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Programmer Manual

Tektronix

packetBERT 200
DC-200 Mb/s Bit Error Rate Tester

070-9966-00

This document applies to firmware version 2.0 and above.

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any equipment connected to it.

Only Tektronix-trained personnel should perform maintenance and service procedures on the PB200. Never remove the covers or disassemble the unit without confirmation from a Tektronix factory authorized representative.

Safety Instructions

⚠ **WARNING! Read and Follow all of these Safety Instructions.**
Failure to do so can cause injury to the user and damage the instrument.

AC Power

The instrument is designed to be powered from 90-125 or 220-240 VAC; 300 VA max. Voltage switching is automatic. There is no voltage switch.

Ground the Instrument

The PB200 is grounded through its AC power cord. Plug this power cord only into a properly grounded, three-conductor outlet. If you operate the instrument without a proper ground, then should there be a fault in the instrument, there is a potential that all metal surfaces on the instrument can become a potential shock hazard.

Use the Proper Fuse

Operating the instrument with an improper fuse creates a fire hazard. The correct fuses to install in the PB200 are shown below:

Power Voltage	Fuse Type
115 VAC	5 A T, 250 V
230 VAC	2.5 A T, 250 V

"T" indicates a Slo-blo fuse.

Do Not Operate in an Explosive Atmosphere

The PB200 does not provide protection from static discharges or arcing components and therefore must not be operated in an explosive atmosphere.

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Do Not Remove Instrument Covers

To avoid a shock hazard and to maintain proper air flow, never operate the PB200 with any of its outside covers removed. There is a plastic front cover that protects the front panel while the test equipment is not in use. This plastic cover must be removed in order to access the controls on the front panel of the PB200.

Safety Terms and Symbols

Paragraphs or sections in this document that contain important safety information will be identified by either a WARNING or a CAUTION label in the left hand margin. These labels are explained below:

Icon	Label	Meaning
⚠	**WARNING!**	Indicates a safety practice that must be followed to avoid **possible injury** to the user and possible damage to the instrument.
⚠	**CAUTION!**	Indicates a safety practice that must be followed to prevent **possible damage** to the PB200 or other instruments used with the PB200.

Product Labels

These terms may appear on the product:

A yellow label indicates DANGER of an injury hazard immediately accessible as you read the marking.

A WARNING label indicates an injury hazard not immediately accessible as you read the marking.

CAUTION: indicates a hazard to propriety including the product.

Product Symbols

The following symbols may appear on the product:

YELLOW LABEL	
Indicates DANGER	Indicates ATTENTION Refer to Manual

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Preface

This manual describes how to use the remote programming commands with the Tektronix PB200 Test Set. This product is also known by the name packetBERT 200.

Related Manuals

The following document is also available for the PB200:

- The *PB200 DC-200 Mb/s Bit Error Rate Tester User Manual* (Tektronix part number 070-9396-xx) is the primary source of information about how to use the PB200.

Certifications and Compliances

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Getting Started

This chapter describes the use of the **PB200 DC-200 Mb/s Bit Error Rate Tester** Remote Interfaces. Since the remote interfaces enable automatic testing, the user does not have to complete any of the manual procedures necessary for front panel operation. However, the user can write programs to conduct the test sessions.

Using the GPIB Interface

The PB200 supports remote control through the GPIB interface bus connector on the rear panel. The unit can be operated from the front panel and over the remote interface simultaneously. All of the front panel functions can be controlled over the GPIB interface, except `POWER.'

Remote commands sent to the PB200 differ from front panel control. The current operating mode is entered directly rather than through submenus.

GPIB Interface Device Settings

For proper GPIB Interface communication and handshaking, the GPIB controller (system that controls the operation) and the device (PB200) must have their addresses and terminating characters set up before use.

Each instrument on the GPIB interface bus needs a unique INSTRUMENT address. The INSTRUMENT address range for the PB200 is 0 - 30 decimals. The GPIB Message Terminator is set to either EOI or EOL/LF. For EOI, the EOI line will be asserted when the last byte of a message is transmitted. For EOI/LF, the last byte of the message will be the line feed character, and the EOI line will be asserted with its transmission.

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Interface Functions

The PB200 is configured as a talker/listener. No controller functions are implemented. As described in the IEEE-488 standards, the PB200 supports the following implementation:

SH1	Complete source handshake
AH1	Complete acceptor handshake
T6	Basic talker; serial poll, no talk only, unaddressed if addressed to listen, no extended talker
L4	Basic listener, no listen only, unaddressed if addressed to talk, no extended listener
SR1	Complete service request
RL1	Complete remote/ local capability including local lockout
PP0	No parellel poll capability
DC1	Complete device clear capability
DT0	No device trigger capability
C0	No controller capability
E2	Tri-state drivers used on DI0 lines for maximum data transfer rate

GPIB Connector Pin-Outs

The PB200 uses the standard D-type 24 pin GPIB connector located on the rear panel. All signals and pins conform to the standard GPIB pin out protocol.

Programming GPIB Remote Commands

There are two types of remote commands for the PB200:

- Set commands (commands)
- Queries commands (queries

The set commands force the PB200 to take a specific action. The query commands direct the PB200 to return status information. The controller sends commands to the PB200 as strings terminated at EOI or EOI/LF characters. These command lines can contain either a single command or multiple commands. The command line may contain both queries and commands. Each individual command within the command line must be separated by semi-colons (;), parameters must be separated by comma (,). Hexadecimal parameters must be preceded by a '#H'.

Each query command sent to the PB200 will return one response. The response may contain multiple response units (separated by semi-colons), however only one EOI/LF response termination is sent by the PB200 to the controller for each query command. The PB200 responses commands will be either character mnemonics (for example, INT or EXT) or numerics (Example: 200.0).

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GPIB Numeric Responses

When responding with a numeric, the receiver specifies it as one of the following types:

<NR1 Numeric>:	decimal integer
<NR2 Numeric>:	decimal real number without exponent
<NR3 Numeric>:	decimal real number with exponent
<Non-decimal Numeric>:	non-decimal number with leading #H (Hex), #Q (Octal), #B (Binary) and always in the range of 0 to 255 decimal (for example, #H55)

GPIB Status Reporting

There is a status reporting function provided for the GPIB interface, which is based on the SRQ (Service Request) and is defined in the ANSI/IEEE standard 488.2-1987. The implementation used by PB200 for status reporting includes one additional register from what is specified within the IEEE-488.2 standard.

Status Byte

There is a status byte which is used to define the SRQ status. The individual bits within the status byte represent the different conditions which might cause the request for service defined as follows:

Bits 1 to 3	Unused	
Bit 4	(TSB) Test Event Status Bit	This is a summary of Test Event Status Byte. It will be set whenever an enabled Test event condition occurs
Bit 5	(MAV) Message Available Bit	Set whenever there is output available for the controller
Bit 6	(ESB) Standard Event Status Bit	This is the summary of the Standard Event Status Byte. It will be set whenever an enabled standard event condition occurs
Bit 7	(MSS) Master Summary Status Bit	This is the Master Summary Status. It is a summary of the status byte, so that whenever one of the bits (TSB, MAV or ESB) is set and it is also enabled (by the Service Request Enable byte), the MSS bit will set
Bit 8	Unused	

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Service Request Enable

Different conditions for a service request can be individually enabled. The Service Request Enable byte contains the enabling bits for the status byte. For a service request to occur, either the MAV or ESB bit must be enabled. Each time the PB200 is powered on, this byte is RESET so that no bits are enabled. The bit definition is the same as the status byte, except bit 7 is undefined.

Service Request (SRQ)

The status byte enables the creation of a service request. Whenever a condition requiring service from the controller occurs and is enabled, the SRQ line is set. It is reset after the controller finishes a serial poll of the PB200 receiver, or when all of the enabled service request conditions have stopped.

Standard Event Status Register

The ESB bit is the summary of the Standard Event Status Register. This byte has an enabling byte similar to the Status Byte. Individual bits within the Standard Event Status Register represent the different possible causes of a Standard Event. The bit definitions for the Standard Event Status Register are as follows:

Bit 1	Operation Complete	Only set following an *OPC command
Bit 2	Request Control	Not Used
Bit 3	Query Error	Set under the following conditions: • when output has been requested from the PB200 and none is available • when a command is sent to the PB200 and PB200 still has a message available • when output has been requested from the PB200 and an unterminated command has been set to the PB200
Bit 4	Device Dependent Error	Set under the following conditions: • when input data is lost over the interface • when the input buffer overflows due to a too-long command line without a terminator
Bit 5	Execution Error	Set under the following conditions: when a command parameter is out of range when the command has too many or too few parameters when the command cannot be properly executed due to a device condition
Bit 6	Command Error	Set whenever the PB200 receives an unrecognized command, or invalid GPIB command
Bit 7	User Request	Not used
Bit 8	Power On	Set whenever the PB200 is powered on

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Standard Event Status Enable Register

Different conditions within the Standard Event Status Register can be individually enabled or disabled. The Standard Event Status Enable Register contains enabling bits. Each time one of the event conditions or one of the enabling bits change, the status of the ESB bit is re-evaluated. If any status bit is set and its corresponding enable bit is set, the ESB bit is set also.

Each time the PB200 is powered on, this byte is reset so that no bits are enabled. The bit definition for the Standard Event Status Enable Register is the same as it is for the Standard Event Status Register.

Test Status Event Register

The TSB bit is the summary of the Test Status Event Register. This byte has an enabling byte which works in a similar manner to the above Status Byte. The individual bits within the Test Status Event Register represent the different conditions which might cause a Test Event. The bit definitions for the Test Status Event Register are as follows.

Bit 1	End-of Window condition	Set at the end of each window period
Bit 2	End-of-Test condition	Set at the end of each Test
Bit 3	Threshold Error condition	Set whenever Test is running and Errored Second occurs, where error rate is above Test Error Rate Threshold
Bit 4	Synchronization Loss condition	Set whenever SYNC LOSS occurs
Bit 5	Phase Error condition	Set whenever a Phase Error occurs
Bit 6	Auto Synchronization complete	Set whenever AUTO SEARCH locks on a Data Pattern
Bit 7	Eye Width Measurement	Set whenever EYE WIDTH completed a measurement or is aborted
Bit 8	Pattern Download Complete	Set whenever the data patterns are copied from internal storage to the hardware RAM (this has nothing to do with diskette access)

Test Status Event Enable Register

The different conditions within the Test Status Event Register can be individually enabled and disabled. The Test Status Event Enable Register contains enabling bits. Each time one of the event conditions or one of the enabling bits change, the status of the TSB bit is re-evaluated. If any status bit is set and its corresponding enable bit is set, the TSB bit will set. Each time the PB200 is powered on, this byte is reset so that no bits are enabled. The bit definition for the Test Status Event Enable Register is the same as for the Test Status Event Register.

GPIB Common Commands

The following commands are provided to use with GPIB status reporting, as defined by IEEE 488.2 for service request:

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*STB? *SRE *SRE? *ESR? *ESE *ESE? *CLS

Additional SRQ GPIB Commands

The following commands are provided to use with the Test Status SRQ feature:

TSE TSE? TSR?

IEEE-488.2 Programming Manual Requirements

Certain programming requirements are specified for GPIB interfaces by the American National Standard Institute (ANSI) document, ANSI/IEEE Std. 488.2-1987, which are detailed in this section.

Power-on settings

The PB200 will restore the device settings to their same values from when it was last powered off. No remote commands affect this. The only exception to this is when the non-volatile RAM becomes corrupted (which should never happen during normal operation). RAM corruption, if it occurs, will be displayed on the unit's LCD display. When this happens, the PB200 will revert to its factory-default settings.

Message Exchange

The message exchange options are as follows:

- The input buffer is command line oriented. There is a new input buffer for each command line or program message. The maximum input buffer length is 80 characters.
- The only remote commands that return more than one response message unit are: *lrn?, meas_all?, meas_agg?.
- All queries immediately generate their own response messages when parsed. No queries wait until the responses are read for them to be generated.
- No commands are coupled.

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Functional Elements

The IEEE 488.2 standard requires a list of the functional elements which are used by the PB200 receiver. These are the functional elements used in constructing the remote commands that control the receiver. For more information, see the IEEE 488.2 standard, sections 4.3, 7.1.1, and 7.3.3. From Tables 4.2 and 4.3 of the IEEE 488.2 standard, the receiver does the following:

< program message>	< program message terminator>
< program message unit>	<program message unit separator>
<command message unit>	<query message unit>
< command program header>*	< query program header>*
< program header separator>	< program data separator>
< program data>	< decimal numeric program data>
< character program data>	<non-decimal numeric program data>

* <compound command program header> and <compound query program header> are not handled.

Specific Command Implementations

The reset command "*rst" performs a device reset. As defined in the IEEE 488.2, it will:

- reset the device settings to default settings
- Macros are not implemented in the PB200, thus macros are ignored
- force the receiver into Operation Complete Command Idle State (OCIS) and Operation Complete Query Idle State (OQIS)

Self Test Query

This tests the receiver's basic functionality. The scope of the self test function is limited.

Overlapped vs. Sequential Commands

All commands are sequential commands.

Operation Complete Message

All command actions are immediate (no overlapped commands), such that operation complete is immediate.

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Using the RS-232 Interface Option

The PB200 supports remote control through the RS-232C connector on the rear panel The unit can be operated from the front panel and over the remote interface simultaneously. Any unit changes made remotely are displayed on the front panel. All of the front panel functions can be controlled over the RS-232C interface, except "POWER."

The remote commands sent to the PB200 differ from front panel - the current operating mode is entered directly rather than through sub-menus.

RS-232 Interface Device Settings

The RS-232C interface device settings are programmable through the front panel. The following RS-232C parameters are programmable, along with the default setting and other values.

Parameter	Default	Values
Baud, BPS rate	9600	4800, 2400, 1200, 600, 300
Parity	Even	None, Odd
Data Size	7	8
Stop Bits	1	2
Echo	ON	OFF
XON/XOFF	OFF	ON
EOL	CR/LF	LF/CR, CR, LF

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RS-232 Interface Hardware/ Handshaking Considerations

The remote interface consists of a 25-pin male D-type connector on the rear panel. When using the RS-232C interface, connect the controller to the PB200 with an appropriate 25-pin cable. The PB200 is configured as an RS-232C DCE (Data Circuit terminating Equipment). For a local (direct) connection to a DTE device (most RS-232C controllers), connect the controller to the PB200 with a straight (non-null modem) cable. To connect to another DCE device, you need a null modem to cross-connect signal pairs 2 & 3, 4 & 5, and 6 & 20.

Refer to the following table for RS-232C signal names, pinouts, and functional descriptions.

Pin	Name	Function
1	DCD	Data Carrier Detect
2	RxD	Received Data Input
3	TxD	Transmitted Data Output
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	RI	Ring Indicator

RS-232 Interface Testing

To test that the RS-232C interface is properly connected, attach a standard 25-pin D-type connector cable between the RS-232C rear panel connector and the controller, with the PB200 turned off. Turn on the PB200. The following message should appear on the RS-232C controller's screen, followed by the PB200>.

**** PB200 RECEIVER VX.X

PB200>

NOTE: V X.X indicates the unit's software version . The "PB200>" line is a prompt message indicating that the PB200 is ready to accept a command.

If the message does not appear, check the following:

The cable may be defective.

The controller may be configured as DCE equipment. A null modem may be needed.

The controller signal format or BAUD rate may not match the PB200's settings. Refer to the first part of this section for interface setting

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Programming RS-232C Remote Commands

There are two types of remote commands for the PB200:

- Set commands (commands)
- Queries commands (queries

The set commands force the PB200 to take a specific action. The query commands direct the PB200 to return status information.

Commands are entered one line at a time. Errors may be corrected while entering a line, with the backspace key. A command string is terminated by a carriage return, which transmits the string to the PB200 and executes the command string. All valid commands are executed. Incorrect or unsupported commands are responded to by an error message. RS-232C error messages follow after this section.

These command lines can contain either a single command or multiple commands. The command line may contain both queries and commands. Each individual command within the command line must be separated by semi-colons (;), parameters must be separated by comma (,). Non-decimal numeric parameters, Hexadecimal, Octal, and Binary must be preceded by a '#H', '#Q', or '#B', respectively. The entire command name does not have to be completely entered for the command to be recognized as valid. There is a minimum valid length associated with each command, which is the length that makes it unique from all other commands.

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RS-232C Error Messages

All RS-232C remote commands received by the PB200 are checked for command validity and appropriate parameters. All valid command strings are executed. Incorrect command strings are responded to with error messages

Error Message	Error
"*** Input Lost"	Input data lost over interface
"*** Input Buffer Overflow"	Input buffer overflow, command line too long without terminator
"*** Command Mnemonic Not Found"	Command not found
"*** Invalid Command for Interface"	Command found, but not valid for this interface
"*** Invalid Command Type"	Command mnemonic found, but command issued incorrectly: missing, or added, "?" on end of command
"*** Too Few Parameters"	Missing parameter
"*** Too Many Parameters"	Too many parameters or trainling garbage at end of command
"*** Invalid Parameters"	Parameter invalid
"*** Parameter Out of Range"	Parameter out of range
"*** Parameter Not in Set"	Parameter not one of the values specified for the command
"*** Invalid String Length"	Parameter string too long
"*** Parameter Separator"	Parameter separator, ';', is missing or command line is terminated following separator
"*** Invalid Non-decimal Parameter"	Parameter not in non-decimal format
"*** Command Execution Error"	Command not executed properly
"*** Out of Memory"	Processor out of memory

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Remote Commands

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Syntax and Commands

Listed after each command is the command format, a brief description, valid parameters, an example, and system responses (to queries).

The commands are separated into eight functional groups and are listed in the following table.

Group	Function	Begins on page
Common Commands	IEEE-488 specified common commands	2-3
Miscellaneous Commands	Miscellaneous commands	2-7
Generator Control Commands	Clock Frequency, Clock and Data Outputs, Error Inject, Pattern Sync commands	2-15
Analyzer Control Commands	Clock and Data Inputs and Sync commands	2-23
Pattern Commands	Data Patterns Controls, Pattern Transfer, and Pattern Edit commands	2-31
Auto Search Commands	Auto Search Status and Control commands	2-40
Eye Width Commands	Eye Width and Extrapolation Status, Control and Measurement commands	2-48
Measurement Commands	Error Control, Status, Measurement Control and Measurement Result commands	2-58
Test Control and Measurement Commands	Test Control and Measurement Commands	2-71
Alphabetical list of all commands		2-84

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Command Descriptions

This chapter contains information on the commands used in remote operation.

The unit does not require entry of the full command name. For any command, it is only necessary to enter the characters that make it unique. For example, pat_a ROM would suffice for pattern_active ROM.

For each command, the chapter gives the command format, a brief description, valid parameters, an example, and system responses (to queries). The following example shows this format in use for the view_angle and view-angle? commands.

view_angle [n]

ACTION: Sets the front panel display view angle to [n], where [n] is an integer from 0 to 15.

EXAMPLE:

view_angle 2

---

view_angle?

ACTION: Returns the current display view angle (from 0 to 15).

RESPONSE: <NR1 Numeric>

EXAMPLE:

view_angle?

VIEW_ANGLE 2

NOTE:All parameters specified within brackets [ ] must be entered exactly as shown. However, do not enclose them in brackets when entering commands.

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IEEE-488 Common Commands

***cls**

ACTION:

Clears the Status Registers. *cls is a mnemonic for Clear Status.

EXAMPLE:

*cls

***ese [n]**

ACTION: Sets the Standard Event Status Enable Register to [n], where n is an integer from 0 to 255.

EXAMPLE:

*ese 255

***ese?**

ACTION: Returns the current contents of the Standard Event Status Enable Register.

RESPONSE: <NR1 NUMERIC>

EXAMPLE:

*ese?

ESE 255

***esr?**

ACTION: Returns the current contents of the Standard Event Status Register.

RESPONSE: <NR1 NUMERIC>

EXAMPLE:

*esr?

ESR 255

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***idn?**

ACTION: Returns the PB200 identification.

RESPONSE: Manufacturer, Model, Software Version.

EXAMPLE:

```
*idn?
Tektronix, Inc./ MWL, packetBERT 200, 0, 2.0
```

***lrn?**

ACTION: Returns the current device setup as a series of message units that can be sent back to the transmitter so it can be restored.

RESPONSE: Sequence of response messages

EXAMPLE:

```
*lrn?
CHAN_MON 1
CLOCK_DELAY 0
CLOCK_TRUE TRUE
ERR_INJ_RATE OFF
Tx_CLOCK_IN DIRECT
Tx_CLOCK_IN_PS PS_4
Tx_CLOCK_IN_TERM AC
VIEW_ANGLE 3
```

***opc**

ACTION: Sets the Operation Complete message in the Standard Event Status Register immediately (all device operations complete immediately).

*opc is a mnemonic for Operation Complete.

EXAMPLE:

```
*opc
```


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---

***opc?**

ACTION: Immediately returns the integer "1", which indicates operation complete.

RESPONSE: <NR1 NUMERIC>

EXAMPLE:

*opc?

1

***rst**

ACTION: Resets the device to the default configuration. Refer to Default Factory Settings in the PB200 user manual appendix.

EXAMPLE:

*rst

***sre [n]**

ACTION: Sets the Service Request Enable Register to [n], where n is 0 to 255.

EXAMPLE:

*sre 255

***sre?**

ACTION: Returns the current contents of the Service Request Enable Register, where bit 6 is ignored.

RESPONSE: <NR1 NUMERIC>

EXAMPLE:

*sre?

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***stb?**

ACTION: Returns the status of the Status Byte, where bit 6 is the Master Summary Status bit.

RESPONSE: <NR1 NUMERIC>

EXAMPLE:

```
*stb?
96
```

***tst?**

ACTION: Returns the self-test result. The scope of the test is limited. A response of `0' indicates that the self-test completed successfully.

RESPONSE: <NR1 NUMERIC>

EXAMPLE:

```
*tst?
0
```

***wai**

ACTION: Stops the processing of all remote commands until all operations are complete (which is immediately, see *opc). The *wai is a mnemonic for Wait to Continue.

EXAMPLE:

```
*wai
```

NOTE: All IEEE-488 Common Commands queries do not return the header in their response. See HEADER? for more information.

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Miscellaneous Commands

CONTRAST [n]

ACTION: Controls the display contrast of the flat panel LCD display on the front of the PB200.

n: 0 to 9

EXAMPLE: contrast 5

CONTRAST?

ACTION: Returns the current LCD display contrast.

RESPONSE: <NR1 Numeric>

EXAMPLE: contrast?

CONTRAST 6

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---

gpib_address [n]

ACTION: Sets the GPIB address to [n]: 0 to 30 (allowed by RS-232 interface only.)

EXAMPLE:

gpib_address 15

---

gpib_address?

ACTION: When operating remotely with an RS-232C interface, tells the current GPIB address: 0 to 30. (allowed by RS-232 interface only)

RESPONSE: <NR1 NUMERIC>

EXAMPLE:

gpib_address?

GPIB_ADDRESS 15

---

gpib_bus [talk_listen, off_bus]

ACTION: Sets the PB200 GPIB Bus Control. When set to OFF_BUS, it will not communicate with the GPIB bus. (allowed by RS-232 interface only)

talk_listen: Communicates over bus

off_bus : No GPIB Communication

EXAMPLE:

gpib_bus talk_listen

---

gpib_bus?

ACTION: Returns the current GPIB Bus control status

RESPONSE: TALK_LISTEN or OFF_BUS (allowed by RS-232 interface only)

EXAMPLE:

gpib_bus?

GPIB_BUS OFF_BUS

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header [on, off]

ACTION: Sets the remote command header status:

ON Response includes the command name

OFF Response excludes the command name

EXAMPLE:

header on

---

header?

ACTION: Returns the header status.

RESPONSE: ON or OFF

EXAMPLE1 (ASSUME HEADER IS ON):

header?

HEADER ON

EXAMPLE2 (ASSUME HEADER IS OFF):

header?

OFF

ID_OPTIONS? [n]

ACTION: Returns all of the options for the passed module, specified by 'n'. For the correlation between 'n' and the modules, see the System ID query (id_system?).

RESPONSE: <NR1 Numeric>, Option text mnemonics

EXAMPLE: id_options? 0

0 , NONE

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---

ID_SERIAL? [n]

ACTION: Returns the serial number for the passed module, specified by 'n'. For the correlation between 'n' and the modules, see the System ID query (id_system?).

RESPONSE: <NR1 Numeric> , <String Response>

EXAMPLE: id_serial? 0

0 , "12345678"

ID_SYSTEM?

ACTION: Returns all of the modules within the unit. For each module, there will be a text description of each module. The correlation between the descriptions and modules is as follows:

Number	Module
0	Unit Model (Ex: PB200)
1	Module 1
3	Module 3
4	Module 4
5	Module 5
6	Module 6
7	Module 7
8	Front Panel
9	Mother Board

RESPONSE: 10 sets of <NR1 Numeric> , <String Response>

EXAMPLE: id_system?

"PB200",

"PB200 PLL/AMP",

"PB200 DATAGEN",

"PB200 ERR/INAMP",

"", "", "", "", "PB200 PANEL",

"PB200 MOTHER BD"

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---

ID_VERSION? [n]

ACTION: Returns the revision number for the passed module, specified by 'n'. For the correlation between 'n' and the modules, see the System ID query (id_system?).

RESPONSE: <NR1 Numeric> , <String Response>

EXAMPLE: id_version? 0

id_version 0 , "1.0"

---

logo?

ACTION: Returns the transceiver logo when operating remotely through an RS-232C interface.

EXAMPLE: logo?

Tektronix, Inc./MWL packetBERT-200, 2.0

REM_DEBUG [on,off]

ACTION: Controls the Debug feature for displaying the remote commands to the PB200 display.

OFF - Normal remote processing.

ON - All of the received remote commands and the formatted responses will be displayed on the PB200 display. This is intended to assist in the development of remote control software.

EXAMPLE: rem_debug on

REM_DEBUG?

ACTION: Returns the current Remote Debug mode.

RESPONSE: ON or OFF

EXAMPLE: rem_debug?

REM_DEBUG OFF

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---

PRINT_REM [LPT1, RS232, GPIB]

ACTION: Selects the print destination
LPT1: Print to the lpt1 device.
RS232: Print to the RS232 device.
GPIB: Print to GPIB.
EXAMPLE: PRINT_REM LPT1

PRINT_REM?

ACTION: Returns the current print destination.
RESPONSE: LPT1, RS232, or GPIB
EXAMPLE: print_rem?
PRINT_REM LPT1

---

rs_echo [ON or OFF]

ACTION: Sets the RS-232C echo mode status:
On: the unit echoes all RS-232C input.
Off: the unit does not echo any RS-232C input.
EXAMPLE: rs_echo on

---

rs_echo?

ACTION: Returns the RS-232C echo mode status.
RESPONSE: ON or OFF.
EXAMPLE: rs_echo?
RS_ECHO OFF

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---

rs_pmt_lf [on, off]

ACTION: Sets the RS-232C prompt (OAH) line-feed status:

On : Line-Feed (OAH) sent after RS-232 prompt.

Off: Line-Feed (OAH) not sent.

EXAMPLE:

rs_pmt_lf on

---

rs_pmt_lf?

ACTION: Returns the RS-232C prompt line-feed status.

RESPONSE: ON or OFF

EXAMPLE:

rs_pmt_lf?

RS_PMT_LF OFF

---

rs_prompt["s"]

ACTION: This command sets the prompt on the RS-232 port to the character string contained in the quoted string s. This string will appear at the start of each new line on a terminal display.

Argument s: <string>, a character string inside double quotes

EXAMPLE:

rs_prompt "PB200>"

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rs_xon_xoff [on, off]

ACTION: Sets the RS-232C protocol status:

on: Enables the XON/XOFF protocol.

off: Disables the XON/XOFF protocol.

EXAMPLE:

```
rs_xon_off  on
```

---

rx_xon_xoff?

ACTION: Returns the RS-232 protocol

RESPONSE: ON or OFF

EXAMPLE:

```
rs_xon_xoff?
 RS_XON_XOFF  OFF
```


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Generator Control Commands

The Generator Control commands are separated into three sub-groups and are listed in the following table.

Group	Function	Begins on page
Clock Frequency Commands	Clock Frequency, External Clock, Clock Gapping and Clock Jitter commands	2-15
Signal Output Commands	Clock, Data and Sync Output commands	2-18
Error Inject Commands	Error Rate control commands	2-22

Clock Frequency Commands

CLOCK_FREQ [n]

ACTION: Controls the current clock frequency.

n: 1 to 205000000 Hz, in steps of 1 Hz

EXAMPLE: clock_freq 51840000

CLOCK_FREQ?

ACTION: Returns the current clock frequency.

RESPONSE: <NR3 Numeric>

EXAMPLE: clock_freq?

CLOCK_FREQ 205000000

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EXTCLK_SRCE [on,off]

ACTION: Controls the use of the External Clock Source input on the front panel.

ON This disables all use of internal clock source (clock_freq) and external reference source (extref_srce), and enables generator external clock input.

OFF The internal clock source will be used (clock_freq).

EXAMPLE: extclk_srce on

EXTCLK_SRCE?

ACTION: Returns the current Generator External Clock Source mode.

RESPONSE: ON or OFF

EXAMPLE: extclk_srce?
EXTCLK_SRCE OFF

EXTCLK_TERM [gnd, neg_2v, pos_3v, ac]

ACTION: Controls the Generator External Clock input termination.

GND	Sets the external clock input termination to ground.
NEG_2V	Sets the external clock input termination to -2V (ECL).
POS_3V	Sets the external clock input termination to +3V (PECL).
AC	Sets the external clock input termination to AC.

EXAMPLE: extclk_term ac

EXTCLK_TERM?

ACTION: Returns the Generator External Clock input termination.

RESPONSE; GND , NEG_2V , POS_3V or AC

EXAMPLE: extclk_term?
EXTCLK_TERM NEG_2V

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EXTCLK_THRES [n]

ACTION: Controls the Generator External Clock input threshold voltage. The following is the full range of levels:

n: -2.00 to 5.00V, in 10mV steps

EXAMPLE: extclk_thres 1.30

EXTCLK_THRES?

ACTION: Returns the external clock input thresh voltage.

RESPONSE: <NR3 Numeric>

EXAMPLE: extclk_thres?

EXTCLK_THRES 55E-2

EXTCLKDISABLE [on,off]

ACTION: Controls the use of the EXT CLOCK DISABLE input on the back panel.

ON: Enables signal applied to BNC connector to gate generator clock.

OFF: This disables the signal

EXAMPLE: extclkdisabl on

EXTCLKDISBL?

ACTION: Returns the current EXT CLOCK DISABLE mode.

RESPONSE: ON or OFF.

OFF: This disables the signal.

EXAMPLE: extclkdisabl?

EXTCLKDISABL OFF

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Signal Output Commands

CLOCK_AMPL [n]

ACTION: Controls the Clock Amplitude.

n: 0.50 to 2.00 V, in 10mV steps

EXAMPLE: clock_ampl 1.25

CLOCK_AMPL?

ACTION: Returns the Clock Amplitude.

RESPONSE: <NR3 Numeric>

EXAMPLE: clock_ampl?

CLOCK_AMPL 125E-2

CLOCK_OFFSET [n]

ACTION: Controls the Clock Offset.

n: -2.00 to 1.80 V, in 10mV steps

EXAMPLE: clock_offset -1.00

CLOCK_OFFSET?

ACTION: Returns the Clock Offset.

RESPONSE: <NR3 Numeric>

EXAMPLE: clock_offset?

CLOCK_OFFSET -100E-2

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---

DATA_AMPL [n]

ACTION: Controls the Data Amplitude.

n: 0.50 to 2.00 V, in 10mV steps

EXAMPLE: data_ampl 1.25

DATA_AMPL?

ACTION: Returns the Data Amplitude.

RESPONSE: <NR3 Numeric>

EXAMPLE: data_ampl?

DATA_AMPL 125E-2

DATA_OFFSET [n]

ACTION: Controls the Data Offset.

n: -2.00 to 1.80 V, in 10mV steps

EXAMPLE: data_offset -1.00

DATA_OFFSET?

ACTION: Returns the Data Offset.

RESPONSE: <NR3 Numeric>

EXAMPLE: data_offset?

DATA_OFFSET -100E-2

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---

GEN_DATA_POL [normal,invert]

ACTION: Controls the generator data output polarity.

NORMAL - The generator will output the data as is.

INVERT - The generator will invert each data bit before transmitting the data.

EXAMPLE: gen_data_pol invert

GEN_DATA_POL?

ACTION: Returns the generator data output polarity.

RESPONSE: NORMAL or INVERT

EXAMPLE: gen_data_pol?
GEN_DATA_POL INVERT

OUTPUT_DELAY [n]

ACTION: Controls the generator output delay. This delays the data output signals.

n: -1.00 to 1.00 nS, in 20pS steps

EXAMPLE: output_delay 20E-11

OUTPUT_DELAY?

ACTION: Returns the generator output delay.

RESPONSE: <NR3 Numeric>

EXAMPLE: output_delay?
OUTPUT_DELAY 42E-11

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PATT_SYNC [mux,pyld,oh]

ACTION Controls the Pattern Sync output on the front panel.

MUX	Pattern Sync output will correspond to output MUX data pattern.
PYLD	Pattern Sync output will correspond to output Payload data pattern.
OH	Pattern Sync output will correspond to output Overhead data pattern.

EXAMPLE: patt_sync oh

PATT_SYNC?

ACTION: Returns the Pattern Sync output mode.

RESPONSE: MUX , PYLD or OH

EXAMPLE: patt_sync?
PATT_SYNC MUX

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Error Inject Commands

ERROR_RATE [off, rate_3, rate_4, rate_5, rate_6, rate_7, ext]

ACTION: Controls the error injection rate into the output data pattern.

OFF	Turns the error injection rate off.
RATE_3	Injects errors at 1E-3.
RATE_4	Injects errors at 1E-4.
RATE_5	Injects errors at 1E-5.
RATE_6	Injects errors at 1E-6.
RATE_7	Injects errors at 1E-7.
EXT	Injects errors according to rear panel external error inject input.

EXAMPLE: error_rate rate_6

ERROR_RATE?

ACTION: Returns the current error inject rate.

RESPONSE: OFF, RATE_3, RATE_4, RATE_5, RATE_6, RATE_7 or EXT

EXAMPLE: error_rate?

ERROR_RATE EXT

ERROR_SINGLE

ACTION: Generates a single bit error. This is disabled if error rate generation is enabled.

EXAMPLE: error_single

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Analyzer Control Commands

AN_DATA_POL [normal,invert]

ACTION: Controls the analyzer data input polarity.

NORMAL - The analyzer will use the data as is.

INVERT - The analyzer will invert each data bit before processing the data.

EXAMPLE: an_data_pol invert

AN_DATA_POL?

ACTION: Returns the analyzer data input polarity.

RESPONSE: NORMAL or INVERT

EXAMPLE: an_data_pol?

AN_DATA_POL INVERT

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---

CLOCK_INPUT [single,diff]

ACTION: Controls input mode for analyzer front panel clock connectors.

SINGLE	Sets the analyzer to use the front panel CLOCK connector when the Analyzer clock source is external. (Single-Ended)
DIFF	Sets the analyzer to use front panel CLOCK and CLOCK BAR connectors when analyzer clock source is external. (Differential)

EXAMPLE: clock_input single

CLOCK_INPUT?

ACTION: Returns the current analyzer clock input mode.

RESPONSE: SINGLE or DIFF

EXAMPLE: clock_input?

CLOCK_INPUT DIFF

CLOCK_SOURCE [int,ext]

ACTION: Sets the analyzer clock source:

INT	Controls analyzer to use internal clock directly from generator.
EXT	Controls analyzer to use external clock received through front panel connector.

EXAMPLE: clock_source ext

CLOCK_SOURCE?

ACTION: Returns the analyzer clock source mode.

RESPONSE: INT or EXT

EXAMPLE: clock_source?

CLOCK_SOURCE EXT

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CLOCK_TERM [gnd, neg_2v, pos_3v, ac]

ACTION: Controls the analyzer clock input termination.

GND	Sets the analyzer clock input termination to ground.
NEG_2V	Sets the analyzer clock input termination to -2V (ECL).
POS_3V	Sets the analyzer clock input termination to +3V (PECL).
AC	Sets the analyzer clock input termination to AC.

EXAMPLE: clock_term neg_2v

CLOCK_TERM?

ACTION: Returns the analyzer clock input termination.

RESPONSE: GND , NEG_2V , POS_3V or AC

EXAMPLE: clock_term?

CLOCK_TERM POS_3V

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CLOCK_THRES [n]

ACTION: Controls the analyzer clock input threshold voltage. The following is the full range of voltage levels:

n: -3.00 to 4.50 V, in 10mV steps

The range is then limited according input termination. For each termination, the ranges are below. Note, when the input termination is adjusted, the threshold voltage may be adjusted if it becomes out of range.

Clock Input Termination	Voltage Range (Volts)
GND	-2.00 to 4.00
-2V	-3.00 to 3.00
+3V	-1.50 to 4.50
AC	-2.00 to 2.00

EXAMPLE: clock_thres 1.30

CLOCK_THRES?

ACTION: Returns the analyzer clock input threshold voltage.

RESPONSE: <NR3 Numeric>

EXAMPLE: clock_thres?

CLOCK_THRES 55E-2

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DATA_INPUT [single,diff]

ACTION: Controls the input mode for the analyzer front panel data connectors.

SINGLE	Sets analyzer to use DATA connector (Single-Ended)
DIFF	Sets analyzer to use front panel DATA and DATA BAR connectors. (Differential)

EXAMPLE: data_input diff

DATA_INPUT?

ACTION: Returns the current analyzer data input mode.

RESPONSE: SINGLE or DIFF

EXAMPLE: data_input?

DATA_INPUT SINGLE

DATA_TERM [gnd, neg_2v, pos_3v, ac]

ACTION: Controls the analyzer data input termination.

GND	Sets the analyzer data input termination to ground.
NEG_2V	Sets the analyzer data input termination to -2V (ECL).
POS_3V	Sets the analyzer data input termination to +3V (PECL).
AC	Sets the analyzer data input termination to AC.

EXAMPLE: data_term pos_3v

DATA_TERM?

ACTION: Returns the analyzer data input termination.

RESPONSE: GND , NEG_2V , POS_3V or AC

EXAMPLE: data_term?

DATA_TERM AC

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DATA_THRES [n]

ACTION: Controls the analyzer data input threshold voltage. The following is the full range of voltage levels:

n: -3.00 to 4.50 V, in 10mV steps

The range is then limited according input termination. For each termination, the ranges are below. Note, when the input termination is adjusted, the threshold voltage may be adjusted if it becomes out of range.

Data Input Termination	**Voltage Range (Volts)**
GND	-2.00 to 4.00
-2V	-3.00 to 3.00
+3V	-1.50 to 4.50
AC	-2.00 to 2.00

EXAMPLE: data_thres 4.35

DATA_THRES?

ACTION: Returns the analyzer data input threshold voltage.

RESPONSE: <NR3 Numeric>

EXAMPLE: data_thres?

DATA_THRES 150E-2

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DESKEW_DELAY [n]

ACTION: Controls the anlayzer deskew delay. This is used to delay the data input with respect to the clock input.

n: 0.00 to 32.00 ns, in 20pS steps

EXAMPLE: deskew_delay 4.22E-9

DESKEW_DELAY?

ACTION: Returns the analyzer deskew delay.

RESPONSE: <NR3 Numeric>

EXAMPLE: deskew_delay?

DESKEW_DELAY 488E-11

SLIP_CONTROL [enable,disable]

ACTION: Controls the analyzers ability to bit slip through the incoming data stream during the synchronization process.

ENABLE - The analyzer will bit slip. When there is a SYNC LOSS indication, the analyzer will slip the data pattern by one clock and determine if the data pattern is in synchronization. If the determination is SYNC LOSS, it will slip again, and so on.

DISABLE - The analyzer will not bit slip.

EXAMPLE: slip_control disable

SLIP_CONTROL?

ACTION: Returns the analyzer slip control state.

RESPONSE: ENABLE or DISABLE

EXAMPLE: slip_control?

SLIP_CONTROL ENABLE

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SYNC_THRES [n]

ACTION: Controls the analyzer synchronization threshold. This is the error rate threshold used to determine if the received data pattern synchronizes to the programmed analyzer data pattern. When the number of errors measured over a certain number of clocks exceeds this threshold, the analyzer determines the received data pattern to have a SYNC LOSS.

n: 1 to 8

The correlation between 'n' and the number of errors and clocks is listed below:

Level	BER	Ratio (errors/clocks)
1	2.5E-01	256 / 1024
2	6.3E-02	256 / 4096
3	1.6E-02	128 / 8192
4	3.9E-03	128 / 32768
5	9.8E-04	64 / 65536
6	2.4E-04	64 / 262144
7	6.1E-05	64 / 1048576
8	1.5E-05	64 / 4194304

EXAMPLE: sync_thres 4

SYNC_THRES?

ACTION: Returns the current analyzer synchronization threshold.

RESPONSE: <NR1 Numeric>

EXAMPLE: sync_thres?

SYNC_THRES 6

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---

PATT_PRBS [generatr, analyzer] , [pn_7, pn_9, pn_10, pn_11, pn_15, pn_23, pn_31]

ACTION: Sets the current Pseudo-Random (PRBS) data pattern exponent, for 'n' in 2n-1. This pattern will be used when the pattern mode (patt_mode) is set to PRBS. The Generator and Analyzer are controlled separately.

GENERATR - Controls the Generator PRBS data pattern.

ANALYZER - Controls the Analyzer PRBS data pattern.

The allowed PRBS data pattern are:

PRBS 2^7-1; PRBS 2^9-1; PRBS 2^11-1; PRBS 2^15-1; PRBS 2^23-1; PRBS 2^31-1;

EXAMPLE: patt_prbs generatr , pn_31

PATT_PRBS? [generatr, analyzer]

ACTION: Returns the exponent for the current PRBS data pattern. The Generator and Analyzer are returned separately.

GENERATOR -Returns the Generator PRBS pattern.

ANALYZER - Returns the Analyzer PRBS pattern.

RESPONSE: GENERATR or ANALYZER , [pn_7, pn_9, pn_10, pn_11, pn_15, pn_23, pn_31]

EXAMPLE: patt_prbs? generatr

PATT_PRBS GENERATR , pn_23

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BYTE_BLOCK [addr], [len], [b1],...,[bn]

ACTION: Overwrites a block of 'len' bits in the edit pattern, beginning at address 'addr', with the overwrite pattern indicated by bytes 'b1'through 'bn'. Note that this command only works when in an edit session (see edit_cntrl?). This command cannot modify past the end of the edit pattern.

addr: 0 to 32767

0 to 16383 (Clock Gap patterns)

0 to 2047 (Pre-amble patterns)

len: 8 to 80 in 8 bit steps

EXAMPLE: byte_block 4096, 24, #HBB, #H10, #HFF

BYTE_BLOCK? [addr]

ACTION: Returns the 80 bit section of the edit pattern beginning with the bits at address 'addr'. Returns data in hexadecimal representation. Note that this command only works when in an edit session (see edit_cntrl?).

addr: 0 to 32767

0 to 16383 (Clock Gap patterns)

0 to 2047 (Pre-amble patterns)

NOTE: If address is within 10 bytes of the end of the pattern, then less than 10 bytes will be returned.

RESPONSE: <NR1 Numeric> , <NR1 Numeric> , <1 to 10 Non-decimal Numerics>

EXAMPLE: byte_block? 500

BYTE_BLOCK 500, 40, #H12, #H34, #H56, #H78, #H9A

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Pattern Commands

PATT_MODE [generatr, analyzer], [prbs, word, mixed]

ACTION Sets the current Pattern Mode to the specified pattern type. The Generator and Analyzer are controlled separately.

GENERATOR	Controls the Generator Pattern type.
ANALYZER	Controls the Analyzer Pattern type.

The Pattern Types are as follows:

Data pattern is Pseudo-Random (**PRBS**), specified by patt_prbs.

Data pattern is **Word,** controlled as Payload.

Data pattern is **Mixed** mode, controlled as Payload, Overhead and Mux.

EXAMPLE: patt_mode generatr , mixed

PATT_MODE? [generatr,analyzer]

ACTION: Returns the current Pattern Mode type. The Generator and Analyzer are returned separately.

GENERATR	Returns the Generator Pattern Mode.
ANALYZER	Returns the Analyzer Pattern Mode.
RESPONSE	GENERATR or ANALYZER, PRBS, WORD or MIXED

EXAMPLE: patt_mode? generatr

PATT_MODE GENERATR , WORD

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BYTE_FILL [addr], [len], [b1]

ACTION: Overwrites the edit pattern from address 'addr' for 'len' bytes with the overwrite pattern indicated by byte 'b1'. Note that this command only works when in an edit session (see edit_cntrl?).

addr: 0 to 32767

0 to 16383 (Clock Gap patterns)

0 to 2047 (Pre-amble patterns)

len: 1 to 32768 in bytes

NOTE: This command cannot fill past the end of the edit pattern.

EXAMPLE: byte_fill 0, 32768, #H55

BYTE_INSERT [addr], [len],[b1],...,[bn]

ACTION: Inserts a pattern of length 'len' bits into the edit pattern starting at address 'addr'. Note that this command only works when in an edit session (see edit_cntrl?).

addr: 0 to 32767

0 to 16383 (Clock Gap patterns)

0 to 2047 (Pre-amble patterns)

len: 8 to 80 in 8 bit steps

NOTE: This command cannot insert past the maximum edit pattern length.

EXAMPLE: byte_insert 25, 24, #H22, #H33, #HEE

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PATT_STATE [run, stop, paused]

ACTION: Controls the Data Pattern state. Also, the clock output of the generator will be turned off when the state iseither STOP or PAUSED.

RUN - This resumes the generator clock output and either restarts the data patterns from a known state, or continues them from where they were left. When previously in STOP, the data patterns of the Generator and Analyzer are restarted from the beginning. When previously in PAUSED, the data patterns continue from they were paused.

STOP - This Stops the data patterns in both the Generator and Analyzer, such that they can be restarted from the beginning.

PAUSED - This pauses the data patterns in both the Generator and Analyzer, such that they can be: resumed by performing a RUN, single stepped by calling patt_single, or queried using the pause_addr and pause_bit query commands

EXAMPLE: patt_state stop

PATT_STATE?

ACTION: Returns the current Data Pattern State.

RESPONSE: RUN, STOP or PAUSED

EXAMPLE: patt_state?

PATT_STATE PAUSED

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COPY_PATT

[gen_pyld,gen_oh,gen_mux,gen_pre,an_pyld,an_oh,an_mux,an_pre,clockgap],

[gen_pyld,gen_oh,gen_mux,gen_ pre,an_pyld,an_oh,an_mux,an_pre,clockgap]

ACTION: Copies one data pattern over another data pattern. The first parameter is the source and the second is the destination. Note that the pattern length of the source pattern cannot exceed the maximum pattern length of the destination pattern.

GEN_PYLD	Generator Payload
GEN_OH	Generator OverHead
GEN_MUX	Generator MUX
AN_PYLD	Analyzer Payload
AN_OH	Analyzer OverHead
AN_MUX	Analyzer MUX
CLOCKGAP	Generator Clock Gap

EXAMPLE: copy_patt gen_pyld, an_pyld

BEDIT_BEGIN

[gen_pyld,gen_oh,gen_mux,gen_pre,an_pyld,an_oh,an_mux,an_pre,clockgap]

ACTION: This command must be issued before starting an editing session. Once this command is issued, front panel editing is disabled. Also, if the front edit menu is being used, this command will not be allowed.

GEN_PYLD	Generator Payload
GEN_OH	Generator OverHead
GEN_MUX	Generator MUX
AN_PYLD	Analyzer Payload
AN_OH	Analyzer OverHead
AN_MUX	Analyzer MUX
CLOCKGAP	Generator Clock Gap

EXAMPLE: edit_begin an_pyld

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BYTE_DELETE [addr], [len]

ACTION: Deletes 'len' bits from the edit pattern starting with bits at address 'addr'. Note that this command only works when in an edit session (see edit_cntrl?).

addr: 0 to 32767

0 to 16383 (Clock Gap patterns)

0 to 2047 (Pre-amble patterns)

len: 8 to 262136 in 8 bit steps

EXAMPLE: byte_delete 0, 24

BYTE_EDIT [addr], [b1]

ACTION: Overwrites a byte in the edit pattern at address 'addr' with the overwrite pattern indicated by bytes 'b1'.

Note that this command only works when in an edit session (see edit_cntrl?).

addr: 0 to 32767

0 to 16383 (Clock Gap patterns)

0 to 2047 (Pre-amble patterns)

EXAMPLE: byte_edit 4096, #HBB

BYTE_EDIT? [addr]

ACTION: Returns the byte of the edit pattern at address 'addr'. Returns data in hexadecimal representation.

Note that this command only works when in an edit session (see edit_cntrl?).

addr: 0 to 32767

0 to 16383 (Clock Gap patterns)

0 to 2047 (Pre-amble patterns)

RESPONSE: <NR1 Numeric> , <Non-decimal Numeric>

EXAMPLE: byte_edit? 500

BYTE_EDIT 500, #H9A

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Auto Search Commands

AUTO_CLOCK [on,off]

ACTION: Controls the Auto Search mode for determining the proper clock threshold level.

ON - If Auto Search is enabled (see auto_search) and there is a SYNC LOSS, the Auto Search process will adjust the analyzer clock input threshold voltage to the center of the incoming clock signal, if possible.

OFF - Auto Search will not adjust the clock input threshold.

EXAMPLE: auto_clock off

AUTO_CLOCK?

ACTION: Returns the Clock Input Threshold search mode for the Auto Search process.

RESPONSE: ON or OFF

EXAMPLE: auto_clock?

AUTO_CLOCK OFF

AUTO_DATA [on,off]

ACTION: Controls the Auto Search mode for determining the proper data threshold level.

ON - If Auto Search is enabled (see auto_search) and there is a SYNC LOSS, the Auto Search process will adjust the analyzer data input threshold voltage to the center of the incoming data signal, if possible.

OFF - Auto Search will not adjust the data input threshold.

EXAMPLE: auto_data off

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BYTE_LENGTH [len]

ACTION: Sets the length of the edit pattern length to len bytes. Note that this command only works when in an edit session (see edit_cntrl?).

len: 1 to 32768

1 to 16384 (Clock Gap patterns)

1 to 2048 (Pre-amble patterns)

EXAMPLE: byte_length 4096

BYTE_LENGTH?

ACTION: Returns the length of the edit pattern.

RESPONSE: <NR1 Numeric>

EXAMPLE: byte_length?

BYTE_LENGTH 32768

BYTE_PATT?

ACTION: Returns the current pattern being edited. Note that this command only works when in an edit session (see edit_cntrl?).

RESPONSE: GEN_MUX , GEN_PYLD ,GEN_OH , GEN_PRE , AN_MUX, AN_PYLD , AN_OH , AN_PRE or CLOCKGAP

EXAMPLE: byte_patt?

BYTE_PATT GEN_PYLD

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AUTO_MIXED [on,off]

ACTION: Controls the Auto Search mode used when searching the data patterns. This controls the MIXED Mode data pattern being included in the list of possible data patterns with which the Auto Search will attempt to SYNC.

ON - The MIXED data pattern will be included in the possible list of data patterns with which the Auto Search process will use to SYNC.

OFF - Auto Search will not use the MIXED Mode data pattern.

EXAMPLE: auto_mixed off

AUTO_MIXED?

ACTION: Returns the MIXED Mode Data Pattern search mode for the Auto Search process.

RESPONSE: ON or OFF

EXAMPLE: auto_mixed?

AUTO_MIXED OFF

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EDIT_CNTRL?

ACTION: Returns the current pattern edit session status. When the front panel edit is in progress, the response is LOCAL. When the remote edit session is in progress, the response is REMOTE. Otherwise, the response is NONE.

RESPONSE: REMOTE , LOCAL or NONE

EXAMPLE: edit_cntrl?

EDIT_CNTRL REMOTE

EDIT_END [enter,esc]

ACTION: This command ends the remote editing session. This command allows the changes or pattern download to be saved or discarded.

ENTER - Save the pattern changes.

ESC - Discard the pattern changes.

EXAMPLE: edit_esc enter

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AUTO_POL [on,off]

ACTION: Controls the Auto Search mode for determining the proper analyzer data input polarity.

ON - If Auto Search is enabled (see auto_search) and there is a SYNC LOSS, the Auto Search process will switch the analyzer data input polarity.

OFF - Auto Search will not change the analyzer data input polarity.

EXAMPLE: auto_pol off

AUTO_POL?

ACTION: Returns the analyzer Data Input Polarity search mode for the Auto Search process.

RESPONSE: ON or OFF

EXAMPLE: auto_pol?

AUTO_POL OFF

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AUTO_DATA?

ACTION: Returns the Data Input Threshold search mode for the Auto Search process.

RESPONSE: ON or OFF

EXAMPLE: auto_data?

AUTO_DATA OFF

AUTO_DELAY [on,off]

ACTION: Controls the Auto Search mode for determining the proper deskew delay. The goal is to set the data delay to allow "measurement sensing" in the middle of the data eye.

ON - If Auto Search is enabled (see auto_search) and there is a SYNC LOSS, the Auto Search process will adjust the analyzer deskew delay to align the clock and data signals, if possible.

OFF - Auto Search will not adjust the deskew delay.

EXAMPLE: auto_delay off

AUTO_DELAY?

ACTION: Returns the Deskew Delay search mode for the Auto Search process.

RESPONSE: ON or OFF

EXAMPLE: auto_delay?

AUTO_DELAY OFF

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AUTO_STATE?

ACTION: Returns the current state of the Auto Search process. When the process is enabled, if the Auto Search process is attempting to SYNC, the state will be SEARCHING. If the process is not enabled or if SYNC has been acquired, the state will be COMPLETE.

RESPONSE: SEARCHING or COMPLETE

EXAMPLE: auto_state?

AUTO_STATE COMPLETE

AUTO_TIME [n]

ACTION: Controls the amount of time the Auto Search process will allow for each of the data patterns to acquire synchronization before attempting a new pattern. This is used when the Auto Search process searches the data patterns (see auto_patt).

n: 0.05 to 10.0 Seconds, in 0.05 Second steps

EXAMPLE: auto_time 1.5

AUTO_TIME?

ACTION: Returns the Data Pattern Synchronization time for the Auto Search process.

RESPONSE: <NR3 Numeric>

EXAMPLE: auto_time?

AUTO_TIME 4E-1

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AUTO_MARK [on, off]

ACTION: Controls the Auto Search mode used when searching the data patterns. This controls the Mark Density data patterns being included in the list of possible data patterns with which the Auto Search will attempt to SYNC. This mode is used when auto_patt is enabled.

ON If the data pattern search mode is enabled (see auto_patt), the Mark Density patterns will be included in the possible list of data patterns with which the Auto Search process will use to SYNC.

OFF Auto Search will not use the Mark Density data patterns.

EXAMPLE: auto_mark off

AUTO_MARK?

ACTION: Returns the Mark Density Data Patterns search mode for the Auto Search process.

RESPONSE: ON or OFF

EXAMPLE: auto_mark?

AUTO_MARK OFF

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Eye Width Commands

EYE_EXTRAP [on, off]

ACTION: Controls the extrapolation mode used by the Eye Width process.

ON - The Eye Width will be measured at the two thresholds (eye_thres and eye_thres_2) and the width at the final threshold (eye_thres_3) will be extrapolated assuming the logarithmic plot of BER versus delay is linear. When complete, all six delay values will be available, (eye_left, eye_right, eye_left_2, eye_right_2, eye_left_3, eye_right_3).

OFF - The extrapolation feature is disabled in the Eye Width process. The width will be measured at the single threshold (eye_thre) and the only delay values available will be eye_left and eye_right.

Example: eye_extrap on

EYE_EXTRAP?

ACTION: Returns the current extrapolation mode used by the Eye Width process.

RESPONSE: ON or OFF

Example: eye_extrap?

EYE_EXTRAP ON

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AUTO_PRBS [on,off]

ACTION: Controls the Auto Search mode used when searching the data patterns. This controls the Pseudo-Random data patterns being included in the list of possible data patterns with which the Auto Search will attempt to SYNC.

ON - The Pseudo-Random patterns will be included in the possible list of data patterns with which the Auto Search process will use to SYNC.

OFF - Auto Search will not use the Pseudo-Random data patterns.

EXAMPLE: auto_prbs off

AUTO_PRBS?

ACTION: Returns the Pseudo-Random Data Pattern search mode for the Auto Search process.

RESPONSE: ON or OFF

EXAMPLE: auto_prbs?

AUTO_PRBS OFF

AUTO_SEARCH [on,off]

ACTION: Controls the analyzer Auto Search process.

ON - Enables the Auto Search process. The search process will not start until SYNC LOSS occurs.

OFF - Disables the Auto Search process.

EXAMPLE: auto_search off

AUTO_SEARCH?

ACTION: Returns the whether the Auto Search process is enabled.

RESPONSE: ON or OFF

EXAMPLE: auto_search?

AUTO_SEARCH OFF

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EYE_LEFT_3?

ACTION: Returns the delay value of the left side of the data eye, based on the threshold (eye_thres_3) and sample size (eye_sample). This is only available when the Eye Width process is complete (eye_status is 1 or 2) and the Extrapolation has been enabled (eye_extrap). The delay value will be the extrapolation point, where the other four delay values were measured.

In the case that eye_status is 1, the width is calculated differently (see eye_left?).

RESPONSE: (NR3 Numeric>

Example: eye_left?

EYE_LEFT_3 -438E-11

EYE_MODE [phase, ber]

ACTION: Controls the measurement mode used by the Eye Width process. The BER mode is more flexible and accurate, but takes longer. The PHASE mod is much quicker, but doe snot allow for selectable sample sizes and BER thresholds.

PHASE: This mode CANNOT be used with Extrapolation enabled. This mode scans the deskew delay range checking for the Clock to Data PHASE status. When PHASE is indicated, the delay value is assumed to be in the data crossing. Otherwise, the delay value is assumed to be in the data eye.

BER: This mode uses the selectable bit sample size and BER threshold to determine the eye width. It also allows the use of extrapolation to determine the width at a much lower BER.

Example: eye_mode ber

EYE_MODE?

ACTION: Returns the current measurement mode used by the Eye Width process.

RESPONSE: BER or PHASE

Example: eye_mode?

EYE_MODE PHASE

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AUTO_WORD [on,off]

ACTION: Controls the Auto Search mode used when searching the data patterns. This controls if the WORD data pattern will be included in the list of possible data patterns with which the Auto Search will attempt to SYNC.

ON - The WORD data pattern will be included in the possible list of data patterns with which the Auto Search process will use to SYNC.

OFF - Auto Search will not use the WORD data pattern.

EXAMPLE: auto_word off

AUTO_WORD?

ACTION: Returns the WORD Data Pattern search mode for the Auto Search process.

RESPONSE: ON or OFF

EXAMPLE: auto_word?

AUTO_WORD OFF

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EYE_RIGHT_3?

ACTION: Returns the delay value of the left side of the data eye, based on the threshold (eye_thres_3) and sample size (eye_sample). This is only available when the Eye Width process is complete (eye_status is 1 or 2) and the Extrapolation has been enabled (eye_extrap). The delay value will be the extrapolation point, where the other four delay values were measured.

In the case that eye_status is 1, the width is calculated differently (see eye_right?).

RESPONSE: (NR3 Numeric>

Example: eye_right?

EYE_RIGHT_3 -438E-11

EYE_SAMPLE [n]

ACTION: This controls the Bit Sample Size used in Eye Width process in the BER mode. This is the number of bits that must occur before the Eye Width process will make the determination that the BER at the delay location is lower than the programmed BER threshold. If the number of errors required to exceed the BER threshold for the programmable sample size occurs prior to receiving the total bits of the sample size, a determination will be made that the delay location is above the BER threshold.

The value "n" is the exponent for the number of bits in the sample size, in terms of 1E+n.

n: 2 to 11

Example: eye_sample 4

EYE_SAMPLE?

ACTION: Returns the Bit Sample Size used by the Eye Width process in the BER mode.

RESPONSE: <NR1 Numeric>

Example: eye_sample?

EYE_SAMPLE 8

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EYE_LEFT?

ACTION: Returns the delay value of the left side of the data eye, based on the threshold (eye_thres) and sample size (eye_sample). This is only available when the Eye Width process is complete (eye_status is 1 or 2).

In the case that eye_status is 1, the width is calculated differently. In this state, the left delay corresponds to the left side of the eye crossing, not the right side. The width calculation is made by first subtracting eye_left from eye_right. This corresponds to the width of the eye crossing. Then using the frequency to determine the period, the crossing width is substracted from the period to determine the Eye Width.

RESPONSE: (NR3 Numeric>

Example: eye_left?

EYE_LEFT -478E-11

EYE_LEFT_2?

ACTION: Returns the delay value of the left side of the data eye, based on the threshold (eye_thres_2) and sample size (eye_sample). This is only available when the Eye Width process is complete (eye_status is 1 or 2) and the Extrapolation has been enabled (eye_extrap).

In the case that eye_status is 1, the width is calculated differently (see eye_left?).

RESPONSE: (NR3 Numeric>

Example: eye_left_2?

EYE_LEFT_2 -438E-11

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EYE_STATUS?

ACTION: Returns the completion status of the Eye Width process for the last run of the Eye Width process since power-on. The status is coded as follows:

Code	Eye Width Status Definition
2	Data Eye Width measured normally
1	Data Eye Width measured. Only one full data crossing found. Width calculated using period measurement.
0	Data Eye Width NOT measured. Process has not been run.
-1	Data Eye Width NOT measured. Only one data crossing found.
-2	Data Eye Width NOT measured. No data crossing found.
-3	Data Eye Width NOT measured. Process was aborted.

RESPONSE: <NR1 Numeric>

Example: eye_status?

EYE_STATUS 2

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EYE_RIGHT?

ACTION: Returns the delay value of the right side of the data eye, based on the threshold (eye_thres) and sample size (eye_sample). This is only available when the Eye Width process is complete (eye_status is 1 or 2).

In the case that eye_status is 1, the width is calculated differently. In this state, the right delay corresponds to the right side of the eye crossing, not the left side. The width calculation is made by first substracting eye_left from eye_right. This corresponds to the width of the eye crossing. Then using the frequency to determine the period, the crossing width is substracted from the period to determine the Eye Width.

RESPONSE: (NR3 Numeric>

Example: eye_right?

EYE_RIGHT 438E-11

EYE_RIGHT_2?

ACTION: Returns the delay value of the left side of the data eye, based on the threshold (eye_thres_2) and sample size (eye_sample). This is only available when the Eye Width process is complete (eye_status is 1 or 2) and the Extrapolation has been enabled (eye_extrap).

In the case that eye_status is 1, the width is calculated differently (see eye_right?).

RESPONSE: (NR3 Numeric>

Example: eye_right_2?

EYE_RIGHT_2 438E-11

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EYE_THRES_2 [n]

ACTION: This controls the 2nd level BER threshold used in the Eye Width process in the Extrapolation mode. This is the Bit Error Rate that is used for the second set of the delay values. (See eye_thres).

The value "n" is the exponent for the error rate, in terms of 1E-n

n: 1 to 10

Example: eye_thres_2 8

EYE_THRES_2?

ACTION: Returns the 2nd level BER threshold used by the Eye Width process in the Extrapolation mode.

RESPONSE <NR1 Numeric>

Example: eye_thres_2?

EYE_THRES_2 6

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EYE_STATE [run, stop]

ACTION: Controls the state of the Eye Width process.

RUN: This starts the Eye Width process. If it is currently running, this will be ignored.

STOP This will abort the Eye Width process, if it is currenly running.

Example: eye_state run

EYE_STATE?

ACTION: Returns the current state of the Eye Width process. Immediately upon completion, the state will return to STOP and the original input deskew delay value will be restored.

RESPONSE: RUN or STOP

Example: eye_state?

EYE_STATE STOP

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Measurement Commands

DISP_SELECT [window,total]

ACTION: Controls which data measurements are to be displayed on the front panel.

WINDOW	Display the sliding window data.
TOTAL	Display the total data measurements.
EXAMPLE:	disp_select window

DISP_SELECT?

ACTION: Returns the current type of data displayed on the front panel.

RESPONSE:	WINDOW or TOTAL
EXAMPLE:	disp_select?
	DISP_SELECT TOTAL

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EYE_THRES [n]

ACTION: This controls the BER threshold used in the Eye Width process in the BER mode. This is the Bit Error Rate that is used as the basis in the determination of the delay locations within the Data Eye Opening versus within the Data Eye Crossing. A Bit Error Rate above the threshold would indicate the data eye crossing.

The value "n" is the exponent for the error rate, in terms of 1E-n

n: 1 to 10

Example: eye_thres 4

EYE_THRES?

ACTION: Returns the BER threshold used by the Eye Width process in the BER mode.

RESPONSE <NR1 Numeric>

Example: eye_thres?

EYE_THRES 6

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HISTRY_PHASE?

ACTION: Returns the Phase Error history LED status.

RESPONSE: ON or OFF

EXAMPLE: histry_phase?

HISTRY_PHASE OFF

HISTRY_POWER?

ACTION: Returns the Power Loss history LED status.

RESPONSE: ON or OFF

EXAMPLE: histry_power?

HISTRY_POWER ON

HISTRY_SYNC?

ACTION: Returns the SYNC Loss history LED status.

RESPONSE: ON or OFF

EXAMPLE: histry_sync?

HISTRY_SYNC OFF

MEAS_FREQ?

ACTION: Returns the Analyzer's measured clock freqeuncy.

RESPONSE: <NR3 Numeric>

EXAMPLE: meas_freq?

MEAS_FREQ 200.000E6

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EYE_THRES_3 [n]

ACTION: This controls the 3rd level BER threshold used in the Eye Width process in the Extrapolation mode. This is the Bit Error Rate that is used for the third set of the delay values. (See eye_thres).

The value "n" is the exponent for the error rate, in terms of 1E-n

n: 6 to 16

Example: eye_thres_3 16

EYE_THRES_3?

ACTION: Returns the 3rd level BER threshold used by the Eye Width process in the Extrapolation mode.

RESPONSE <NR1 Numeric>

Example: eye_thres_3?

EYE_THRES_3 16

EYE_WIDTH?

ACTION: Returns the calculated Eye Width. This is available upon completion of the Eye_Width process. When the Eye Width status (eye_status) is 2, this is the width that is measured. When the status is 1, an additional calculation is done to determine the period. When extrapolation is used, additional calculations are done to determine the width at the lower BER threshold.

The range of the Eye Width will be up to 32 ns with an Eye Width status of 2. With a status of 1, the values can become much larger, up to about 1 μs, which is limited due to the frequency and period measurement accuracy.

RESPONSE: <NR3 Numeric>

Example: eye_width?

EYE_WIDTH 462E-11

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TOTAL_1_ERR?

ACTION: Returns the number of 1's errors that have occured over the Totalize period. The Totalize period is the time since either Power On or the last Error Reset (error_reset).

RESPONSE: <NR1 Numeric>

EXAMPLE: total_1_err?

TOTAL_1_ERR 123456

TOTAL_1_RATE?

ACTION: Returns the 1's Error Rate for the errors that have occured over the Totalize period. The Totalize period is the time since either Power On or the last Error Reset (error_reset).

RESPONSE: <NR3 Numeric>

EXAMPLE: total_1_rate?

TOTAL_1_RATE 1.30E-9

TOTAL_BITS?

ACTION: Returns the total number of data bits that have occured over the Totalize period. The Totalize period is the time since either Power On or the last Error Reset (error_reset).

RESPONSE: <NR1 Numeric>

EXAMPLE: total_bits?

TOTAL_BITS 123456789

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ERROR_MODE [all,oh,pyld]

ACTION: Controls which field of the MIXED data patterns with which the error information will correspond. It also controls the field with which the Synchronization circuitry will attempt to SYNC. For data pattern types other than MIXED, this parameter will not be used.

ALL - All data bits will be examined for errors.

PYLD -Only the Payload field of the MIXED data pattern will be examined for errors.

OH - Only the Overhead field of the MIXED data pattern will be examined for errors.

EXAMPLE: error_mode pyld

ERROR_MODE?

ACTION: Returns the current Error Field mode.

RESPONSE: ALL , PYLD or OH

EXAMPLE: error_mode?

ERROR_MODE OH

ERROR_RESET

ACTION: Resets all of the totalize and window measurements. This also clears the front panel history status LEDs.

EXAMPLE: error_reset

HISTRY_BITS?

ACTION: Returns the BIT Error history LED status.

RESPONSE: ON or OFF

EXAMPLE: histry_bits?

HISTRY_BITS OFF

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TSE [n]

ACTION: Controls the Test Status Enable register. This register is used to mask conditions that will occur in the Test Status Register (tsr) to allow certain test conditions to set GPIB SRQs.

n: 0 to 255

EXAMPLE: tse 4

-

TSE?

ACTION: Returns the current Test Status Enable register.

RESPONSE: <NR1 Numeric>

EXAMPLE: tse?

TSE 16

TSR?

ACTION: Returns the current Test Status Register.

RESPONSE: <NR1 Numeric>

EXAMPLE: tsr?

TSR 1

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SYNC?

ACTION: Returns the Analyzer SYNC Lock status.

RESPONSE: ON or OFF

EXAMPLE: sync?

SYNC ON

TOTAL_0_ERR?

ACTION: Returns the number of 0's errors that have occured over the Totalize period. The Totalize period is the time since either Power On or the last Error Reset (error_reset).

RESPONSE: <NR1 Numeric>

EXAMPLE: total_0_err?

TOTAL_0_ERR 123456

TOTAL_0_RATE?

ACTION: Returns the 0's Error Rate for the errors that have occured over the Totalize period. The Totalize period is the time since either Power On or the last Error Reset (error_reset).

RESPONSE: <NR3 Numeric>

EXAMPLE: total_0_rate?

TOTAL_0_RATE 1.30E-9

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WIN_0_RATE?

ACTION: Returns the error rate for 0's errors that occurred during the sliding window.

RESPONSE: <NR3 Numeric>

EXAMPLE: win_0_rate?

WIN_0_RATE 0.00E-07

WIN_1_ERR?

ACTION: Returns the number of 1's errors that occurred during the sliding window. The sliding window is the period of time based on the window mode (win_mode) and the window length (win_bit_len or win_sec_len).

RESPONSE: <NR1 Numeric>

EXAMPLE: win_1_err?

WIN_1_ERR 9932

WIN_1_RATE?

ACTION: Returns the error rate for 1's errors that occurred during the sliding window. The sliding window is the period of time based on the window mode (win_mode) and the window length (win_bit_len or win_sec_len).

RESPONSE: <NR3 Numeric>

EXAMPLE: win_1_rate?

WIN_1_RATE 5.52E-4

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TOTAL_ERROR?

ACTION: Returns the total number of errors that have occured over the Totalize period. The Totalize period is the time since either Power On or the last Error Reset (error_reset).

RESPONSE: <NR1 Numeric>

EXAMPLE: total_error?

TOTAL_ERROR 12345678

TOTAL_RATE?

ACTION: Returns the Error Rate for all errors that have occured over the Totalize period. The Totalize period is the time since either Power On or the last Error Reset (error_reset).

RESPONSE: <NR3 Numeric>

EXAMPLE: total_rate?

TOTAL_RATE 1.23E-12

TOTAL_TIME?

ACTION: Returns the time over which the Totalize period occured.

RESPONSE: <String Response>, in the format of "DDD-HH:MM:SS"

EXAMPLE: total_time?

TOTAL_TIME "003-17:32:51"

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WIN_MODE [bits, sec]

ACTION: Controls which type of length is used for the sliding window.

BITS- The sliding window length will be determined based on the number bits.

SEC- The sliding window length will in terms of time.

EXAMPLE: win_mode sec

WIN_MODE?

ACTION: Returns the current sliding window length mode.

RESPONSE: BITS or SEC

EXAMPLE: win_mode?

WIN_MODE BITS

WIN_RATE?

ACTION: Returns the error rate for errors that occurred during the sliding window.

RESPONSE: <NR3 Numeric>

EXAMPLE: win_rate?

WIN_RATE 0.00E-07

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TTL50_ERROR?

ACTION: Returns the quick data measurements. Data will be available within 50 to 100ms of sending the ttl50_reset. This command and the TTL50_RESET command

can be used to obtain quick measurements. This command will accumulate up to 100 intervals, or 5 seconds, of data, after which the interval will be returned as -1.

RESPONSE: <3 NR1 Numerics>, in the format of number of 50ms intervals, number of errors, and number of bits.

EXAMPLE: ttl50_error?

TTL50_ERROR 20, 205000, 205000000

TTL50_RESET

ACTION: Resets the intervals of the quick measurements. This command is used inconjunction with the ttl50_error command to obtain quick data measurements.

EXAMPLE: ttl50_reset

WIN_0_ERR?

ACTION: Returns the total number of 0's errors that occurred during the sliding window.

RESPONSE: <NR1 Numeric>

EXAMPLE: win_0_err?

WIN_0_ERR 1234567890

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WIN_TIME?

ACTION: Returns the current length of the sliding window in seconds.

RESPONSE: <String Response>, in the form of "DDD-HH:MM:SS"

EXAMPLE: win_time?

WIN_TIME "000-23:59:59"

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WIN_BIT_LEN [n]

ACTION: Controls the Sliding Window length for the BITS mode. The BITS mode length is set to 1E+n.

n: 4 to 16

EXAMPLE: win_bit_len 8

WIN_BIT_LEN?

ACTION: Returns the length of the Sliding Window for the BITS mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: win_bit_len?

WIN_BIT_LEN 12

WIN_BITS?

ACTION: Returns the total number of bits that occurred during the sliding window.

RESPONSE: <NR1 Numeric>

EXAMPLE: win_bits?

WIN_BITS 123456789000

WIN_ERROR?

ACTION: Returns the total number of errors that occurred during the sliding window.

RESPONSE: <NR1 Numeric>

EXAMPLE: win_error?

WIN_ERROR 1234567890

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RES_1_RATE?

ACTION: Returns the error rate for 1's errors that occurred during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR3 Numeric>

EXAMPLE: res_1_rate?

RES_1_RATE 0.00E-07

RES_BITS?

ACTION: Returns the total number of bits that occurred during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: res_bits?

RES_BITS 20500000000

RES_DM?

ACTION: Returns total number of degraded minutes counted during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: res_dm?

RES_DM 1

RES_DM_PER?

ACTION: Returns the percentage of degraded minutes calculated for either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR3 Numeric>

EXAMPLE: res_dm_per?

RES_DM_PER 5000E-2

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---

WIN_REPORT [on,off]

ACTION: Controls the end of window reports.

ON- Reports are printed at the end of the sliding window interval.

OFF- Reports are disabled.

EXAMPLE: win_report off

-

WIN_REPORT?

ACTION: Returns the current sliding window report mode.

RESPONSE: ON or OFF

EXAMPLE: win_report?

WIN_REPORT OFF

WIN_SEC_LEN <time>

ACTION: Controls the length of the sliding window in terms of time. This is used when the window mode is set to sec. The value is the form of hours, minutes and seconds.

EXAMPLE: win_sec_len "00:00:30"

WIN_SEC_LEN?

ACTION: Returns the current time length for the sliding window.

RESPONSE: <String Response>, in the form of "HH:MM:SS"

EXAMPLE: win_sec_len?

WIN_SEC_LEN "23:59:59"

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RES_ES?

ACTION: Returns the total number of errored seconds counted during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: res_es?

RES_ES 0

RES_ES_PER?

ACTION: Returns the percentage of errored seconds calculated for either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR3 Numeric>

EXAMPLE: res_es_per?

RES_ES_PER 0E-2

RES_PHASE?

ACTION: Returns the state of the Phase Error indicator detected for either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: ON or OFF

EXAMPLE: res_phase?

RES_PHASE OFF

RES_RATE?

ACTION: Returns the error rate for the errors that occurred during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR3 Numeric>

EXAMPLE: res_rate?

RES_RATE 0.00E-07

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Test Control and Measurement Commands

RES_0_ERRS?

ACTION: Returns the total number of 0's errors that occurred during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: res_0_errs?

RES_0_ERRS 1234

RES_0_RATE?

ACTION: Returns the error rate for 0's errors that occurred during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR3 Numeric>

EXAMPLE: res_0_rate?

RES_0_RATE 0.00E-07

RES_1_ERRS?

ACTION: Returns the total number of 1's errors that occurred during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: res_1_errs?

RES_1_ERRS 1234

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RES_STOP?

ACTION: Returns the stop time for the previous test interval. If the test_prev mode is current, this command is invalid.

RESPONSE: <String Response>, in the form of "YYYY/MM/DD-HH:MM:SS"

EXAMPLE: res_stop?

RES_STOP "1995/11/06-11:01:01"

RES_SYNC?

ACTION: Returns the state of the Sync Loss indicator detected for either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: ON or OFF

EXAMPLE: res_sync?

RES_SYNC OFF

RES_TES?

ACTION: Returns the total number of threshold errored seconds counted during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: res_tes?

RES_TES 0

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RES_EFS?

ACTION: Returns the total number of error free seconds counted during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: res_efs?

RES_EFS 60

RES_EFS_PER?

ACTION: Returns the percentage of error free seconds calculated for either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR3 Numeric>

EXAMPLE: res_efs_per?

RES_EFS_PER 10000E-2

RES_ELAPSED?

ACTION: Returns the current test length in seconds for either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <String Response>, in the form of "DDD-HH:MM:SS"

EXAMPLE: res_elapsed?

RES_ELAPSED "001-01:01:01"

RES_ERRORS?

ACTION: Returns the total number of errors that occurred during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: res_errors?

RES_ERRORS 12

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TEST_DISCARD

ACTION: Discards the previous test results, making the results unavailable for query.

EXAMPLE: test_discard

TEST_LENGTH <time>

ACTION: Controls the length of the timed or repeat tests. The value is the form of hours, minutes and seconds.

EXAMPLE: test_length "00:00:30"

TEST_LENGTH?

ACTION: Returns the current length for the timed and repeat tests.

RESPONSE: <String Response>, in the form of "HH:MM:SS"

EXAMPLE: test_length?

TEST_LENGTH "23:59:59"

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RES_SES?

ACTION: Returns the total number of severely errored seconds counted during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: res_ses?

RES_SES 0

RES_SES_PER?

ACTION: Returns the percentage of severely errored seconds calculated for either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR3 Numeric>

EXAMPLE: res_ses_per?

RES_SES_PER 0E-2

RES_START?

ACTION: Returns the starting time for either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <String Response>, in the form of "YYYY/MM/DD-HH:MM:SS"

EXAMPLE: res_start?

RES_START "1995/11/06-11:01:01"

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TEST_PREV [previous , current]

ACTION: Controls whether to return the test data measurement from the currently running test or from the previously run test. Note, once a test stops, it becomes the previous test. Also that if no test is currently running

PREVIOUS - Results (res_xxx) will return data from the previous test.

CURRENT - Results (res_xxx) will return data from the current test.

EXAMPLE: test_prev previous

TEST_PREV?

ACTION: Returns the current test_prev mode.

RESPONSE: PREVIOUS or CURRENT

EXAMPLE: test_prev?

TEST_PREV CURRENT

TEST_PRINT

ACTION: Prints an end-of-test report. If a test is currently running. it will be an intermediate summary for this test. Otherwise, it will print the end-of-test summary for the previous test.

EXAMPLE: test_print

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RES_TES_PER?

ACTION: Returns the percentage of threshold errored seconds calculated for either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR3 Numeric>

EXAMPLE: res_tes_per?

RES_TES_PER 0E-2

RES_US?

ACTION: Returns the total number of unavailable seconds counted during either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR1 Numeric>

EXAMPLE: res_us?

RES_US 0

RES_US_PER?

ACTION: Returns the percentage of unavailable seconds calculated for either the current test interval or previous test interval, depending on the test_prev mode.

RESPONSE: <NR3 Numeric>

EXAMPLE: res_us_per?

RES_US_PER 0E-2

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---

TEST_SQUELCH [on , off]

ACTION: Controls the squelching of the On Error reports.

OFF - The On Error reports will not be squelched

ON - Squelching is enabled. Whenever 10 consecutive seconds have On Error reports, the remainder will be squelched until there are 5 consecutive seconds with error rates below the Test Error Threshold.

EXAMPLE: test_squelch off

TEST_SQUELCH?

ACTION: Returns the current test squelch mode.

RESPONSE: ON or OFF

EXAMPLE: test_squelch?
TEST_SQUELCH ON

TEST_STATE [run , stop]

ACTION: Controls the current state of the test.

RUN - Starts a test.

STOP - Stops a test.

EXAMPLE: test_state run

TEST_STATE?

ACTION: Returns the current test state.

RESPONSE: RUN or STOP

EXAMPLE: test_state?
TEST_STATE STOP

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TEST_MODE [untimed, timed, repeat]

ACTION: Controls the type of test that will be run.

TIMED - Tests will execute for a specific length of time (test_length) and then stop automatically, unless manually stopped sooner.

REPEAT -Tests will execute the same as Timed tests, except after automatically stopping, it will restart.

UNTIMED -Tests will execute indefinitely, until manually stopped.

EXAMPLE: test_mode repeat

TEST_MODE?

ACTION: Returns the current test mode.

RESPONSE: UNTIMED , TIMED or REPEAT

EXAMPLE: test_mode?

TEST_MODE REPEAT

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TEST_REPORT [none , on_error , eot , both]

ACTION: Controls the type of test report that will be printed.

NONE -No reports will be generated during the test.

ON_ERROR - Reports will be generated whenever the error rate for a second exceeds the Test Error Rate Threshold.

EOT - The End-Of-Test report will be printed at the end of the test.

BOTH - Both types of reports will be printed.

EXAMPLE: test_report both

TEST_REPORT?

ACTION: Returns the current test report mode.

RESPONSE: NONE , ON_ERROR , EOT or BOTH

EXAMPLE: test_report?

TEST_REPORT ON_ERROR

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TEST_THRES [exp]

ACTION: Controls the current Test Error Rate Threshold. The value 'exp' is the exponent for the error rate, in terms of 1E-exp.

exp: 2 to 10

EXAMPLE: test_thres 6

TEST_THRES?

ACTION: Returns the current Test Error Rate Threshold exponent.

RESPONSE: <NR1 Numeric>

EXAMPLE: test_thres?
TEST_THRES 2

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Bit

A binary digit, the smallest element of information in binary system. A 1 or 0 of binary data.

Bit Error

An incorrect bit. Also known as a coding violation.

Bit Rate

The number of bits of data transmitted over a phone line per second.

Byte

A unit of 8 bits.

Channel

A communications path or the signal sent over a channel. Through multiplexing several channels, voice channels can be transmitted over an optical channel.

Clock

1. An electronic component that emits consistent signals that paces a computer's operations. 2. An oscillator-generated signal that provides a timing reference for a transmission link. A clock provides signals used in a transmission system to control the timing of certain functions, such as the duration of signal elements or the sampling rate. It also generates periodic, accurately spaced signals used for such purposes as timing, regulation of the operations of a processor, or generation of interrupts. A clock has two functions: to generate periodic signals for synchronization on a transmission facility, and to provide a time base for the sampling of signal elements. In computers, a clock synchronizes certain procedures, such as communication with other devices.

Error Detection

Checking for errors in data transmission. A calculation is made on the data being sent and the results are sent along with it. The receiving station then performs the same calculation and compares its results with those sent. ...Code in which each data signal conforms to specific rules of construction so that departures from this construction in the received signals can be automatically detected. Any data detected as being in error is either deleted from the data delivered to the destination, with or without an indication that such deletion has taken place, or delivered to the destination together with an indication that is has been detected as being in error.

Error Rate

The ratio of the number of data units in error to the total number of data units.

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Appendices

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Glossary

Address

A number specifying a particular user device attachment point. The location of a terminal, a peripheral device, a node, or any other unit or component in a network. A set of numbers than uniquely identifies something - a location in computer memory, a packet of data traveling through a network.

Analog-to-Digital Converter

A device that converts an analog signal, that is, a signal in the form of a continuously variable voltage or current, to a digital signal, in the form of bits.

Attenuation

A decrease in magnitude of current, voltage, or power of a signal in transmission between points.

Attenuator

An electronic transducer, either fixed or adjustable, that reduces the amplitude of a wave without causing significant distortion.

Bandwidth

The difference between the limiting frequencies of a continuous frequency spectrum. The range of frequencies handled by a device or system.

BER

An acronym for Bit Error Ratio (or Rate). The principal measure of quality of a digital transmission system. BER is defined as:

BER = Number of Errors/Total Number of Bits

BER is usually expressed as negative exponent. For example, a BER of 10^{-7} means that 1 bit out of 10^{7} bits is in error.

BER Floor

A limiting of the bit-error-ratio (BER) in a digital fiber optic system as a function of received power due to the presence of signal degradation mechanisms or noise.

Binary

A numbering system that allows only two values, zero and one, (0 and 1). Binary is the way most computers store information., in combination of ones and zeros. Voltage on. Voltage off. See also: Bit.

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