format                           Statistics
Pattern Type                         ZSUB11
Total Measured Bits             17814455232
Pattern Length[bit]                    2048

A -- Address[bit]
BEC -- Bit Error Count

      A     BEC
0000011  000003
0000020  000003
0000029  000001
0000038  000003
0000047  000012
0000058  000011
0000080  000003
0000099  000001
0000108  000015
0000119  000006
```

8. An example: Error Phase Analysis Statistics (*.txt)

```
ADVANTEST D3371 3.6G Transmission Analyzer
Error Phase Analysis
Start       2001/10/18     19:17:12

Format                              Statistics
Pattern Type                          STM-4
Total Measured Bits            18849153344
Pattern Length[bit]                   77760

FN -- Frame No.
R -- Row
C -- Column[byte]
B -- Bit
BEC -- Bit Error Count

 FN       R             C      B           BEC
001       1          0037      8        000001
001       1          0038      2        000002
001       1          0039      5        000003
001       1          0039      8        000002
001       1          0040      6        000001
001       1          0041      1        000003
001       1          0041      3        000002
001       1          0041      4        000002
001       1          0042      5        000001
001       1          0043      1        000003
001       1          0044      3        000003
001       1          0044      6        000002
001       1          0044      8        000002
```

9. An example: Error Phase Analysis Statistics (*.txt)

```
ADVANTEST D3371 3.6G Transmission Analyzer
Error Phase Analysis
Start      2001/10/18      19:22:15

Format                              Statistics
Pattern Type                              FLEX
Total Measured Bits           204668316288
Pattern Length[bit]                2097408

I -- Index
A -- Address[bit]
BEC -- Bit Error Count

   I              A       BEC
0003      0000020    000001
0003      0000038    000001
0003      0000044    000001
0003      0000060    000001
0003      0000108    000001
0003      0000132    000001
0003      0000141    000001
0003      0000168    000001
0003      0000236    000001
0003      0000300    000001
0003      0000308    000001
0003      0000314    000001
0003      0000316    000001
```

10. An example: Jitter Tolerance Text Data (*.txt)

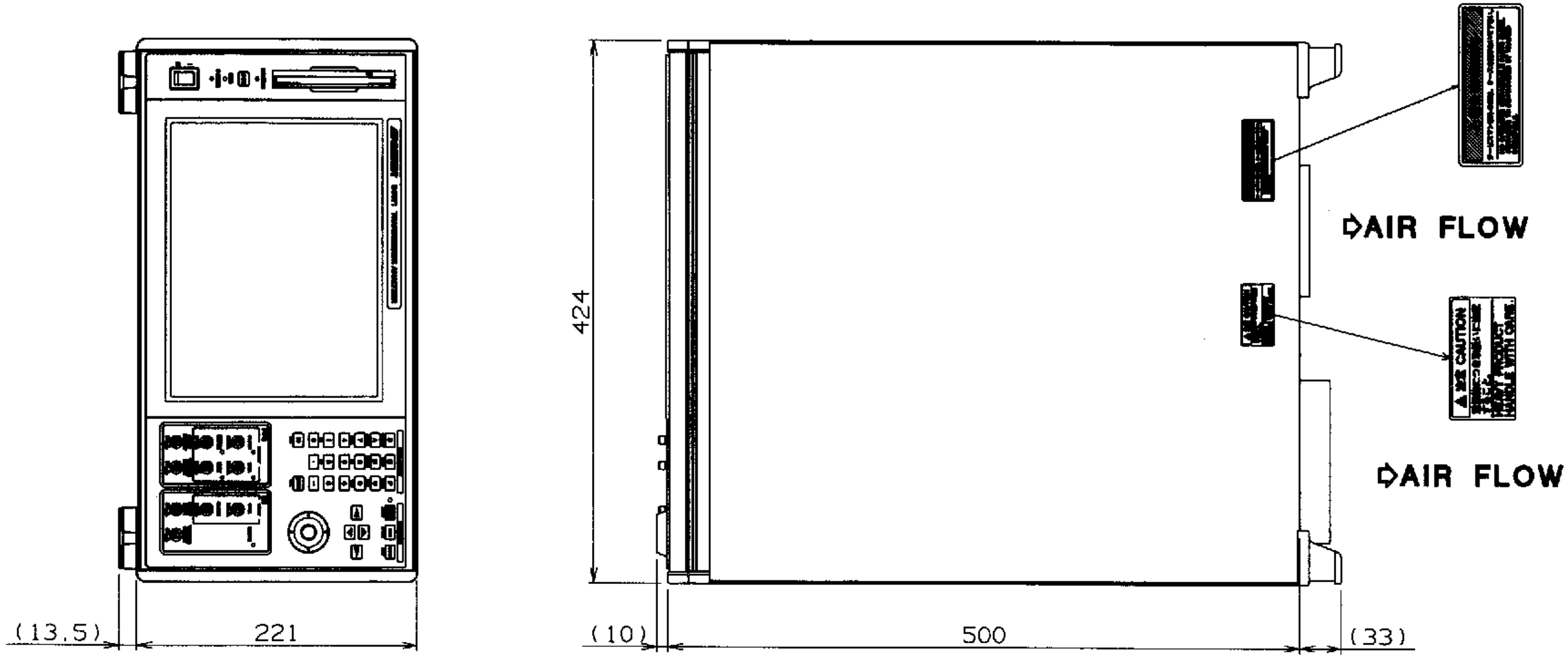
```
ADVANTEST D3371 3.6G Transmission Analyzer
Jitter Tolerance Measurement
Start         2001/10/22 14:47:40

Measurement Mode          Search Mode
Clock Frequency[kHz]      2488320

[Measurement Data]
Frequency[Hz]     Status       Amplitude[UIpp] Result
          10        >            800.00         -----
         100        >            100.00         -----
        1000        >             50.00         -----
        5000        >             50.00          OK
       10000        >             20.00          OK
       20000        >             20.00          OK
       50000        >             20.00          OK
      100000        >             20.00          OK
      200000        >             20.00          OK
      500000        >             20.00          OK
     1000000        >             10.00          OK
     2000000        >              5.00          OK
     5000000        >              2.00          OK
    10000000        >              1.00          OK
    20000000        >              0.50          OK
```

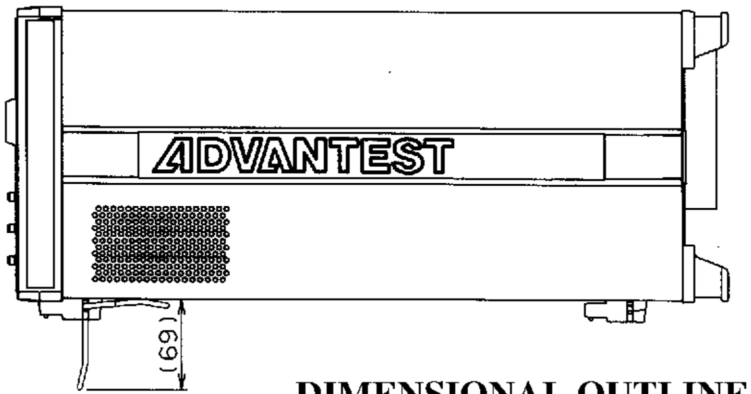
11. An example: Jitter Tolerance Text Data (*.txt)

```
ADVANTEST D3371 3.6G Transmission Analyzer
Jitter Tolerance Measurement
Start        2001/10/10 11:08:13

Measurement Mode          Sweep Mode
Clock Frequency[kHz]      2488320

[Measurement Data]
Frequency[Hz] Status Amplitude[UIpp]Result
      10                          800.00      O
      10                          166.00      O
      10                           34.60      O
      10                            7.20      O
      10                            1.50      O
     100                          100.00      O
     100                           35.00      O
     100                           12.20      O
     100                            4.29      O
     100                            1.50      O
    1000                           50.00      O
    1000                           20.80      O
    1000                            8.70      O
    1000                            3.60      O
    1000                            1.50      O
    5000                           50.00      O
    5000                           20.80      O
    5000                            8.70      O
    5000                            3.60      O
    5000                            1.50      O
   10000                           20.00      O
   10000                           10.50      O
   10000                            5.50      O
   10000                            2.87      O
   10000                            1.50      O
   20000                           20.00      FAIL
   20000                           10.50      O
   20000                            5.50      O
   20000                            2.87      O
   20000                            1.50      O
```

500000	20.00	FAIL
500000	12.50	FAIL
500000	7.90	FAIL
500000	4.93	FAIL
500000	3.09	FAIL
500000	1.94	FAIL
500000	1.22	FAIL
500000	0.76	FAIL
500000	0.48	O
500000	0.30	O
1000000	10.00	FAIL
1000000	6.30	FAIL
1000000	3.93	FAIL
1000000	2.47	FAIL
1000000	1.55	FAIL
1000000	0.97	FAIL
1000000	0.61	FAIL
1000000	0.38	O
1000000	0.24	O
1000000	0.15	O
2000000	5.00	FAIL
2000000	3.39	FAIL
2000000	2.29	FAIL
2000000	1.55	FAIL
2000000	1.05	FAIL
2000000	0.71	FAIL
2000000	0.48	FAIL
2000000	0.33	X
2000000	0.22	O
2000000	0.15	O
5000000	2.00	FAIL
5000000	1.50	FAIL
5000000	1.12	FAIL
5000000	0.84	FAIL
5000000	0.63	FAIL
5000000	0.47	X
5000000	0.36	O
5000000	0.27	O
5000000	0.20	O
5000000	0.15	O
10000000	1.00	FAIL
10000000	0.62	FAIL
10000000	0.39	O
10000000	0.24	O

20000000	0.50	X
20000000	0.37	O
20000000	0.27	O
20000000	0.20	O
20000000	0.15	O





Unit : mm

CAUTION

This drawing shows external dimensions of this instrument.

The difference in products and options used can cause a change in the appearance of the instrument.

DIMENSIONAL OUTLINE DRAWING

ALPHABETICAL INDEX

[Symbol]

[Numerics]

[A]

[B]

[C]

[Q]

[R]

[S]

[T]

[U]

[V]

[W]

[X]

[Y]

[Z]

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Advantest's maintenance agreement provides the Purchaser on-site and off-site maintenance, parts, maintenance machinery, regular inspections, and telephone support and will last a maximum of ten years from the date the delivery of the Product. For specific details of the services provided under the maintenance agreement, please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest 's sales representatives.

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