10 G SpectralBER System

Remote Control Manual (Part No. J1420-90006)

Where to Find it - Online and Printed Information:

System installation (hardware/software)...	VXIbus Configuration Guide* SpectralBER Installation & System Reference Manual
Module configuration/control	SpectralBER Installation & System Reference Manual Individual Module User's Manuals
SCPI information.....	This Manual
VXI programming	SpectralBER Online Help
VXI example programs	SpectralBER Online Help This Manual VXI function reference SpectralBER Online Help
Soft Front Panel information	SpectralBER Installation & System Reference Manual .....SpectralBER Online Help
VISA language information.....	VISA User's Guide
VEE programming information.....	VEE User's Manual

**Supplied with Command Modules , Embedded Controllers, and VXLink.*

Contents

Chapter 1
Remote Control Introduction

Introduction

The Agilent SpectralBER System can be controlled from a PC or workstation using either SCPI commands, Universal Instrument Drivers, or interactively using a Soft Front Panel (Graphical User Interface). This manual describes using SCPI Commands to control the J1420B, J1421A, J1422B modules.

For more information on using the Graphical User Interface and the Universal Instrument Drivers, refer to the *Installation & System Refernce Manual*.

Controlling the Module using SCPI Commands

Communication between modules and the VXI Slot0 Controller is via the VXI Message-based Device Word Serial Protocol. Module functions, such as controlling the data rate of incoming/outgoing signals, generating and detecting alarms/errors and so on, can be performed using SCPI commands. By combining SCPI commands with a programming language, you can write test application programs.

You can also use IEEE.488.2 common commands, which perform functions such as reset, self-test, and query status, in your programs, see Chapter 2, "Common Commands".

For detailed information on the SCPI commands associated with each module function, refer to Chapters 3 to 5.

Command Structure

For programming, SCPI commands are combined with, for example, HP BASIC “output” and “enter” commands. The command structures are:

Output Command:

OUTPUT 70907;"INPut:TELecom:RATE" *(The SCPI command is enclosed in quotes.)*

Enter Command:

ENTER 70907;variable

The “output” command is sent to the module from the Slot 0 Controller. The “enter” command is the response of the module sent to the Slot 0 Controller.

Both Commands take numeric addresses that specify the destination of the command. The address used to communicate with the Slot 0 Controller in the examples above is 70907, where:

- 7 is the interface select code of the controller (computer).
- 09 is the GPIB primary address (the logical address of the Slot 0 Controller).
- 07 is the GPIB secondary address (derived by dividing the logical address of the module by 8).

Connecting the Slot 0 Controller to the GPIB

The following points should be considered when connecting the Slot 0 to the GPIB:

- Operating distance
- Communication with the system controller

Operating Distances

1. The total length of GPIB cable must not exceed 2 meters (6 feet) times the number of devices in the system.
2. The total length of GPIB cable used to interconnect all devices in the system must not exceed 20 meters (65 feet).

Using GPIB Extenders Agilent 37204A or Agilent 37201A can increase operating distances:

- Up to 1250 meters using a Agilent 37204A.
- Over 1250 meters using two Agilent 37201A and two suitable Modems.

Remote Control Hints and Tips

The following paragraphs give some hints and tips on how to control the J1420B, J1421A and J1422B modules remotely. Before writing a program to control the Modules it may help to go through the steps required to setup the desired configuration manually.

Default Settings

In general, default settings should not be assumed. It is recommended that each instrument setting should be explicitly programmed to the desired value. Also commands that affect higher level settings such as Signal Rate or Payload Type should be sent before commands to set up lower level settings such as Pattern. This is because in some cases, higher level setting changes can affect the values of lower settings.

Error Checking

It is recommended that, when sending SCPI commands to the modules, you also periodically send the SYSTem:ERRor? command to check for any Remote Control Errors reported by the instrument. This command returns 0, "No Error" if there are no errors in the error queue. If the SYSTem:ERRor? command is sent after every setup command then it

makes debugging any reported errors much easier since you will know exactly which command caused the error.

The actual error queue within the modules can be cleared by sending the *CLS command.

Command Completion

Often a program will have to wait for one command to be completed before starting another. For example, a command to set up a Transmitter Module must be completed before another command to start measuring can be started.

In this situation, we recommend using the IEEE488.2 Common Command *OPC? which returns a 1 on completion.

Setup Delays

Even after the module has accepted a SCPI command it may take some time for it to execute the requested operation (e.g. payload change, single error add). It is therefore recommended that at least 200ms is allowed after the command has completed before expecting the instrument operation to occur, because the command operation is completed before the actual execution of the command.

Status Registers

Status registers in general are only updated every 100 ms by the modules. Therefore you should avoid reading them any faster than that, since although it does not do any harm if they are read faster, it means that less processing power will be available to update the display.

If you need to detect a status register bit that is momentarily changing state, avoid using the condition register in the hope of catching both states. Instead it is much better to program the PTRansition and NTRansition registers to catch the event of interest, and then use the event register to monitor for the event.

Gating Control

There are a number of status register bits that can be used to indicate the state of the modules.

When you send the start gating command, you should check the MEAS bit (DB4) in the OPERation status register. This is because the modules take a finite time (the actual length of time can be affected by factors such as whether Stored Measurement Graphics is selected or not) to start gating. When the MEAS bit is set to one it means that the module is gating.

Frequency Offsets

If the Agilent J1422B Transmitter's SDH signal rate or frequency offset is changed it will take some time for the Internal VCXOs to settle.

Chapter 2
Common Commands

SCPI Command Format

Instrument functions such as making measurements, retrieving data, and querying status, are performed by stringing together SCPI "nodes" into commands. The SCPI commands are based on a hierarchical structure called a "subsystem" that comprises of a top level "root" node and one or more lower-level nodes and their parameters as follows:

:SENSe:DATA:TELecom:TMODE:PRBS
:SENSe is the root node
:DATA is a second level node
:TELecom is a third level node
:TMODE is a fourth level node
:PRBS is a fifth level node

Command Syntax

Commands are shown as a mix of upper and lowercase characters.

Commands can be abbreviated for shorter program line lengths. The uppercase characters define the abbreviated form of the command.

Commands are formed by linking the root node with lower-level nodes. A colon (:) is used to link nodes.

If the command requires a parameter, a space must separate the lowest level node and the parameter. If there is more than one parameter, a comma (,) is used to separate the parameters.

An example of a typical command and its abbreviated form is shown below :

:STATus:QUEStionable:ENABle%<enable_mask>	full form
:STAT:QUES:ENAB %<enable_mask>	abbreviated form

SCPI Long Form Command Headers

The general rule for SCPI long form command headers that are greater than four characters in length is as follows:

- Abbreviated short form mnemonics - the first four characters from the long form command header are used unless the fourth character is a vowel. In such cases, the vowel is dropped and only the first three characters are used.
- If the command is four characters long then all four characters are used, irrespective of whether the fourth character is a vowel or not.

Linking Command Statements

Command statements can be linked using a semicolon (;). For example :

SOUR:DATA:TEL:ALAR ON;:STAT:QUES:ENAB?

Parameters

In this manual, parameters are shown in angled brackets < >. There are five parameter types used in commands as listed in Table 2-1.

Table 2-1. Parameter Types

Parameter types	Description
<Numeric>	All commonly used decimal numbers including optional signs, decimal points, and scientific notation. Examples are 123, 123E2, -123, -1.23E2, .123, .123E2 and 1.2300E-01. Special cases include MINimum and MAXimum. A numeric parameter can also be specified in hex, octal, and/or binary. Examples are #H7B, #Q173 and #B11110111.
<Boolean>	A single binary condition that is either true or false. Examples are ON, OFF, 1 and 0.
<Discrete>	Values that are represented by a string of alphanumeric characters. Examples are INTernal and EXTernal.
<String>	Any set of ASCII characters enclosed within single quotes or double quotes. Examples are '1111111111111111' and "0000000000000000"
<Block>	Used to transfer large quantities of related data. Blocks can be sent as definite length blocks (#<numeric><numeric>) or indefinite length blocks (#0)

Remote Control Commands

The remote control commands in this manual have been grouped into sections for each module. The following are Common Commands for each module:

- VXI Subsystem
- SYSTem Subsystem
- STATus Subsystem

VXI Subsytem

This VXI Subsystem section contains the following:

- SCPI Command Quick Reference
- Detailed Information about commands in the subsystem

SCPI Command Quick Reference

VXI Subsytem Tasks and Commands are listed in Table 2-2. Detailed command information is described after the table.

Table 2-2. VXI Quick Reference

Task	Command
To configure module logical addresses in the system.	VXI:CONFigure:DLADdress?
To configure the total number of modules in the system	VXI:CONFigure:DNUMber?

:VXI:CONFigure:DLADdress?

This command returns a numeric list of logical addresses for the module and all its servants.

Response Name	Value
Response Type	Numeric
Response Range	0 to 255
Default Units	none

The number of entries in the returned list is given by the response to the :VXI:CONF:DNUM? command.

If no servants have seen allocated to the module, the list will contain only the module logical addresses.

Dynamically configured modules return their current logical addresses.

:VXI:CONFigure:DNUMber?

This command returns the total number of devices that are allocated to the module, and the module itself. This constitutes a logical instrument.

Response Name	Value
Response Type	Numeric
Response Range	1 to 256
Default Unit	none

This command determines the number of values to be returned by VXI:CONF:DLAD?.

If no servants have been allocated to the module, the command returns the value 1.

SYSTem Subsystem

:SYSTem:DATE <year>,<month>,<day>

This command sets the date.

<year>=	<numeric>	1970 to 2069
<month>=	<numeric>	1 to 12
<day>=	<numeric>	1 to 31

:SYSTem:DATE ?

This command requests the system date.

Returns : <year>,<month>,<day>

:SYSTem:TIME <hour>,<minute>,<second>

This command sets the system time.

<hour>=	<numeric>	0 to 23
<minute=>	<numeric>	0 to 59
<second=>	<numeric>	0 to 59

:SYSTem:TIME ?

This command requests the system time..

Returns : <hour>,<minute>,<second>

:SYSTem:VERSion ?

This command requests the revision of SCPI remote control. .

Returns : <version>= YYYY.V

Where <version> = YYYY.V, e.g. YYYY.V = 1994.0

:SYSTem:ERRor ?

This command requests Remote Control Error Status.

Returns : <numeric>,<string>

Where <numeric> = -32768 to 32767 and <string> = 0 to 255 characters

When there is no error, this command returns 0,"No error".

Number of Error/Event queue is 32.

When queue is overflowed, the last error is indicated as -350, "Too many errors".

Error queue will be cleared on the following conditions:

- When power is on
- When receiving *CLS/*RSTcommands
- When last item is read from queue

STATus Subsystem

:STATus:CHISTory

This command clears the contents of all History registers.

:STATus:PRESet

This command presets the contents of all History registers to default.

Default conditions are as follows:

Table 2-3.

Register	ENABle	PTRansition	NTRansition
OPERation	all 0	all 1	all 0
QUESTionable	all 0	all 1	all 0
All others	all 1	all 1	all 1

:STATus:<Status Register>:ENABle<numeric>

This command sets the Event Enable register mask which allows true conditions in the Event register to be reported in the <**Status Register**> summary bit. If a bit is "1" in the Event Enable register and its associated event bit makes the transition to true, a positive transition will occur in the <**Status Register**> summary bit.

<numeric>= <numeric> 0 to 32767

:STATus:<Status Register>:ENABle?

This command returns the current mask setting value of <**Status Register**>.

Returns : <numeric>

:STATus:<Status Register>:PTRansition<numeric>

This command sets the positive Transition Filter.

<numeric>= <numeric> 0 to 32767

:STATus:<Status Register>:PTRansition?

This command returns the setting of the positive Transition Filte.

Returns : <numeric>

:STATus:<Status Register>:NTRansition<numeric>

This command sets the negative Transition Filter

<numeric>=	<numeric>	0 to 32767

:STATus:<Status Register>:NTRansition?

This command returns the setting of the negative Transition Filter.

Returns :	<numeric>

:STATus:<Status Register>:EVENt?

This command returns the contents of the Event register associated with the <**Status Register**>. Reading this register clears its contents.

Returns :	<numeric>	0 to 32767

:STATus:<Status Register>:CONDition?

This command returns the contents of the Condition register associated with the <**Status Register**>. Reading this register, does not clear its contents.

Returns :	<numeric>	0 to 32767

:STATus:<Status Register>:HISTory?

This command returns the contents of the History Condition register associated with the <**Status Register**>. This is in effect a latched version of the Condition register. A bit set to “1” in the Condition register will set the corresponding bit in the History register. This register is not cleared when it is read. The only time the History register is cleared is at a start of measurement period, or when the commands *RST / :STATus:CHISTory are sent.

Returns :	<numeric>	0 to 32767

IEEE488.2 Common Commands

***CLS**

Clear Status - This command clears all status registers and the error queue.

Consequently, the corresponding Summary bit (Bit 3, 5, and 7) and the instrument peculiar bit (Bit 0, 1, and 2) of a status byte register are cleared.

Moreover, the Enable setup of the bit of a status register and a transition filter are not affected. (Refer to the Reset command *RST.)

The Operation Complete function and Operation Complete Query function are disabled.

***ESE <numeric>**

Standard Event Status Enable - This command sets the mask of the Event Status Register.

<numeric>	1	Operation Complete
	2	Request Control
	4	Query Error
	8	Device Dependent Error
	16	Execution Error
	32	Command Error
	64	User Request
	128	Power On

***ESE?**

Standard Event Status Enable Query -This command returns the current masking setting.

Returns :	<numeric>	0 to 255

***ESR?**

Standard Event Status Register Query - This command returns the state of the Event Status register. After reading this register, it clears its contents.

Returns :	<numeric>	0 to 255

***IDN?**

Identification Query - This command returns the Manufacture Name, Model Number & Name, Serial Number, and Firmware Revision Number.

Each field is divided by a comma [,].

"AGILENT-TECHNOLOGIES, J1420B, JPnnnnnnn, A.nn.nn"

JP signifies the country of origin (Japan).

***OPC**

Operation Complete Command - A "1" is set to the bit 0 (Operation Complete Message) of a Standard Event Register when execution of the previous command is completed.

***OPC?**

Operation Complete Query - This command returns "1" when execution of the previous command is completed.

***RST**

Reset Command -This command initializes all trigger conditions, measurement conditions and setting conditions. However, it does not affect the status. (Refer to the Reset command *RST.)

***SRE <value>**

Service Request Enable Command - This command sets Service Request Enable.

<value>	<numeric>	0 to 255

***SRE?**

Service Request Enable Query - This command returns the current setting of Service Request Enable.

Returns :	<numeric>	0 to 255

***STB?**

Read Status Byte Query - This command returns the value of the Status Byte resister.

Returns :	<numeric>	0 to 255

***WAI**

Wait-to-Continue Command - The following command is not executed until the operation started by the previous command is completed (sequential operation).

***TST?**

Self-Test Query - This command performs a self test and returns the result.

Response message:

0 Self-test pass

Other than 0 Self-test fail

***OPT?**

Option Identification Query - This command returns the option information of the module. .

Returns : <numeric> 0 to 65535

Each bit of the numerical value returned indicates the option status.

Bit value:

0 No option

1 With option

According to the type of module, the value returned changes as follows:

J1421A and J1422B:

Bit 0 indicates the status of the J1422B High Output Power option as described above.

BITs 1-15 : 0

J1420B:

Bit 0 indicates the status of the 2.5G Optical option as described above.

BITs 1-15 : 0

Chapter 3
Receiver Command Reference

This chapter describes SCPI Commands for the J1420B Receiver Module. For more information about SCPI common commands, see Chapter 2, "Common Commands".

:SENSe:DATA:TELecom:SENSe <source>

This command sets a frame format for the Receiving Signal.

<source>	discrete	SDH | SONet

When SDH is selected, the frame format of the Receiving Signal is SDH.

When SONet is selected, the frame format of the Receiving Signal is SONET.

If this command is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:SENSe?

Description

This command returns the current frame format selected by :SENSe:DATA:TELecom:SENSe.

Returns : <source>

:SENSe:DATA:TELecom:RATE <rate>

This command sets the interface rate of the Receiving Signal. .

<rate>	discrete	STM64 | OC192

STM64 and OC192, and STM16 and OC48 have the same meaning.

Receiving frame format on SDH or SONET is set by SENSe:DATA:TELecom:SENSe.

If this command is sent during measurement, a Command Error is generated .

:SENSe:DATA:TELecom:RATE?

This command returns the current interface rate selected by :SENSe:DATA:TELecom:RATE.

Returns : <rate>

When SDH is selected by :SENSe:DATA:TELecom:SOURce, it returns STM64 or STM16.

When SONET is selected by :SENSe:DATA:TELecom:SOURce, it returns OC192 or OC48.

:SENSe:DATA:TELecom:POLarity <polarity>

This command sets the polarity of the Input Signal..

<polarity>	discrete	INVerted | NORMal

If NORMal is selected, the polarity of the Input Signal is normal. Data input of Hi-Level (Laser emitting) is logic “1”.

If INVerted is selected, the polarity of the Input Signal is inverted. Data input of Lo-Level (Laser off) is logic “1”.

If this command is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:POLarity?

This command returns the current polarity of the Input Signal selected by (:SENSe:DATA:TELecom:POLarity).

Returns : <polarity>

:SENSe:DATA:TELecom:DESCramble <descramble>

This command sets Descramble ON or OFF on the Input Signal..

<descramble>	boolean	ON | 1 |OFF | 0

Selecting ON (1), the Input Signal is descrambled.

Selecting OFF (0), the Input Signal is not descrambled.

If this command is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:DESCramble?

This command returns the current setting selected by (:SENSe:DATA:TELecom:DESCramble).

Returns : <descramble>

:SENSe:DATA:TELecom:MAPPing:MODE <mode>

This command selects the Mapping Mode.

<mode>	discrete	OFF | INTernal

INTernal uses the transmitter's internally generated payload signal consisting of path and signal overhead and payload frame formats from VC3/STS-1 SPE to VC-64c/STS-192c SPE.

When the mode is set to OFF, the SOH is present and the entire payload is bulk filled with the test pattern (PRBS pattern etc.). In this mode the compatibility with previous products can be set up by using the command :SOURce:DATA:TELecom:CMODe.

If the comand is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:MAPPing:MODE?

This command returns the current mapping mode setting.

Returns : <mode>

:SENSe:DATA:TELecom:MAPPing <discrete>

This command selects the mapping test signal.

<discrete>	discrete	AU4-64c | AU4-16c | AU4-4c | AU4 | AU3 | STS-192c | STS-48c | STS-12c | STS-3c | STS-1

If the command is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:MAPPing?

The command returns the current Mapping setting.

Returns : <discrete>

:SENSe:DATA:TELecom:MAPPing:CHANnel <ch>

This command selects the channel.

<ch>	numeric	1 through 64

Table 3-1. Channel Setting Range

	STM-64/OC-192	STM-16/OC-48
STM-64/STS-192	Not Valid	Not Valid
STM-16/STS-48	1 through 4	Not Valid
STM-4/STS-12	1 through 16	1 through 4
STM-1/STS-3	1 through 64	1 through 16

If the rate is modified by :SOURce:DATA:TELecom:MAPPing or :SOURce:DATA:TELecom:MAPPing:EXTernal, the setting range is changed to match.

If this command is sent during mesurement, a command error is generated.

:SENSe:DATA:TELecom:MAPPing:CHANnel?

This command returns the setting of Channel for :SENSe:DATA:TELecom:MAPPing:CHANnel <ch>.

Returns : <channel>

:SENSe:DATA:TELecom:MAPPing:CHANnel:TRIButary <ch>

This command selects the VC3 or STS-1 channel to test.

<ch> numeric 1 through 4

This command is only valid when the mapping mode is set to VC3 or STS-1.

If this command is sent during the mesurement, a command error is generated.

:SENSe:DATA:TELecom:MAPPing:CHANnel:TRIButary?

This command returns the value of VC3 or STS-1 channel set by :SENSe:DATA:TELecom:MAPPing:CHANnel:TRIButary <ch>

Returns : <ch>

:SENSe:DATA:TELecom:CMODe <discrete>

This command sets the compatiblity mode or CID pattern when mapping is OFF. The bit-error monitoring area is set up by this command.

<discrete>	discrete	J142X | AP9940 | CID

This command can be used when OFF is set up with :SOURce:DATA:TELecom:MAPPing:MODE.

Using J142X, there is no path overhead and the payload is bulk filled.

Using AP9940, the whole payload and the M-SOH areas serve as a monitoring area.

Using CID, the whole payload and except the 1st line of the SOH area serves as a monitoring area.

If this command is sent during a mesurement, a command error is generated.

:SENSe:DATA:TELecom:CMODe?

This commad returns the setting of the compatibility mode set by :SENSe:DATA:TELecom:CMODe <discrete>.

Returns : <discrete>

:OUTPut:TELecom:CHANnel <mode>

This commad sets the channel output mode of the received signal.

<mode>	discrete	OFF | ALL | SELEct

ALL outputs all the channels of the received signal.

SELEct outputs only the mapping channel selected with :SENSe:DATA:TELecom:MAPPing:CHANnel.

SELEct cannot be selected when :SENSe:DATA:TELecom:MAPPing:MODE is set to OFF.

SELEct selects STN64 (OC-192) with (:SENSe:DATA:TELecom:RATE) but cannot select if AU4-64c (STS-192c) or STM-64(STS-192) is set up with :SENSe:DATA:TELecom:MAPPing:EXTernal.

SELEct selects STN16 (OC-48) with (:SENSe:DATA:TELecom:RATE) but cannot select if AU4-16c (STS-48c) is set up with :SENSe:DATA:TELecom:MAPPing or STM-16(STS-48) is set up with :SENSe:DATA:TELecom:MAPPing:EXTernal.

If this command is sent during a mesurement, a command error is generated.

:OUTPut:TELecom:CHANnel?

This command returns the receiver channel output mode set by :OUTPut:TELecom:CHANnel<mode>.

Returns : <mode>

:SENSe:DATA:TELecom:TMODE <testmode>

This command sets the Receiver Test Mode.

<testmode>	discrete	PRBS | PROGram CID

If this command is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:TMODE?

This command returns the current Receiver Test Mode selected by :SENSe:DATA:TELecom:TMODE.

Returns : <testmode>

:SENSe:DATA:TELecom:TMODE:PROGram:PATTern <pattern>

This command sets the ProgramPattern.

<pattern>	discrete	ALL0 | ALL1 | USER

When selecting ALL0, the program pattern is all 0s.

When selecting ALL1, the program pattern is all 1s.

When selecting USER, the program pattern is User Defined Data. User Defined Data is set by :SENSe:DATA:TELecom:TMODE:PROGram:UDATa.

The program pattern selected by this command can be received only when setting PROGram on :SENSe:DATA:TELecom:TMODE.

If this command is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:TMODE:PROGram:PATTern?

This command returns the current program pattern selected by :SENSe:DATA:TELecom:TMODE:PROGram:PATTern.

Returns : <pattern>

:SENSe:DATA:TELecom:TMODE:PROGram:UDATa <byteno>,<userdata>

This command sets the User Defined Data of the program pattern. .

<byteno>	numeric	1 to 64
<userdata>	numeric	0 to 255

Sets the user defined data for the selected byteno.

User defined data selected by this command will be received only when PROgram or TMODE is selected with :SENSe:DATA:TELecom:TMODE and USER or PATTern with :SENSe:DATA:TELecom:TMODE:PROGram. Default value is “0” for all byte numbers.

If this command is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:TMODE:PROGram:UDATa? <byteno>

This command returns the user defined data of the current program pattern set by (:SENSe:DATA:TELecom:TMODE:PROGram:UDATa).

Returns : <byteno>,<userdata>

Returns the user defined data to selected byte number.

:SENSe:DATA:TELecom:TMODE:PRBS:PATTern<pattern>

This command sets the PRBS Pattern.

<pattern>	discrete	PRBS23 | PRBS9 PRBS10 | PRBS11 PRBS15 | PRBS20 PRBS31

The program pattern selected by this command will be received only when setting PRBS on TMODE selection of : SENSe:DATA:TELecom:TMODE.

If this command is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:TMODE:PRBS:PATTern?

This command returns the current PRBS Pattern selected by (:SENSe:DATA:TELecom:TMODE:PRBS:PATTern).

Returns : <pattern>

:SENSe:DATA:TELecom:TMODE:PRBS:POLarity<polarity>

This command sets the polarity of the internal reference PRBS pattern.

<polarity>	discrete	NORMal | INVerted

When set to NORMal, the PRBS pattern is normal polarity.

When set to INVerted, polarity of the PRBS pattern is inverted.

PRBS will be received only when PRBS is set on TMODE selection of :SOURce:DATA:TELecom:TMODE.

If this command is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:TMODE:PRBS:POLarity?

This command returns the current logic polarity of the PRBS pattern selected by (:SENSe:DATA:TELecom:TMODE:PRBS:POLarity).

Returns : <polarity>

CID Pattern Setup

:SENSe:DATA:TELecom:TMODE:CID:LENGth <length>

This command sets the 0/1 Continuance CID Pattern Length.

<length>	numeric	1 to 128	STM-64/OC-192
		1 to 32	STM-16/OC-48

The CID pattern defined by this command will be received only if CID is set on :TMODE selection of :SENSe:DATA:TELecom.

If :SOURce:RATE is set to G10, the length of valid selection range is 1 to 128.

If :SOURce:RATE is set to G2_5, the length of valid selection range is 1 to 32.

If STM-16 or OC48 rate is selected in :SENSe:DATA:TELecom:RATE , it forces the setting of :SENSe:DATA:TELecom:TMODE:CID:LENGth to 32 as the maximum value at 2.5G.

If this command is sent during measurement, a Command Error is generated.

:SENSe:DATA:TELecom:TMODE:CID:LENGth?

This command returns the current setting of the 0/1 continuance CID pattern length selected by (:SENSe:DATA:TELecom:TMODE:CID:LENGth)

Returns : <length>

Cumulative Results Setup

These parameters return the cumulative value from the start of measurement to receiving the command.

Alarms

:SENSe:DATA?<"result">

where "result" =:

"ASEConds:LOS [CUMulative]" : This returns the cumulative count of LOS Alarm Seconds measurement.

"ASEConds:LOF [CUMulative]" : This returns the cumulative count of LOF Alarm Seconds measurement.

"ASEConds:OOF [CUMulative]" : This returns the cumulative count of OOF Alarm Seconds measurement.

"ASEConds:AIS [CUMulative]" : This returns the cumulative count of AIS Alarm Seconds measurement.

"ASEConds:RDI [CUMulative]" : This returns the cumulative count of RDI Alarm Seconds measurement.

"ASEConds:SYNC [CUMulative]" : This returns the cumulative count of SYNC Alarm Seconds measurement.

"ASEConds :PAIS [CUMulative]" : This returns the cumulative count of PAIS Alarms Seconds measurement.

"ASEConds :PLOP [CUMulative]" : This returns the cumulative count of PLOP Alarms Seconds measurement.

"ASEConds :PRDI [CUMulative]" : This returns the cumulative count of PRDI Alarms Seconds measurement.

"ASEConds:ALL [CUMulative]" : This returns the cumulative count of all Alarm Seconds measurements.

Errors

:SENSe:DATA?<"result">

where "result" =:

"ECOunt:B1 [CUMulative]" : This returns the cumulative count of B1 Error measurement.

"ECOunt:B2 [CUMulative]" : This returns the cumulative count of B2 Error measurement.

"ECOunt:REI [CUMulative]" : This returns the cumulative count of REI Error measurement.

"ECOunt:B3 [CUMulative]" : This returns the cumulative count of B3 Error measurement.

"ECOunt :PREI [CUMulative]" : This returns the cumulative count of PREI Error measurement.

"ECOunt:BIT [CUMulative]" : This returns the cumulative count of Bit Error measurement.

"ERATio:B1 [CUMulative]" : This returns the cumulative error ratio of B1 Error measurement.

"ERATio:B2 [CUMulative]" : This returns the cumulative error ratio of B2 Error measurement.

"ERATio:REI [CUMulative]" : This returns the cumulative error ratio of REI Error measurement.

"ERATio:B3 [CUMulative]" : This returns the cumulative error ratio of B3 Error measurement.

"ERATio :PREI [CUMulative]" : This returns the cumulative error ratio of PREI Error measurement.

"ERATio:BIT [CUMulative]" : This returns the cumulative error ratio of BIT Error measurement.

"ESEConds:B1 [CUMulative]" : This returns the cumulative error count of B1 error second measurement.

"ESEConds:B2 [CUMulative]" : This returns the cumulative error count of B2 error second measurement.

"ESEConds:REI [CUMulative]" : This returns the cumulative error count of REI error second measurement.

"ESEConds:B3 [CUMulative]" : This returns the cumulative error count of B3 error second measurement.

"ESEConds :PREI [CUMulative]" : This returns the cumulative error count of PREI error second measurement.

"ESEConds:BIT [CUMulative]" : This returns the cumulative error count of BIT error second measurement.

"ECOunt:ALL [CUMulative]" : This returns the cumulative count of all Error measurements.

"ERATio:ALL [CUMulative]" : This returns the cumulative error ratio of all Error measurements.

"ESEConds:ALL [CUMulative]" : This returns the cumulative count of all Error Seconds measurements.

Integration Period Results Setup

These parameters return the previous result of the Integration Period Measurement.

Alarms

:SENSe:DATA?<"result">

where "result =:

"ASEConds:LOS IPERiod" : This returns measurement result of LOS Alarm Seconds.

"ASEConds:LOF IPERiod" : This returns the measurement result of LOF Alarm Seconds.

"ASEConds:OOF IPERiod" : This returns the measurement result of OOF Alarm Seconds.

"ASEConds:AIS IPERiod" : This returns the measurement result of AIS Alarm Seconds.

"ASEConds:RDI IPERiod" : This returns the measurement result of RDI Alarm Seconds.

"ASEConds:SYNC IPERiod" : This returns the measurement result of SYNC Alarm Seconds.

"ASEConds :PAIS IPERiod" : This returns measurement result of PAIS alarm seconds.

"ASEConds :PLOP IPERiod" : This returns measurement result of PLOP alarm seconds.

"ASEConds :PRDI IPERiod" : This returns measurement result of PRDI alarm seconds.

"ASEConds:ALL IPERiod" : This returns the measurement results of all Alarm Seconds.

Errors

:SENSe:DATA?<"result">

where "result" =:

"ECOunt:B1 IPERiod" : This returns the measurement result of B1 Error count.

"ECOunt:B2 IPERiod" : This returns the measurement result of B2 Error count.

"ECOunt:REI IPERiod" : This returns the measurement result of REI Error count.

"ECOunt:BIT IPERiod" : This returns the measurement result of Bit Error count.

"ECOunt:B3 IPERiod" : This returns the measurement result of B3 Error count.

"ECOunt:PREI IPERiod" : This returns the measurement result of PREI Error count.

"ERATio:B1 IPERiod" : This returns the error ratio of B1 Error measurement.

"ERATio:B2 IPERiod" : This returns the error ratio of B2 Error measurement.

"ERATio:REI IPERiod" : This returns the error ratio of REI Error measurement.

"ERATio:BIT IPERiod" : This returns the error ratio of Bit Error measurement.

"ERATio:B3 IPERiod" : This returns the error ratio of B3 Error measurement.

"ERATio:PREI IPERiod" : This returns the error ratio of PREI Error measurement.

"ESEConds:B1 IPERiod" : This returns the measurement result of B1 Error seconds.

"ESEConds:B2 IPERiod" : This returns the measurement result of B2 Error seconds.

"ESEConds:REI IPERiod" : This returns the measurement result of REI Error seconds.

"ESEConds:BIT IPERiod" : This returns the measurement result of BIT Error seconds.

"ESEConds:B3 IPERiod" : This returns the measurement result of B3 Error seconds.

"ESEConds:PREI IPERiod" : This returns the measurement result of PREI Error seconds.

"ECOunt:ALL IPERiod" : This returns the measurement results of all Error counts.

"ERATio:ALL" : This returns the error ratio of all error measurements.

"ESEConds:ALL IPERiod" : This returns the measurement results of all Error seconds.

G.828/G.826 Monitoring Setup

This section describes the use of SCPI commands in G.828/G.826 measurement functions.

SCPI Commands

Please refer to the next table for SCPI commands and G.828/G.826 parameters.

Table 3-2. G.828/G.826 Parameters and SCPI Commands

Parameter	Meaning	SCPI Command
ES	Error Seconds	:SENSe:DATA? "ESEConds:B1:ANALysis" :SENSe:DATA? "ESEConds:B2:ANALysis" :SENSe:DATA? "ESEConds:REI:ANALysis" :SENSe:DATA? "ESEConds:B3:ANALysis" :SENSe:DATA? "ESEConds:PREI:ANALysis" :SENSe:DATA? "ESEConds:ALL:ANALysis"
SES	Severely Errored Seconds	:SENSe:DATA? "SESeconds:B1:ANALysis" :SENSe:DATA? "SESeconds:B2:ANALysis" :SENSe:DATA? "SESeconds:REI:ANALysis" :SENSe:DATA? "SESeconds:B3:ANALysis" :SENSe:DATA? "SESeconds:PREI:ANALysis" :SENSe:DATA? "SESeconds:ALL:ANALysis"
SEP	Severely Errored Period	:SENSe:DATA? "SEPeriod:B1:ANALysis" :SENSe:DATA? "SEPeriod:B2:ANALysis" :SENSe:DATA? "SEPeriod:REI:ANALysis" :SENSe:DATA? "SEPeriod:B3:ANALysis" :SENSe:DATA? "SEPeriod:PREI:ANALysis" :SENSe:DATA? "SEPeriod:ALL:ANALysis"
EB	Errored Block Count	:SENSe:DATA? "EBCount:B1:ANALysis" :SENSe:DATA? "EBCount:B2:ANALysis" :SENSe:DATA? "EBCount:REI:ANALysis" :SENSe:DATA? "EBCount:B3:ANALysis" :SENSe:DATA? "EBCount:PREI:ANALysis"

Table 3-2. G.828/G.826 Parameters and SCPI Commands

		:SENSe:DATA? "EBCount:ALL:ANALysis"
BBE	Background Block Error Count	:SENSe:DATA? "BBECount:B1:ANALysis" :SENSe:DATA? "BBECount:B2:ANALysis" :SENSe:DATA? "BBECount:REI:ANALysis" :SENSe:DATA? "BBECount:B3:ANALysis" :SENSe:DATA? "BBECount:PREI:ANALysis" :SENSe:DATA? "BBECount:ALL:ANALysis"
ESR	Error Second Ratio	:SENSe:DATA? "ESRatio:B1:ANALysis" :SENSe:DATA? "ESRatio:B2:ANALysis" :SENSe:DATA? "ESRatio:REI:ANALysis" :SENSe:DATA? "ESRatio:B3:ANALysis" :SENSe:DATA? "ESRatio:PREI:ANALysis" :SENSe:DATA? "ESRatio:ALL:ANALysis"
SESR	Severely Errored Second Ratio	:SENSe:DATA? "SESRatio:B1:ANALysis" :SENSe:DATA? "SESRatio:B2:ANALysis" :SENSe:DATA? "SESRatio:REI:ANALysis" :SENSe:DATA? "SESRatio:B3:ANALysis" :SENSe:DATA? "SESRatio:PREI:ANALysis" :SENSe:DATA? "SESRatio:ALL:ANALysis"
BBER	Background Block Error Ratio	:SENSe:DATA? "BBERatio:B1:ANALysis" :SENSe:DATA? "BBERatio:B2:ANALysis" :SENSe:DATA? "BBERatio:REI:ANALysis" :SENSe:DATA? "BBERatio:B3:ANALysis" :SENSe:DATA? "BBERatio:PREI:ANALysis" :SENSe:DATA? "BBERatio:ALL:ANALysis"
US	Unavailable Seconds	:SENSe:DATA? "UASeconds:B1:ANALysis" :SENSe:DATA? "UASeconds:B2:ANALysis" :SENSe:DATA? "UASeconds:REI:ANALysis" :SENSe:DATA? "UASeconds:B3:ANALysis"

Table 3-2. G.828/G.826 Parameters and SCPI Commands

		:SENSe:DATA? "UASeconds:PREI:ANALysis" :SENSe:DATA? "UASeconds:ALL:ANALysis"
SEPI	Severely Errored Period Intensity	:SENSe:DATA? "SEPIntensity:B1:ANALysis" :SENSe:DATA? "SEPIntensity:B2:ANALysis" :SENSe:DATA? "SEPIntensity:REI:ANALysis" :SENSe:DATA? "SEPIntensity:B3:ANALysis" :SENSe:DATA? "SEPIntensity:PREI:ANALysis" :SENSe:DATA? "SEPIntensity:ALL:ANALysis"
ALL	All data requests	:SENSe:DATA? "B1:ALL:ANALysis" :SENSe:DATA? "B2:ALL:ANALysis" :SENSe:DATA? "REI:ALL:ANALysis" :SENSe:DATA? "B3:ALL:ANALysis" :SENSe:DATA? "PREI:ALL:ANALysis"

Return

1. In " B1:ANALysis"/" ... B2:ANALysis"/" ...REI:ANALysis each monitoring result is returned.
2. In ALL:ANALysis" The monitoring result is separated with commas.

<B1 information>, <B2 information>, <REI information>, <B3 information>, <PREI information>

The format of each measured value is returned as follows:

Table 3-3. Parameter Format of G.828/G.826 Parameters

Parameter	Meaning	Format of Response
ES	Error Seconds	Decimal
SES	Severely Errored Seconds	Decimal
SEP	Severely Errored Period	Decimal
EB	Errored Block count	Decimal
BBE	Background Block Error count	Decimal
ESR	Error Second Ratio	Exponent form
SESR	Severely Errored Second Ratio	Exponent form
BBER	Background Block Error Ratio	Exponent form
US	Unavailable Seconds	Decimal
SEPI	Severely Errored Period Intensity	Exponent form

3. In the case of "B1:ALL:ANALysis", "B2:ALL:ANALysis", and "REI:ALL:ANALysis" all parameters are divided with a comma.

ES,SES,SEP,EB,BBE,ESR,SESR,BBER,US,SEPI

If a :SENSe:DATA:TELecom:TMODE value is CID, it becomes an error and returns an error message.

Measurement Time Information Setup

:SENSe:DATA:ELAPsed ?

This command returns the measurement elapsed time (in seconds).

J0 Data Setup

Set Up the String Length

:SENSe:DATA:TELecom:J0:DATA:LENGth <length>

This command sets the length of the J0 string.

<length>	discrete	16 | 64

Request the String Length

:SENSe:DATA:TELecom:J0:DATA:LENGth?

This command returns the length of the J0 string.

Returns :	<length>	

Request by String

:FETCh:STRing:DATA:TELecom:J0?

Returns :	<string>	15/16 ASCII chars
		62/64 ASCII chars

15 character string if CRC7 error is detected.

16 character string if CRC7 error is not detected.

62 character string if CR, LF is detected.

64 character string if CR, LF is not detected.

If the string contains any non-printing characters, then "~" is substituted.

Request by HEX

:FETCh:STRing:DATA:TELecom:J0:HEXadecimal?

Returns :	<block>	

The block header is #215 if CRC7 error is detected.

The block header is #216 if CRC7 error is not detected.

The block header is #262 if CR, LF is detected.

The block header is #264 if CR, LF is not detected.

J1 Data Setup

Set Up the String Length

:SENSe:DATA:TELecom:J1:DATA:LENGth <length>

This command sets the length of the J1 string.

<length>	discrete	16 | 64

Request the String Length

:SENSe:DATA:TELecom:J1:DATA:LENGth?

This command returns the length of the J1 string.

Returns : <length>

Request by String

:FETCh:STRing:DATA:TELecom:J1?

Returns :	<string>	15/16 ASCII chars
		62/64 ASCII chars

15 character string if CRC7 error is detected.

16 character string if CRC7 error is not detected.

62 character string if CR, LF is detected.

64 character string if CR, LF is not detected.

If the string contains any non-printing characters, then "~" is substituted.

Request by HEX

:FETCh:STRing:DATA:TELecom:J1:HEXadecimal?

Returns : <block>

The block header is #215 if CRC7 error is detected.

The block header is #216 if CRC7 error is not detected.

The block header is #262 if CR, LF is detected.

The block header is #264 if CR, LF is not detected.

Pointer Setup

Note These commands are invalid if Mapping mode is OFF.

:FETCh:SCALar:DATA:TELecom:PVALue?

The AU pointer value of an input signal is returned.

Returns : <pvalue> (decimal)

:FETCh:SCALar:DATA:TELecom:POFFset?

The AU pointer offset value of a received signal is returned.

Returns : <poffset> (decimal)

:SENSe:DATA? "PACTivity:PSEConds [CUMulative]"

The POS (Positive Justification) seconds measured value of the AU pointer is returned.

Returns : <pointer POS seconds> (decimal)

:SENSe:DATA? "PACTivity:NSEConds [CUMulative]"

The NEG (Negative Justification) seconds measured value of the AU pointer is returned.

Returns : <pointer NEG seconds> (decimal)

:SENSe:DATA? "PACTivity:NDFSeconds [CUMulative]"

The NDF (New Data Flag) seconds measured value of the AU pointer is returned.

Returns : <pointer NDF seconds> (decimal)

:SENSe:DATA? "PACTivity:MNDFSeconds [CUMulative]"

The MNDF (Missing New Data Flag) seconds measured value of the AU pointer is returned.

Returns : <pointer MNDF seconds> (decimal)

:SENSe:DATA? "PACTivity:PCOunt [CUMulative]"

The POS (Positive Justification) count of the AU pointer is returned.

Returns : <pointer POS count> (decimal)

:SENSe:DATA? "PACTivity:NCOunt [CUMulative]"

The NEG (Negative Justification) count of the AU pointer is returned.

Returns : <pointer NEG count> (decimal)

:SENSe:DATA? "PACTivity:ALL [CUMulative]"

All the measured results of AU pointer are retuned.

Returns : <POS seconds >, <NEG seconds>,
<NDF seconds>, <MNDF seconds>,
<POS count>, <NEG count>

The values are returned as decimal numbers.

:SENSe:DATA? "PACTivity:PSEConds IPERiod"

The POS (Positive Justification) seconds value of the AU pointer in a previous measurement cycle is returned.

Returns : <pointer POS seconds> (decimal)

:SENSe:DATA? "PACTivity:NSEConds IPERiod"

The NEG (Negative Justification) seconds value of the AU pointer in a previous measurement cycle is returned.

Returns : <pointer NEG seconds> (decimal)

:SENSe:DATA? "PACTivity:NDFSeconds IPERiod"

The NDF (New Data Flag) seconds value of the AU pointer in a previous measurement cycle is returned.

Returns : <pointer NDF seconds> (decimal)

:SENSe:DATA? "PACTivity:MNDFSeconds IPERiod"

The MNDF (Missing New Data Flag) seconds value of the AU pointer in a previous measurement cycle is returned.

Returns : <pointer MNDF seconds> (decimal)

:SENSe:DATA? "PACTivity:PCOunt IPERiod"

The POS (Positive Justification) count of the AU pointer in a previous measurement cycle is returned.

Returns : <pointer POS count> (decimal)

:SENSe:DATA? "PACTivity:NCOunt IPERiod"

The NEG (Negative Justification) count of the AU pointer in a previous measurement cycle is returned.

Returns : <pointer NEG count> (decimal)

:SENSe:DATA? "PACTivity:ALL IPERiod"

All the measured results of AU pointer in a previous measurement cycle are retuned.

Returns : <POS seconds >, <NEG seconds>,
<NDF seconds>, <MNDF seconds>,
<POS count>, <NEG count>

The values are returned as decimal numbers.

Logging Setup

The instrument has the ability to log alarms and errors at one second intervals during a measurement. The logged data can then be read from the instrument and subsequently displayed in a graphical or tabular format.

Log Information

Two types of information are recorded Alarm Status and Error Count.

The alarms and errors logged will vary, depending on the Test Mode selected, as shown in the following table:

Table 3-4. Logged Data

Type	Item	Test Mode		
		PROGram	PRBS	CID
Alarm	LOS	•[1]	•	•
	LOF	•	•	•
	OOF	•	•	•
	AIS	•	•	–[2]
	RDI	•	•	–
	SYNC	–	•	•
	PAIS			
	PLOP			
	PRDI			
Error	B1	•	•	–
	B2	•	•	–
	REI	•	•	–
	BIT	•	•	•
	B3			
	PREI			

1 • Logged
2 – Not Logged

Managing Log Records

The instrument records the information shown above, at one second intervals during a measurement. The maximum number of records that can be stored in the instrument is 20, therefore to ensure no data is lost the records must be read more frequently that every 20 seconds.

New records are discarded if the instrument is already holding 20 records and there is therefore no space left.

To manage the logged records there are commands to query the instrument for the number of records and to clear stored records.

The log records will be cleared at power on, with the logging clear command and with the Word Serial CLEAR command. (Log records are not cleared with the *RST and *CLS commands.)

Reading Log Records

To read logged data, two SCPI commands are provided. The first command is used to query the instrument for the number of records currently held in the queue and the second command is used to get the records from the instrument. The command to get the records can return several records at once.

SCPI Commands

The SCPI Logging Commands are listed in Table 3-5 and explained in the paragraphs following.

Table 3-5. SCPI Logging Commands

SCPI Command	Description
:SENSe:DATA:TELecom:SMG:HDATa[:NORMal]? [Read Number]	Request log records
:SENSe:DATA:TELecom:SMG:HDATa:NUMBer?	Request the number of log records
:SENSe:DATA:TELecom:SMG:HDATa:CLEar	Clear log information
:SENSe:DATA:TELecom:SMG:HDATa:STATus	Log status

:SENSe:DATA:TELecom:SMG:HDATa[:NORMal]? [Read Number]

This command returns log records.

[Read Number] discrete 1 - 20

[Read Number] The number of log records to be read from the instrument (1-20). Read Number will default to 1 if the parameter is not specified.

Response

The log record is returned in the following format.

Returns : <SerialNo >, <Alarm information>,
<ErrorCount1>, <ErrorCount2>, <ErrorCount3>...

SerialNo Numeric in the range -1,1 to 3596400

SerialNo is the record number in the queue. (SerialNo is the same as the number of seconds of the current measurement.)

If no more log records are available, then the value -1 will be returned.

Alarm information Numeric in the range 1 to 512

Each bit shows whether an alarm was set for 1 second. (0 = No Alarm, 1 = Alarm exists.) The following table shows which bit represents each alarm.

Bit	Item
0	LOS
1	LOF
2	OOF
3	AIS[1]
4	RDI[1]
5	SYNC[2]
6	PAIS[1]
7	PLOP[1]
8	PRDI[1]

1 Invalid when :SENSe:DATA:TELecom:TMODE is set to CID. (Invalid is represented by 0.)
2 Invalid when :SENSe:DATA:TELecom:TMODE is set to PROGram. (Invalid is represented by 0.)

ErrorCountX Where X can be from 1 to 6 in numeric exponent form

When :SENSe:DATA:TELecom:TMODE is PROGram or PRBS

<B1 Count>, <B2 Count>, <REI Count>,
<BIT Count>,<B3 Count>,<PREI Count>

When :SENSe:DATA:TELecom:TMODE is CID

<BIT Count>

Note SerialNo is set to -1 when the log record queue is empty and Alarm information and ErrorCount information are not included in the response message.

When [Read Number] parameter is greater than the number of log records in the queue, -1 is returned after all the valid log records held. (Refer to Example)

Examples

When Read Number parameter is omitted

Sent: :SENSe:DATA:TELecom:SMG:HDATa:NUMBer?

Returned: 3

Sent: :SENSe:DATA:TELecom:SMG:HDATa?

Returned: 1,0,0.00E+0,0.00E+0,0.00E+0,0.00E+0

Sent: :SENSe:DATA:TELecom:SMG:HDATa?

Returned: 2,0,0.00E+0,0.00E+0,0.00E+0,0.00E+0

Sent: :SENSe:DATA:TELecom:SMG:HDATa?

Returned: 3,0,0.00E+0,0.00E+0,0.00E+0,0.00E+0

When Read Number parameter is added

Sent: :SENSe:DATA:TELecom:SMG:HDATa:NUMBer?

Returned: 3

Sent: :SENSe:DATA:TELecom:SMG:HDATa? 3

Returned: 1,0,0.00E+0,0.00E+0,0.00E+0,0.00E+0

2,0,0.00E+0,0.00E+0,0.00E+0,0.00E+0

3,0,0.00E+0,0.00E+0,0.00E+0,0.00E+0

When Read Number parameter larger than the recorded log information is added

Sent: :SENSe:DATA:TELecom:SMG:HDATa:NUMBer?

Returned: 3

Sent: :SENSe:DATA:TELecom:SMG:HDATa? 10

Returned: 1,0,0.00E+0,0.00E+0,0.00E+0,0.00E+0

2,0,0.00E+0,0.00E+0,0.00E+0,0.00E+0

3,0,0.00E+0,0.00E+0,0.00E+0,0.00E+0

-1

In this case 10 is specified as [Read Number] when the log record queue is 3. (-1 is returned after the 3 log entries.)

:SENSe:DATA:TELecom:SMG:HDATa:CLEar

The queue of log records and the error status of the log are cleared.

:SENSe:DATA:TELecom:SMG:HDATa:NUMBer?

Returns the number of log records in the queue.

Returns : <Number> (numeric 0 to 20)

:SENSe:DATA:TELecom:SMG:HDATa:STATus?

Returns the status of logging.

Returns : <Status> (numeric 0 | -1)

0 = No Error.

-1 = Canceled log information.

The error information is cleared after returning a response.

APS Capture Setup

The TRIGger [1] subsystem is only used for APS capture.

:ABORt[1]

The TRIGger [1] subsystem (APS capture mode) is reset to an idle state.

This command cannot be set when
:SENSe:DATA:TELecom:MAPPing:MODE is set to OFF and
SENSe:DATA:TELecom:CMODe is set to J142X or AP9940.

When TRIGger [1] subsystem is in a "wait for trigger" state, this command shifts to an idle state and sets APS bit of CAPTrigger Status Register and set the APS bit of SYSActive Status Register.

When TRIGger [1] subsystem is an idle state, this command has no effect.

This command will stop the TRIGger[1] subsystem when it is in the “wait for trigger” state.

:INITiate[1][:IMMediate]

The TRIGger [1] subsystem (APS capture) is started.

This command cannot be set when
:SENSe:DATA:TELecom:MAPPing:MODE is set to OFF, and
:SENSe:DATA:TELecom:CMODe is set to J142X or AP9940.

When TRIGger [1] subsystem is in a "idle" status, this command shifts to “wait for trigger” state and clears the APS bit of CAPTrigger Status Register and sets APS bit of SYSActive Status Register.

When TRIGger [1] subsystem is in a "wait for trigger" state, this command generates an error.

:TRIGger[1][:IMMediate]

A trigger is generated with TRIGger [1] subsystem (APS capture mode).

This command cannot be set when
:SENSe:DATA:TELecom:MAPPing:MODE is set to OFF, and
:SENSe:DATA:TELecom:CMODe is set to J142X or AP9940.

When TRIGger [1] subsystem is in a "wait for trigger" state, this command shifts to an idle state, sets up APS bit of CAPTrigger Status Register and clears the APS bit of SYSActive Status Register.

When TRIGger [1] subsystem is an idle state, this command generates an error.

:TRIGger[1]:LOGic <condition>

The trigger conditions of the TRIGger [1] subsystem (APS capture mode) are set up.

<condition>	discrete	CHANge | EQUAl | NOTEqual

This command cannot be set when :SENSe:DATA:TELecom:MAPPing:MODE is set to OFF, and :SENSe:DATA:TELecom:CMODe is set to J142X or AP9940.

If EQUAl is selected, a trigger is generated when the data set up with :TRIGer:LOGic:VALue and :TRIGer:LOGic:MASK, correspond.

If NOTEqual is selected, a trigger is generated when the data set up with :TRIGer:LOGic:VALue and :TRIGer:LOGic:MASK do not corresponded.

If CHANge is selected, a trigger is generated when the receiving APS message is changed.

This command is effective when LOGic is set up with :TRIGger:SOURce.

:TRIGger[1]:LOGic?

The trigger conditions of TRIGger [1] subsystem (APS capture mode) are returned.

Returns : <condition>

:TRIGger[1]:LOGic:DATA <source>

This command sets the source for the TRIGger [1] subsystem.

This command should be set before using the commands of the TRIGger [1] subsystem.

<source>	discrete	APSWitch

This command cannot be set when :SENSe:DATA:TELecom:MAPPing:MODE is set to OFF, and :SENSe:DATA:TELecom:CMODe is set to J142X or AP9940.

:TRIGger[1]:LOGic:DATA?

The trigger source of the TRIGger [1] subsystem is returned.

Returns : <source>

:TRIGger[1]:LOGic:MASK <mask>

The effective bits of the trigger comparison data of TRIGger [1] subsystem are set up.

This command is effective during an idle state. .

<mask>	numeric	65535 to 0

This command cannot be set when
:SENSe:DATA:TELecom:MAPPing:MODE is set to OFF and
:SENSe:DATA:TELecom:CMODe is set to J142X or AP9940.

This command is effective when EQUAl and NOTEqual are set up with :TRIGger:SOURce and :TRIGger:LOGic.

:TRIGger[1]:LOGic:MASK?

The effective bits of the trigger comparison data of TRIGger [1] subsystem is returned.

Returns : <mask>

:TRIGger[1]:LOGic:VALue <value>

The trigger comparison data of TRIGger [1] subsystem is set up.

This command is effective during an idle state.

Although this command can always be set up, the actual time of set up is when LOGic is selected with the TRIG:SOUR command and VALue or NOTValue is selected with TRIG:LOG command. .

<value>	numeric	0 to 65535

This command cannot be set when
:SENSe:DATA:TELecom:MAPPing:MODE is set to OFF and
:SENSe:DATA:TELecom:CMODe is set to J142X or AP9940.

This command is effective when EQUAl or NOTEqual are set up with :TRIGger:SOURce and :TRIGger:LOGic.

:TRIGger[1]:LOGic:VALue?

The trigger comparison data of TRIGger [1] subsystem is returned.

Returns : <value>

:TRIGger[1]:SOURce <source>

The source of the TRIGger [1] subsystem is set up with this command. The trigger can be directly generated or generated with the condition set up by TRIG:LOG command.

<source>	discrete	MANUal | LOGic

This command cannot be set when
:SENSe:DATA:TELecom:MAPPing:MODE is set to OFF and
:SENSe:DATA:TELecom:CMODe is set to J142X and AP9940.

This command is effective during an idle state.

If the MANU parameter is used, the "wait for trigger" state is continued after using the INIT command until the TRIG:IMM command is used.

If the LOG parameter is used, the "wait for trigger" state is continued after using the INIT command until meeting the conditions set up by the TRIG:LOG command.

:TRIGger[1]:SOURce?

The source of TRIGger [1] subsystem is returned.

Returns : <source>

:TRIGger[1]:LOGic:POINt <position>

The trigger position of TRIGger [1] Subsystem (APS capture) is specified.

<position>	discrete	STARt | CENTer | STOP

This command cannot be set when :SENSe:DATA:TELecom:MAPPing:MODE is set to OFF and :SENSe:DATA:TELecom:CMODe is set to J142X or AP9940.

This command is effective during an idle state.

When STARt is selected, if trigger conditions are matched, the data of 64 states is captured and APS capture is stopped. Therefore, the data of 64 states and their frame numbers can be obtained.

When CENTer is selected, if trigger conditions are matched the data of 32 states is captured and APS capture is stopped. Therefore, the data of a maximum of 32 states and their frame numbers before the trigger conditions are matched and 32 states and their frame numbers after the tigger conditions are matched can be obtained.

When STOP is selected, if trigger conditions are matched, APS capture will be stopped. Therefore, the data of up to a maximum of 64 states and their frame numbers before the trigger conditions are matched can be obtained.

:TRIGger[1]:LOGic:POINt?

The trigger position of TRIGger [1] subsystem (APS capture) is returned.

Returns : <position>

:FETCh:ARRay:DATA:TELecom:APSWitch? <samples>,<start>

The contents of APS capture data from <start> position for <samples> are returned.

<samples>	numeric	1 to 64
<start>	numeric	1 to 64

Response

A maximum of 64 data values and frame numbers are returned. <value> returns the value of K 1 x 256 +K2.

Returns:	<value>	numeric	0 to 65535
	<frame>	numeric	1 to 80000

Data in the list is ordered from oldest to newest and is separated with a commas (,) as shown below:

value1, frame1, value2, frame2, ... value64, frame64

This command cannot be set when :SENSe:DATA:TELecom:MAPPing:MODE is set to OFF and :SENSe:DATA:TELecom:CMODe is set to J142X and AP9940.

If the number of frames overflows a counter, <frame> will return 80001. In this case, data capture continues.

:FETCh[:SCALar][:DATA]:TELecom:APSWitch?

The number of received APS capture data values and the data value during reception are returned.

Returns:	<samples>	numeric	0 to 64
	<value>	numeric	0 to 65535

This command cannot be set when :SENSe:DATA:TELecom:MAPPing:MODE is set to OFF and :SENSe:DATA:TELecom:CMODe is set to J142X or AP9940.

This command returns a value even when APS capture is operating.

<value> returns the last received data and has the value K 1 x 256 +K 2.

POH Data Monitoring Setup

:FETCh:ARRay:DATA:POH:BYTe?

POH data is returned.

Returns: <J1>,<B3>,<C2>,<G1>,<F2>,<H4>,<F3>,<K3>,<N1>

Service Disruption Measurement Setup

:SENSe:DATA:TELecom:SDISruption <discrete>

The Service Disruption function is set up.

<discrete>	boolean	0 | 1 | OFF | ON

By selecting ON, the Service Disruption function is enabled. An actual measurement is started with the command for starting a measurement.

By selecting OFF, the Service Disruption function is disabled.

This command cannot be actioned during a measurement.

This command is effective when the mapping mode is INTernal.

The Service Disruption function needs the :SENSe:DATA:TELecom:TMODE command to be set to PRBS.

:SENSe:DATA:TELecom:SDISruption?

The status of Service Disruption is returned.

Returns : <discrete>

:SENSe:DATA? <"result">

The result of a Service Disruption measurement is returned.

<"result">	discrete	"SDTest:COUNt:LONG" (longest error burst) "SDTest:COUNt:SHORt" (shortest error burst) "SDTest:COUNt:LAST" (last error burst)

Returns :	<range>,<value>	
<range>	numeric	0 to 2 0: result is invalid 1: result is valid 2: out of range (>2 million)
<value>[1]	numeric	0 to 2 million 0 when <range> is other than 1

1 <value> is the time in micro seconds.

Results are returned every micro second.

Alarm & Pointer Status Setup

These commands return the conditions of the Status LEDs on the Receiver Module and clear the history.

Alarm Status

:SENSe:DATA? "STATe"

Returns : <current_state>,<history_state>

<current_state>	numeric	0 - 65536
<history_state>	numeric	0 - 65536

0: No Alarm/Error or History
1: Alarm/Error or History

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	PREI (HP-REI/ REI-P)	B3	PRDI (HP-RDI/ RDI-P)	PLOP (AU-LOP/ LOP-P)	PAIS (AU-AIS/ AIS-P)	BIT	REI
DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
B2	B1	SYNC	RDI	AIS	OOF	LOF	LOS

DB0 LOS Alarm occurred.

DB1 LOF Alarm occurred.

DB2 OOF Alarm occurred.

DB3 AIS Alarm occurred.

DB4 RDI Alarm occurred.

DB5 SYNC Alarm occurred.

DB6 B1 Error occurred.

DB7 B2 Error occurred.

DB8 REI Error occurred.

DB9 BIT Error occurred.

DB10 PAIS (AU-AIS/AIS-P) Alarm occurred.

DB11 PLOP (AU-LOP/LOP-P) Alarm occurred.

DB12 PRDI (HP-RDI/RDI-P) Alarm occurred.

DB13 B3 Error occurred.

DB14 PREI (HP-REI/REI-P) Alarm occurred.

Pointer Status :SENSe:DATA? "STATe:PACTivity"

The status of the AU pointer is returned.

Returns : <current_state>,<history_state>

<current_state>	numeric	0 | 1
<history_state>	numeric	0 | 1

0: No Pointer activity or History
1: Pointer activity or History

The following table shows the bit representation.

Bit	Item
0	POS
1	NEG
2	NDF
3	MNDF

Clear History :SENSe:DATA:CHIStory

This command clears the LEDs history of Alarms and Errors.

Chapter 4
Clock Source Command Reference

This chapter describes SCPI Commands of the J1421A Clock Source Module. For more information about SCPI common commands, see chapter Chapter 2, Common Commands.

SOURce Subsystem

This subsystem controls the output ports of the equipment.

:SOURce:RATE <rate>

This command selects the output clock [**Clock Out**] rate.

<rate>	<discrete>	G10 | G2_5

When G10 is selected, clock rate is 9.95328GHz.

When G2_5 is selected, clock rate is 2.48832GHz.

When EXTernal is selected by the :SOURce:SOURce command, the selected rate is invalid.

:SOURce:RATE ?

This command returns the current output clock [**Clock Out**] rate selected by (:SOURce:RATE).

Returns : <rate>

:SOURce:SOURce <source>

This command sets the clock source reference.

<source>	<discrete>	INTernal | EXTernal | INSert | SLAVe

INTernal: the clock source is derived from the Internal Clock Reference.

EXTernal: the clock source is derived from the signal present at the Ext Clock In connector.

INSert: the clock source is derived from the signal present at the Ref Clock Insert connector. The frequency can be 156 MHz, 622 MHz or 2.5 GHz.

SLAVe: the clock source is derived from the 156 MHz signal present at the Ref Clock Slave connector. Normally, this is connected to the Receiver Module Ref Clock Out connector.

:SOURce:SOURce ?

This command returns the present current clock source reference selected by: SOURce:SOURce.

Returns : <source>

:SOURce:OFFSet <offset>

This command sets the frequency offset of the Clock Output in steps of 1 ppm.

<offset>	<numeric>	-20 to 20

Default value 0

This command is valid only when the INTernal Reference is selected by the :SOURce:SOURce command.

:SOURce:OFFSet ?

This command returns the current frequency offset selected by :SOURce:OFFSet.

Returns : <offset>

:INPut[1] Subsystem

:INPut[1]:IFREquency <frequency>

This command is used to set the frequency of operation of the Ref Clock Insert port.

<frequency>	<discrete>	2_5G | 622M | 155M

When 2_5G is selected, the Ref Clock Insert port operating frequency is 2.5 GHz.

When 622M is selected, the Ref Clock Insert port operating frequency is 622 MHz.

When 155M is selected, the Ref Clock Insert port operating frequency is 155 MHz.

The Ref Clock Insert port is operational when INSert is selected by the (:SOURce:SOURce) command.

:INPut[1]:IFREquency?

This command returns the current value selected by :INPut[1]:IFREquency.

Returns : <frequency>

Chapter 5
Transmitter Command Reference

This chapter describes SCPI Commands of the J1422B Transmitter Module. For more information about SCPI common commands, see chapter Chapter 2, Common Commands.

:SOURce:DATA:TELecom:SOURce <source>

This command sets the Frame Format of the Transmit Signal.

<source>	discrete	SDH | SONet

When SDH is selected, the frame format of the Transmit Signal is SDH.

When SONet is selected, the frame format of the Transmit Signal is SONET.

:SOURce:DATA:TELecom:SOURce?

This command returns the current frame format selected by :SOURce:DATA:TELecom:SOURce.

Returns : <source>

:SOURce:DATA:TELecom:RATE <rate>

This command sets the Interface Rate of the Transmission Signal.

<rate>	discrete	STM64 | STM16 | OC192 | OC48

STM64 and OC192, and STM16 and OC48 respectively are the same interface rates.

The :SOURce:DATA:TELecom:SOURce value sets the frame format (SDH or SONET) to be transmitted.

When changing the Rate with this command, the following settings are changed automatically:

:SOURce:DATA:TELecom:ALARm is set to OFF.

:SOURce:DATA:TELecom:ERRor is set to OFF.

:SOURce:DATA:TELecom:RATE?

This command returns the current Transmission Signal Rate selected by :SOURce:DATA:TELecom:RATE.

Returns : <rate>

When the current : SOURce:DATA:TELecom:SOURce value is SDH, it returns STM64 or STM16.

When the current : SOURce:DATA:TELecom:SOURce value is SONet, it returns OC192 or OC48.

:SOURce:DATA:TELecom:POLarity <polarity>

This command sets the polarity of the Output Signal

<polarity>	discrete	NORMal | INVerted

When set to NORMal, the Output Signal data "1" is high (laser emitting).

When set to INVerted, the Output Signal data "1" is low (laser off).

:SOURce:DATA:TELecom:POLarity?

This command returns the current polarity of the Output Signal selected by :SOURce:DATA:TELecom:POLarity.

Returns : <polarity>

:SOURce:DATA:TELecom:SCRamble <scramble>

This command sets Scramble ON or OFF on the Output Signal.

<scramble>	boolean	ON | OFF | 1 | 0

When ON or 1 is selected, the Output Signal is scrambled.

When OFF or 0 is selected, the Output Signal is not scrambled.

:SOURce:DATA:TELecom:SCRamble?

This command returns the current setting selected by :SOURce:DATA:TELecom:SCRamble.

Returns : <scramble>

When set to scramble ON or 1, it returns “1”.

When set to scramble OFF or 0, it returns “0”.

:SOURce:DATA:TELecom:MAPPing:MODE <mode>

The mapping mode to a transmitting signal is selected.

<mode>	discrete	OFF | INTernal

When the mode is set to INTernal, the payload is generated in the module and the mapping is setup with the command: SOURce:DATA:TELecom:MAPPing.

When the mode is set to OFF, the SOH is present and the entire payload is bulk filled with the test pattern (PRBS pattern etc.). In this mode the compatibility with previous products can be set up by using the command :SOURce:DATA:TELecom:CMODe.

When the mode is modified, the rate of the modified mode is set up as the default.

:SOURce:DATA:TELecom:MAPPing:MODE?

The present mapping mode setting is returned.

Returns : <mode>

This command generates a command error if it is sent during a measurement.

:SOURce:DATA:TELecom:MAPPing <discrete>

Test signal mapping is selected.

SDH Mode	<discrete>	discrete	AU4-64c | AU4-16c | AU4-4c | AU4 | AU3
SONET Mode	<discrete>	discrete	STS-192c | STS-48c | STS-12c | STS-3c | STS-1

This command is only valid when the mapping mode is set to INTernal or EPAY.

VC3, VC4, STS-3c, and STS-1 cannot be selected when EPAY is set up with SOURce:DATA:TELecom:MAPPing:MODE.

When STM16 or OC48 are set up with :SOURce:DATA:TELecom:RATE , VC4-64c and STS-192c cannot be selected.

This command generates a command error if it is sent during a mesurement.

:SOURce:DATA:TELecom:MAPPing?

This command returns the current value for the mapping as setup by the command :SOURce:DATA:TELecom:MAPPing.

Returns : <discrete>

:SOURce:DATA:TELecom:MAPPing:CHANnel <ch>

The insertion channel of a mapping signal is set up.

<ch>	numeric	1 to 64

This command cannot be set up when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF.

If VC4-16c or STS-48c is set up with :SOURce:DATA:TELecom:MAPPing, the channel range is 1 to 4.

If VC4-4c or STS-12c is set up with :SOURce:DATA:TELecom:MAPPing, the channel range is 1 to 16.

If VC4, VC3, STS-3c or STS-1 is set up with :SOURce:DATA:TELecom:MAPPing or :STM-1, the channel range is 1 to 64.

:SOURce:DATA:TELecom:MAPPing:CHANnel?

This command returns the current channel number as set by the command :SOURce:DATA:TELecom:MAPPing:CHANnel <ch>.

Returns : <numeric>

:SOURce:DATA:TELecom:MAPPing:CHANnel:TRIButary <ch>

This command sets the VC3 or STS-1 tributary channel number.

<ch>	numeric	1 to 3

This command is only valid when the mapping mode is set to INTernal and the mapping is set to VC3 or STS-1.

:SOURce:DATA:TELecom:MAPPing:CHANnel:TRIButary?

This command returns the current setting of the tributary channel number as set by :SOURce:DATA:TELecom:MAPPing:CHANnel:TRIButary <ch>.

Returns : <numeric>

:SOURce:DATA:TELecom:CMODe <discrete>

This command sets the compatibility mode or CID pattern when the mapping mode is set to OFF.

<discrete>	discrete	J142X | AP9940 | CID

This command is valid when the mapping mode is set to OFF with the command :SOURce:DATA:TELecom:MAPPing:MODE.

:SOURce:DATA:TELecom:CMODe?

This command returns the current setting of the compatibility mode as set by the command :SOURce:DATA:TELecom:CMODe.

Returns : <discrete>

:SOURce:DATA:TELecom:EXTernal:OVERwrite <mode>

This command enables the SOH to be overwritten. It is used when the mapping mode is set to external.

<mode>	boolean	OFF |ON | 0 | 1

SOH is overwritten when ON (1) is set.

SOH is not overwritten when OFF (0) is set.

This command is valid when EXTernal is set up by :SOURce:DATA:TELecom:MAPPing:MODE <mode>.

:SOURce:DATA:TELecom:EXTernal:OVERwrite?

The present SOH overwrite setting as set by :SOURce:DATA:TELecom:EXTernal:OVERwrite <mode> is returned.

Returns : <mode>

:SOURce:DATA:TELecom:TMODE <testmode>

This command sets the Transmitter Test Mode.

<testmode>	discrete	PROGram | PRBS | CID

Select PRBS to transmit a PRBS pattern.

Select PROGram to transmit a Program pattern.

Select CID to transmit a CID pattern.

When the test mode is changed with this command, the following settings are changed automatically:

:SOURce:DATA:TELecom:ALARm is set to OFF.

:SOURce:DATA:TELecom:ERRor is set to OFF.

:SOURce:DATA:TELecom:TMODE?

This command returns the current test mode selected by :SOURce:DATA:TELecom:TMODE.

Returns : <testmode>

:SOURce:DATA:TELecom:TMODE:PROGram:PATTern <pattern>

This command sets the Program pattern

<pattern>	discrete	ALL0 | ALL1 | USER

Select ALL0 to set the Program pattern to all 0s.

Select ALL1 to set the Program pattern to all 1s.

When USER is selected, the Program pattern is user-defined data.

User-defined data is set by the :SOURce:DATA:TELecom:TMODE:PROGram:UDATa command.

The Program pattern selected by this command can be transmitted only when PROGram is selected by the :SOURce:DATA:TELecom:TMODE command.

:SOURce:DATA:TELecom:TMODE:PROGram:PATTern?

This command returns the current Program pattern selected by the :SOURce:DATA:TELecom:TMODE:PROGram:PATTern command.

Returns : <pattern>

:SOURce:DATA:TELecom:TMODE:PROGram:UDATa<byteno>,<userdata>

This command sets the user-defined data of the Program pattern.

<byteno>	numeric	1 to 64
<userdata>	numeric	0 to 255

Sets user-defined data for the selected byte number. User-defined data selected by this command will be transmitted only when PROgram is selected by the :SOURce:DATA:TELecom: TMODE command, and USER is selected by the :SOURce:DATA:TELecom:TMODE:PROGram:PATTern command.

:SOURce:DATA:TELecom:TMODE:PROGram:UDATa? <byteno>

This command returns the user-defined data of the current Program pattern set by the :SOURce:DATA:TELecom:TMODE:PROGram:UDATa command.

Returns : <byteno>,<userdata>

Returns the user-defined data to the selected byte number.

:SOURce:DATA:TELecom:TMODE:PRBS:PATTern <pattern>

This command sets the PRBS pattern.

<pattern>	discrete	PRBS23 | PRBS9 | PRBS10 | PRBS11 | PRBS15 | PRBS20 | PRBS31

The PRBS pattern selected by this command will be transmitted only when PRBS is selected by the :SOURce:DATA:TELecom:TMODE command.

:SOURce:DATA:TELecom:TMODE:PRBS:PATTern?

This command returns the current PRBS pattern selected by the :SOURce:DATA:TELecom:TMODE:PRBS:PATTern command.

Returns : <pattern>

:SOURce:DATA:TELecom:TMODE:PRBS:POLarity <polarity>

This command sets the polarity of the PRBS pattern.

<polarity>	discrete	NORMal | INVerted

When set to NORMal, the PRBS pattern data “1” is high (laser emitting).

When set to INVerted, the PRBS pattern data “1” is low (laser off).

The PRBS pattern, with the polarity selected by this command, will be transmitted only when PRBS is selected by the :SOURce:DATA:TELecom:TMODE command.

:SOURce:DATA:TELecom:TMODE:PRBS:POLarity?

This command returns the current polarity of the PRBS pattern selected by the :SOURce:DATA:TELecom:TMODE:PRBS:POLarity command.

Returns : <polarity>

CID Pattern Setup

:SOURce:DATA:TELecom:TMODE:CID:LENGth <length>

This command sets the 0 / 1 pattern length of the CID pattern.

STM-64/OC-192	<length>	numeric	1 to 128
STM-16/OC-48	<length>	numeric	1 to 32

The CID pattern defined by this command will be transmitted only when CID is selected by the :SOURce:DATA:TELecom:TMODE command.

If STM64 or OC192 is the RATE selected by the :SOURce:DATA:TELcom:RATE command, the valid selection range for length is 1 to 128.

If STM16 or OC48 is the RATE selected by the :SOURce:DATA:TELcom:RATE command, the valid selection range for length is 1 to 32.

If STM-16 or OC48 is the RATE selected by the :SOURce:DATA:TELecom:RATE command, it automatically changes the setting of :SOURce:DATA:TELecom:TMODE:CID:LENGth to 32 as the maximum value at 2.5G.

:SOURce:DATA:TELecom:TMODE:CID:LENGth?

This command returns the current setting of the 0/1 continuance CID pattern length selected by the :SOURce:DATA:TELecom:TMODE:CID:LENGth command.

Returns : <length>

:SOURce:DATA:TELecom:OVERhead:MODE <mode>

This command sets the overhead data to be transmitted.

<mode>	discrete	DEFault | USER

If DEFault is selected, it transmits overhead data as the default value.

If USER is selected, it transmits the user-defined data. The user-defined data is set by the :SOURce:DATA:TELecom:OVERhead:DATA command.

:SOURce:DATA:TELecom:OVERhead:MODE?

This command returns the current setting of the overhead data selected by the :SOURce:DATA:TELecom:OVERhead:MODE command.

Returns : <mode>

:SOURce:DATA:TELecom:OVERhead:DATA <ch>,<row>,<column>,<data>

This command sets the user-defined overhead data.

STM-64/OC-192	<ch>	numeric	1 to 64
STM-16/OC-48	<ch>	numeric	1 to 16
	<row>	numeric	1 to 9
	<column>	numeric	1 to 9
	<data>	numeric	0 to 255

If USER is selected by the :SOURce:DATA:TELecom:OVERhead:MODE command, it transmits the user-defined data. Otherwise the default data is transmitted.

Even if B1 byte and B2 byte (B21, B22, B23) are set, they are not transmitted. If mapping :SOURce:DATA:TELecomMapping:MODE<mode> is set to something other than OFF, H1, H2 or H3, byte cannot be set.

The default value of the user-defined data is an SDH pattern.

Examples:

1. To set “8” on C1 byte of channel 1:
   :SOURce:DATA:TELecom:OVERhead:DATA 1,1,7,8

2. To set “20” on K1 byte and “21” on K2 byte of the channel 1:
   :SOURce:DATA:TELecom:OVERhead:DATA 1,5,4,20
   :SOURce:DATA:TELecom:OVERhead:DATA 1,5,7,21

:SOURce:DATA:TELecom:OVERhead:DATA?<ch>,<row>,<column>,<data>

This command returns the current setting of the user-defined data of the overhead data selected by the :SOURce:DATA:TELecom:OVERhead:DATA command.

Returns : <ch>,<row>,<column>,<data>

:SOURce:DATA:TELecom:OVERhead:DATA:PRESet

This command sets all user-defined data of the overhead to be transmitted as the default.

<none>

If SDH is selected by the :SOURce:DATA:TELecom:SOURce command, the user-defined data is an SDH pattern.

If SONet is selected by the :SOURce:DATA:TELecom:SOURce command, the user-defined data is a SONET pattern.

Background Pattern Setup

:SOURce:DATA:TELecom:BACKground:PATTern <discrete>

This command sets the background pattern.

<discrete>	discrete	PRBS15 | PRBS23 | ALL0 | ALL1 | USER | COPY

This command selects the payload test pattern of all channels except for the channel specified with :SOURce:DATA:TELecom:MAPPing:CHANnel.

This command cannot be set up when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF.

This command cannot be set up when VC4-64c or STS-192c is set up with :SOURce:DATA:TELecom:MAPPing.

When USER is selected, the pattern specified by :SOURce:DATA:TELecom:BACKground:UDATa is used.

When COPY is selected, the test pattern is copied from the foreground.

:SOURce:DATA:TELecom:BACKground:PATTern?

This command returns the background pattern set with :SOURce:DATA:TELecom:BACKground:PATTern <discrete>.

Returns : <pattern>

:SOURce:DATA:TELecom:BACKground:PRBS:POLarity <polarity>

This command sets up the logic polarity of the background PRBS pattern.

<polarity>	discrete	NORMal | INVerted

This command cannot be used when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF.

This command cannot be set up when VC4-64c or STS-192c is set up with :SOURce:DATA:TELecom:MAPPing.

This command is effective when PRBS15 and PRBS23 are set up with :SOURce:DATA:TELecom:BACKground:PATTern.

:SOURce:DATA:TELecom:BACKground:PRBS:POLarity?

This command returns the background PRBS polarity set with :SOURce:DATA:TELecom:BACKground:PRBS:POLarity <polarity>.

Returns : <polarity>

:SOURce:DATA:TELecom:BACKground:UDATa <data>

This command sets up the background user pattern.

<data>	block	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 (16) 00 00 00 00 (4) 00 (1)

This command cannot be set up when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF.

This command cannot be set up when VC4-64c or STS-192c are set up with :SOURce:DATA:TELecom:MAPPing.

This command is effective when USER is set up with :SOURce:DATA:TELecom:BACKground :PATTern.

The pattern is 16 byte data when VC4-16c or STS-48c is set up by :SOURce:DATA:TELecom:MAPPing.

The pattern is 4 byte data when VC4-4c or STS-12c is set up by SOURce:DATA:TELecom:MAPPing.

The pattern is 1 byte data when VC4, VC3, STS-3c or STS-1 is set up by :SOURce:DATA:TELecom:MAPPing.

:SOURce:DATA:TELecom:BACKground:UDATa?

This command returns the present background user pattern as set by :SOURce:DATA:TELecom:BACKground:UDATa <data>.

Returns : <data>

J0 Transmission Setup

:SOURce:DATA:TELecom:J0 <function>

This command sets the J0 transmission ON/OFF.

<function>	boolean	OFF/0 | ON/1

If ON or 1 is selected, J0 data set by the :SOURce:DATA:TELecom command or the :SOURce:DATA:TELecom:J0:DATA:HEXadecimal command is transmitted.

The module transmits the J0 data set by the :SOURce:DATA:TELecom:J0:DATA command as default.

If OFF or 0 is selected, data set by the :SOURce:DATA:TELecom:OVERhead:DATA command is transmitted.

:SOURce:DATA:TELecom:J0?

This command returns the current setting of the :SOURce:DATA:TELecom:J0 command.

Returns : <function>

:SOURce:DATA:TELecom:J0:DATA:LENGth <length>

This command sets up the length of the J0 data.

<length>	discrete	16 | 64

If 16 is selected, a 15 character string length is set with :SOURce:DATA:TELecom:J0:DATA and a 32 character string length is selected with :SOURce:DATA:TELecom:J0:DATA:HEXadecimal.

If 64 is selected, a 62 character string length is set with :SOURce:DATA:TELecom:J0:DATA and a 128 character string length is selected with :SOURce:DATA:TELecom:J0:DATA:HEXadecimal.

:SOURce:DATA:TELecom:J0:DATA:LENGth?

This command returns the length of the J0 message as set with :SOURce:DATA:TELecom:J0:DATA:LENGth <length>.

Returns : <length>

:SOURce:DATA:TELecom:J0:DATA <string>

This command sets up the J0 data string to be transmitted.

<string>	string	15 characters | 62 characters

default=

0123456789ABCDE or

0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCD

If ON or 1 is selected by the :SOURce:DATA:TELecom:J0 command, J0 data set up by this command is transmitted with a 16 character multi-frame.

In the case of a 16 byte message, CRC is calculated by the firmware and added automatically.

In the case of a 64 byte message, CR+LF is added automatically.

The string length is specified by :SOURce:DATA:TELecom:J0:LENGth

:SOURce:DATA:TELecom:J0:DATA?

This command returns the current J0 data set by the :SOURce:DATA:TELecom:J0 command.

Returns : <string>

:SOURce:DATA:TELecom:J0:DATA:HEXadecimal <hex>

This command sets up the J0 data string to be transmitted in HEX data block format.

<hex>	block	32 | 128 HEX data

default=

#2328030313233343536373839414243444 5 or

#3128303132333435363738394142434445464730313233343536373839414243444454647303132333435363738394142434445464730313233343536373839414243444450D0A

To transmit J0 data set up by this command, the :SOURce:DATA:TELecom:J0 command should be set to ON or 1.

In the case of a 16 byte message, CRC is not calculated by the firmware. It transmits the value specified in the command parameter.

In the case of a 64 byte message, CR+LF is not automatically added but transmits the value specified in the command parameter.

The string length is specified by :SOURce:DATA:TELecom:J0:LENGth.

:SOURce:DATA:TELecom:J0:DATA:HEXadecimal?

This command returns the current J0 data set up by the :SOURce:DATA:TELecom:J0:DATA:HEXadecimal command.

Returns : <hex>

J1 Transmission Setup

:SOURce:DATA:TELecom:J1 <function>

This command sets the J1 transmission ON/OFF.

<function>	boolean	OFF/0 | ON/1

This command can be used when INTernal is selected with :SOURce:DATA:TELecom:MAPPing:MODE.

If ON or 1 is specified, J1 data set by the :SOURce:DATA:TELecom command or the :SOURce:DATA:TELecom:J1:DATA:HEXadecimal command is transmitted.

The module transmits the J1 data set by the :SOURce:DATA:TELecom:J1:DATA command as default.

If OFF or 0 is selected, data set by the :SOURce:DATA:TELecom:POH:DATA command is transmitted.

:SOURce:DATA:TELecom:J1?

This command returns the current setting of the :SOURce:DATA:TELecom:J1 command..

Returns : <function>

:SOURce:DATA:TELecom:J1:DATA:LENGth <length>

This command sets up the length of the J0 data.

<length>	discrete	16 | 64

This command can be used when INTernal is selected with :SOURce:DATA:TELecom:MAPPing:MODE.

If 16 is selected, a 15 character string length is set with :SOURce:DATA:TELecom:J1:DATA and a 32 character string length is selected with :SOURce:DATA:TELecom:J1:DATA:HEXadecimal.

If 64 is selected, a 62 character string length is set with :SOURce:DATA:TELecom:J1:DATA and a 128 character string length is selected with :SOURce:DATA:TELecom:J1:DATA:HEXadecimal.

:SOURce:DATA:TELecom:J1:DATA:LENGth?

This command returns the length of the J1 message as set with :SOURce:DATA:TELecom:J0:DATA:LENGth <length>.

Returns : <length>

:SOURce:DATA:TELecom:J1:DATA <string>

This command sets up the J1 data string to be transmitted.

<string>	string	15 characters | 62 characters

default=

0123456789ABCDE or

0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCD

If ON or 1 is selected by the :SOURce:DATA:TELecom:J1 command, J1 data set up by this command is transmitted with a 16 character multi-frame.

In the case of a 16 byte message, CRC is calculated by the firmware and added automatically.

In the case of a 64 byte message, CR+LF is added automatically.

The string length is specified by :SOURce:DATA:TELecom:J1:LENGth

:SOURce:DATA:TELecom:J1:DATA?

This command returns the current J1 data set by the :SOURce:DATA:TELecom:J1 command.

Returns : <string>

:SOURce:DATA:TELecom:J1:DATA:HEXadecimal <hex>

This command sets up the J1 data string to be transmitted in HEX data block format.

<hex>	block	32 | 128 HEX data

default=

#2328030313233343536373839414243444 5 or

#3128303132333435363738394142434445464730313233343536373839414243444454647303132333435363738394142434445464730313233343536373839414243444450D0A

To transmit J1 data set up by this command, the :SOURce:DATA:TELecom:J1 command should be set to ON or 1.

In the case of a 16 byte message, CRC is not calculated by the firmware. It transmits the value specified in the command parameter.

In the case of a 64 byte message, CR+LF is not automatically added but transmits the value specified in the command parameter.

The string length is specified by :SOURce:DATA:TELecom:J1:LENGth.

:SOURce:DATA:TELecom:J1:DATA:HEXadecimal?

This command returns the current J1 data set up by the :SOURce:DATA:TELecom:J1:DATA:HEXadecimal command.

Returns : <hex>

Pointer Setup

:SOURce:DATA:TELecom:POINter:VALue <ndf>,<value>

This command sets up pointer value.

<ndf>	boolean	0 | 1
<value>	numeric	0 to 782

This command can be set up when INTernal is set up with :SOURce:DATA:TELecom:MAPPing:MODE.

:SOURce:DATA:TELecom:POINter:VALue?

This command returns the current pointer setting as set by :SOURce:DATA:TELecomPOINter:VALue <ndf>, <value>.

Returns : <ndf>
<value>

:SOURce:DATA:TELecom:POINter:NPOinter <ndf>

This command sets up NDF when the pointer value is set.

<ndf>	discrete	NNDF | NDF

This command can be set up when the :SOURce:DATA:TELecom:MAPPing:MODE command is set to INTernal.

:SOURce:DATA:TELecom:POINter:NPOinter?

This command returns the NDF status set up by the :SOURce:DATA:TELecom:POINter:NPOinter <discrete> command.

Returns : <ndf>

:SOURce:DATA:TELecom:POINter:DIRection <direction>

This command changes the AU pointer value by one.

<direction>	discrete	INCRement | DECRement

This command can be used when INTernal is set with :SOURce:DATA:TELecom:MAPPing:MODE.

The Pointer is incremented by one when INCRement is sent.

The Pointer is decremented by one when DECRement is sent.

:SOURce:DATA:TELecom:POH:MODE <mode>

This command selects the path overhead mode.

<mode>	discrete	DEFault | USER

This command can be set up when INTernal is set with :SOURce:DATA:TELecom:MAPPing:MODE.

When USER is selected, the value set by :SOURce:DATA:TELecom:POH:DATA[:FOREground] or :SOURce:DATA:TELecom:POH:DATA:BACKground is used.

:SOURce:DATA:TELecom:POH:MODE?

This command returns the path overhead mode.

Returns : <mode>

:SOURce:DATA:TELecom:POH:DATA[:FOREground] <j1>,<C2>,<G1>,<f2>,<h4>,<f3>,<k3>,<n1>

This command sets up the POH values of the test channel.

<j1>,<C2>,<G1>,<f2>,<h4>,<f3>,<k3>,<n1>	numeric	0 to 255

This command sets the value of the path overhead bytes of the channel set by SOURce:DATA:TELecom:MAPPing:CHANnel.

This command is valid when INTernal is set up with :SOURce:DATA:TELecom:MAPPing:MODE and when USER is set up with :SOURce:DATA:TELecom:POH:MODE.

:SOURce:DATA:TELecom:POH:DATA[:FOREground]?

This command returns the path overhead values of the test channel.

Returns : <j1>,<C2>,<G1>,<f2>,<h4>,<f3>,<k3>,<n1>

:SOURce:DATA:TELecom:POH:DATA:BACKground <j1>,<C2>,<G1>,<f2>,<h4>,<f3>,<k3>,<n1>

This command sets up the values of the background path overhead.

<j1>,<C2>,<G1>,<f2>,<h4>,<f3>,<k3>,<n1>	mumeric	0 to 255

This command is valid when INTernal is set up with :SOURce:DATA:TELecom:MAPPing:MODE and when USER is set up with :SOURce:DATA:TELecom:POH:MODE.

:SOURce:DATA:TELecom:POH:DATA:BACKground?

This command returns the background path overhead values.

Returns : <j1>,<C2>,<G1>,<f2>,<h4>,<f3>,<k3>,<n1>

:SOURce:DATA:TELecom:POH:DATA:PRESet

This command sets the foreground and background path overhead values to their default conditions according to the setting (SDH or SONET) of :SOURce:DATA:TELecom:SOURce.

This command is valid when INTernal is set up with :SOURce:DATA:TELecom:MAPPing:MODE and when USER is set up with :SOURce:DATA:TELecom:POH:MODE.

:SOURce:DATA:TELecom:ALARm <function>

This command sets the Alarm transmission ON or OFF.

<function>	boolean	OFF/0 | ON/1

If ON or 1 is selected, it transmits the alarm types selected by the :SOURce:DATA:TELecom:ALARm:TYPE command.

When ON is selected by the :SOURce:DATA:TELecom:ALARm command and CID by the :SOURce:DATA:TELecom:TMODE command, AIS and RDI alarms cannot be selected.

One single occurrence of the alarm is added whenever the :SOURce:DATA:TELecom:ALARm command is set to ON and when the :SOURce:DATA:TELecom:ALARm:MODE command is set to ONCE.

An alarm is not transmitted when OFF or 0 is selected.

The selection is changed automatically to OFF in the following cases:

1. When the rate is changed by the :SOURce:DATA:TELecom:RATE command.

2. When the test mode is changed by the :SOURce:DATA:TELecom:TMODE command.

:SOURce:DATA:TELecom:ALARm?

This command returns the current setting ON or OFF of the alarm transmission :SOURce:DATA:TELecom:ALARm command.

Returns : <function>

:SOURce:DATA:TELecom:ALARm:TYPE <type>

This command sets up the type of alarm transmitted.

<type>	discrete	LOS | LOF | OOF | AIS | RDI | PAIS | PLOP | PRDI| MSAis | AISL | MSRDi | RDIL | AISP | LOP | LOPP | HPRP | HPRDi | RDIP

When the :SOURce:DATA:TELecom:ALARm command is set to ON, the alarm specified by this command is transmitted.

When ON is selected with the :SOURce:DATA:TELecom:ALARm command and CID by the :SOURce:DATA:TELecom:TMODE command, AIS and RDI alarms cannot be selected.

When OFF is selected with :SOURce:DATA:TELecom:MAPPing:MODE and AP992X is selected with :SOURce:DATA:TELecom:CMODe, PAIS, PLOP, and PRDI cannot be selected.

When OFF is selected with :SOURce:DATA:TELecom:MAPPing:MODE and AP9940 or CID are selected with :SOURce:DATA:TELecom:CMODe, AIS, RDI, PAIS, PLOP, and PRDI cannot be selected.

:SOURce:DATA:TELecom:ALARm:TYPE?

This command returns the current alarm type as set by the :SOURce:DATA:TELecom:ALARm:TYPE)command..

Returns : <type>

:SOURce:DATA:TELecom:ALARm:MODE <mode>

This command sets up the alarm addition mode.

<mode>	discrete	REPeat | ONCE ALL

Select ONCE to transmit one occurrence of the alarm.

Select REPeat to transmit the alarm periodically with the timing specified by interval and duration, as follows:

Interval is set up with :SOURce:DATA:TELecom:ALARm:INTerval.

Duration is set up with :SOURce:DATA:TELecom:ALARm:DURation.

Select ALL to transmit the alarm continuously.

:SOURce:DATA:TELecom:ALARm:MODE?

Description

This command returns the current alarm addition mode set by the :SOURce:DATA:TELecom:ALARm:TYPE command.

Returns : <mode>

:SOURce:DATA:TELecom:ALARm:INTerval <interval>

This command sets up the repeat interval of the alarm.

<interval>	numeric	2 to 16000000 frames

This is the interval between alarm events when REPeat is selected using the :SOURce:DATA:TELecom:ALARm:MODE command.

The interval chosen should be larger than the duration selected by the :SOURce:DATA:TELecom:ALARm:DURation command.

A Command Error is generated if the selected interval value is invalid.

:SOURce:DATA:TELecom:ALARm:INTerval?

This command returns the current interval of the repeat mode set by :SOURce:DATA:TELecom:ALARm:INTerval command..

Returns : <interval>

:SOURce:DATA:TELecom:ALARm:DURation <duration>

This command sets up the duration of the alarm events in the repeat alarm mode.

<duration>	numeric	1 to 480000 frames

This selects the duration of the alarm events when REPeat is selected by the :SOURce:DATA:TELecom:ALARm:MODE command.

The duration should be smaller than the interval selected by the :SOURce:DATA:TELecom:ALARm:INT command.

:SOURce:DATA:TELecom:ALARm:DURation?

This command returns the current duration of the alarm events.

Returns : <duration>

:SOURce:DATA:TELecom:ERRor:MODE <mode>

This command sets up the error addition mode.

<mode>	discrete	RATE | ONCE | ALL

Errors are added when the :SOURce:DATA:TELecom:ERRor command is set to ON.

Select ONCE to add only one error. When the :SOURce:DATA:TELecom:ERRor command is sent, one error is added.

Select RATE to add errors at a specific rate. The RATE is specified by the :SOURce:DATA:TELecom:ERRor:RATE command.

Select ALL to add all errors.

:SOURce:DATA:TELecom:ERRor:MODE?

This command returns the current Error addition mode set by the :SOURce:DATA:TELecom:ERRor:MODE command..

Returns : <mode>

:SOURce:DATA:TELecom:ERRor <function>

This command sets the Error addition mode ON or OFF.

<function>	boolean	OFF/0 | ON/1

When OFF or 0 is selected, Errors are not added.

When ON or 1 is selected, Errors are added.

ON or 1 cannot be selected when CID is selected using the :SOURce:DATA:TELecom:TMODE command.

The :SOURce:DATA:TELecom:ERRor selection is changed automatically to OFF in the following cases:

When the rate is changed using :SOURce:DATA:TELecom:RATE.

When the test mode is changed using :SOURce:DATA:TELecom:TMODE .

:SOURce:DATA:TELecom:ERRor?

This command returns the current Error addition setting as selected with the :SOURce:DATA:TELecom:ERRor command.

Returns : <function>

:SOURce:DATA:TELecom:ERRor:TYPE <type>

This command sets up the type of error to be added.

<type>	discrete	B1 | B2 | REI | BIT | B3 | PREI | RSBip | CVS | MSBip | CVL | MSRei | REIL | PBIP | CVP | HPRei | REIP

Errors of the type specified by this command are added when ON is selected using the :SOURce:DATA:TELecom:ERRor command.

B1, B2, REI, B3 and PREI errors cannot be selected when :SOURce:DATA:TELecom:ERRor is ON and :SOURce:DATA:TELecom:TMODE is set to CID.

B3 and PREI cannot be selected when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF and :SOURce:DATA:TELecom:CMODe is set to AP992X.

B1 and BIT can be selected when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF and :SOURce:DATA:TELecom:CMODe is set to AP9940.

BIT can be selected when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF and :SOURce:DATA:TELecom:CMODe is set to CID.

:SOURce:DATA:TELecom:ERRor:TYPE?

This command returns the current setting of the Error addition type as set by the :SOURce:DATA:TELecom:ERRor:TYPE command.

Returns : <type>

:SOURce:DATA:TELecom:ERRor:RATE <rate>

This command sets up the error add rate..

<rate>	numeric	1E-12 to 1E-03*
	default=	1E-06

*Please refer to the Appendix A

The error rate can be set when :SOURce:DATA:TELecom:ERRor:MODE is set to RATE.

The error rate that can be set depends on the combination of settings of :SOURce:DATA:TELecom:RATE and :SOURce:DATA:TELecom:ERRor:TYPE and :SOURce:DATA:TELecom:MAPPing.

:SOURce:DATA:TELecom:ERRor:RATE?

This command returns the current error rate set by :SOURce:DATA:TELecom:ERRor:RATE.

Returns : <rate>

:SOURce:DATA:TELecom:APSWitch:MODE <mode>

This command sets the mode of APS message transmission.

<mode>	discrete	ONCE | REPeat | STEP

The mode ONCE is used to send the programmed sequence of values . The sequence is started and stopped by the command :SOURce:DATA:TELecom:APSWitch.

The mode REPeat will continuously loop round the programmed sequence of values. The looping sequence is started and stopped by the command :SOURce:DATA:TELecom:APSWitch.

The mode STEP is used to step through the values programmed. In this mode the number of frames programmed is ignored and the next value is set when the command :SOURce:DATA:TELecom:APSWitch:STEP is sent to the module. A step is implemented by the command :SOURce:DATA:TELecom:APSWitch.

This command cannot be set up when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF and :SOURce:DATA:TELecom:CMODe is set to AP992X or AP9940.

An APS message cannot be transmitted during an AIS or RDI alarm mode. The alarm function takes priority.

:SOURce:DATA:TELecom:APSWitch:MODE?

This command returns the APS transmission mode.

Returns : <mode>

:SOURce:DATA:TELecom:APSWitch <function>

This command starts or stops APS sequence transmission.

<function>	boolean	OFF/0 | ON/1

This command is invalid when the mapping mode is set to OFF with :SOURce:DATA:TELecom:MAPPing:MODE.

The APS message cannot be transmitted during an AIS or RDI alarm mode. The alarm function takes priority.

:SOURce:DATA:TELecom:APSWitch?

This command returns the current APS transmission status.

Returns : <function>

:SOURce:DATA:TELecom:APSWitch:REPeat <no>

This command is used to set the message number of the last active message that will be transmitted before returning to message number 1 to begin the next loop.

<no>	numeric	1 to 64

When the APS Mode is ONCE, this command sets the last value that will be transmitted.

This command is invalid when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF.

:SOURce:DATA:TELecom:APSWitch:REPeat?

This command retuns the message number of the last active message that will be transmitted.

Returns : <no>

:SOURce:DATA:TELecom:APSWitch:DATA <no>,<value>,<frame>

This command sets up the APS transmission data.

<no>	numeric	1 to 64
<value>	numeric	0 to 65535
<frame	numeric	1 to 80000

The value of K1 and K2 bytes are calculated as follows:
value = K1 x 256 +K2

The value for frame is ignored when the APS mode is set to STEP. In this mode the next APS message is selected by using the command :SOURce:DATA:TELecom:APSWitch:STEP.

This command is invalid when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF.

:SOURce:DATA:TELecom:APSWitch:DATA? <no>

This command retuns the APS message data for the selected APS message number.

<no>	numeric	1 to 64

Returns : <K1 value, K2 value>
Returns : <frame>

The value of K1 and K2 bytes are calculated as follows:
value = K1 x 256 +K2

This command is invalid when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF.

:SOURce:DATA:TELecom:APSWitch:POINt?

This command returns the number of the present APS message that is being transmitted.

Returns :	<no>	0 | 1 to 64

The module returns 0 when the APS message sequence transmission has stopped.

This command is invalid when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF.

:SOURce:DATA:TELecom:APSWitch:STEP

This command changes the APS message that is transmitted to the next in the sequence when the APS mode is set to STEP.

This command is invalid when :SOURce:DATA:TELecom:MAPPing:MODE is set to OFF.

:OUTPut:TELecom:OPT <function>

This command sets the optical output signal ON or OFF.

<function>	boolean	OFF/0 | ON/1

When ON or 1 is selected, a signal is transmitted.

When OFF or 0 is selected, a signal is not transmitted.

:OUTPut:TELecom:OPT?

This command returns the current setting of the optical output signal as set by the :OUTPut:TELecom:OPT command.

Returns : <function>

:OUTPut:TELecom:OPT:WAVelength?

This command returns the optical output wavelength of the transmitted signal in string format.

Returns : <wavelength> <string>

For example, the response returned has the format "1527.98 nm".

:OUTPut:TELecom:OPT:WFREquency?

This command returns the optical output frequency of the transmitted signal in string format.

Returns : <wavefrequency> <string>

For example, the response returned has the format "196.2THz".

Chapter 6
Status Reporting

This chapter describes the Status Reporting SCPI commands for each module.

The format of the Status Report differs for each module.

Module	Status Register Name	Note
Receiver	QUEStionable	
	QUEStionable:DATA[1]	
	QUEStionable:DATA[1]:DATA[1]	
	OPERation	
	OPERation:INSTrument	
Clock Source	QUEStionable	
	QUEStionable:DATA[1]	
	QUEStionable:DATA[1]:DATA2	
	OPERation	
	OPERation:INSTrument	
Transmitter	QUEStionable	
	QUEStionable:DATA[1]	
	QUEStionable:DATA[1]:DATA3	
	OPERation	
	OPERation:INSTrument	

Note In addition to the above, the following bytes defined by IEEE488.2 are available for each module separately:
Standard Status byte
Event Status Register byte

Receiver Module Status Register

Standard Event Status Register

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

DB0 OPC - Operation Complete

DB1 RQC - Request Control

DB2 QYE - Query Error

DB3 DDE - Device Dependent Error

DB4 EXE - Execution Error

DB5 CME - Command Error

DB6 URQ - User Request

DB7 PON - Power On

Status Byte

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
OSR	RQS	ESB	MAV	QSR		-	-

DBO – DB2 Not used

DB3 QSR - Questionable Summary bit

DB4 MAV - Message Available Summary bit.This shows that there is a message that can be read.

DB5 ESB - Event Status Summary bit as defined by IEEE488.2

DB6 RQS - Master Summary bit as defined by IEEE488.2

DB7 OSR - Operation Summary bit

OPERation Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	ISR	CAPTRIG	XBEAT	IBEAT	VALDAT	EIPER

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	SYSACT	MEAS	-	-	-	-

DB0 – DB3 Not used

DB4 MEAS – Measuring
This instrument is actively measuring.

DB5 SYSACT - Capture System active
Set when capture is initialed (see INIT[1] in the TRIG[1] subsystem) and cleared automatically when capture is completed or aborted.

DB6 – DB7 Not used.

DB8 EIPER - End of Integration Period.
This measurement system has completed an integration period.

An integration period is completed when either a synchronous command pulse from the selected VXIbus trigger line or a TRIG3[:IMM] command has been received while TRIG:3COMM is set to STARt. See OUTP5, TRIG2 and TRIG3 subsystem.

DB9 VALDAT - Valid data
0 in the case of INIT, and 1 when updating the APS capture position.

DB10 IBEAT - Internal Heartbeat.
This bit is pulsed when an internal heartbeat is received by the measurement system.

DB11 XBEAT - External Heartbeat.
This bit is pulsed when an external heartbeat from the selected VXIbus trigger line is received by the measurement system. See OUTP5, TRIG2 and TRIG3 subsystem.

DB12 CAPTRIG - Capture system triggered
Cleared when capture is initiated and set automatically when capture trigger data match is satisfied. See TRIG1 subsystem.

DB13 ISR – INSTrument Status summary

DB14 – DB15 Not used

OPERation:INSTrument Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	SLFERR	-	-	-	-	-

DB0 – DB4 Not used

DB5 SLFERR – Self-test Error

DB6 – DB15 Not used

OPERation:SYSActive Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	-	-	-	APS

DB0 APS capture effective

DB1 - DB15 Not used

OPERation:VALData Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	-	-	-	APS

DB0 APS capture data exists

DB1 - DB15 Not used

QUEStionable Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	DATA	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	-	-	-	-

DB0 – DB8 Not used

DB9 DATA – Register Summary bit

DB10 – DB15 Not used

QUEStionable:DATA[1] Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	PWF	TMPF	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	DATA5	DATA4	-	-	DATA[1]	-

DB0 Not used

DB1 DATA[1] – Register Summary bit

DB2 – DB3 Not used

DB4 DATA4 Register Summary bit

DB5 DATA5 Register Summary bit

DB6 - DB12 Not used

DB13 TMPF - Temperature Fail

DB14 PWF – Power Fail

DB15 Not used

QUEStionable:DATA[1] :DATA[1] Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	NOOPT	-	-	-		BIT	REI

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
B2	B1	SYNC	RDI	AIS	OOF	LOF	LOS

DB0 LOS – Loss of Signal Detection

DB1 LOF – Loss of Frame Detection

DB2 OOF – Out of Frame Detection

DB3 AIS – Alarm Indication Signal Detection

DB4 RDI – RDI Detection

DB5 SYNC – Pattern Sync Loss Detection

DB6 B1 – B1 Error Detection

DB7 B2 – B2 Error Detection

DB8 REI – REI Error Detection

DB9 BIT – Bit Error Detection

DB10 – DB13 Not used

DB14 NOOPT – No Optical Optical Power (Optical Power too low)

DB15 Not used

QUEStionable:DATA[1] :DATA4 Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	PREI	B3	PRDI	PLOF	PAIS

DB0 PAIS - AU-AIS / AIS-P detection

DB1 PLOF - AU-LOP/LOP-P detection

DB2 PRDI - HP-RDI/RDI-P detection

DB3 B3 - B3 error detection

DB4 PREI - HP-REI/REI-P detection

DB5 - DB15 Not used

QUEStionable:DATA[1] :DATA5 Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	MNDF	NDF	NEG	POS

DB0 POS - AU Pointer POS detection

DB1 NEG - AU Pointer NEG detection

DB2 NDF- AU Pointer NDF detection

DB3 MNDF - AU Pointer Missing NDF detection

DB4 - DB15 Not used

Clock Source Module Status Register

Standard Event Status Register

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

DB0 OPC - Operation Complete

DB1 RQC - Request Control

DB2 QYE - Query Error

DB3 DDE - Device Dependent Error

DB4 EXE - Execution Error

DB5 CME - Command Error

DB6 URQ - User Request

DB7 PON - Power On

Status Byte

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
OSR	RQS	ESB	MAV	QSR		-	-

DBO – DB2 Not used

DB3 QSR - Questionable Summary bit

DB4 MAV - Message Available Summary bit. This shows that there is a message that can be read.

DB5 ESB - Event Status Summary bit as defined by IEEE488.2

DB6 RQS - Master Summary bit as defined by IEEE488.2

DB7 OSR - Operation Summary bit

OPERation Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	INST	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	-	-	-	-

DB0 – DB12 Not used

DB13 INSTrument Register Summary bit

DB14 – DB15 Not used

OPERation:INSTrument Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	SLFERR	-	-	-	-	-

DB0 – DB4 Not used

DB5 SLFERR – Self-Test Error

DB6 – DB15 Not used

QUEStionable Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	-	-	-	-

DB0 – DB8 Not used

DB9 DATA – Register Summary bit

DB10 – DB15 Not used

QUEStionable:DATA Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	PWF	TMPF	-	-	-	DATA	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	-	DATA2	-	-

DB0 – DB1 Not used

DB2 DATA2 – Register Summary bit

DB3 – DB12 Not used

DB13 TMPF – Temperature Fail

DB14 PWF – Power Fail

DB15 Not used

QUEStionable:DATA:DATA2 Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	-	-	155MPLLERR	10GPLLERR

DB0 10GPLLERR – 10G PLL lock off

DB1 155MPLLERR – 155M PLL lock off

DB2 – DB15 Not used

Transmitter Module Status Register

Standard Event Status Register

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

DB0 OPC - Operation Complete

DB1 RQC - Request Control

DB2 QYE - Query Error

DB3 DDE - Device Dependent Error

DB4 EXE - Execution Error

DB5 CME - Command Error

DB6 URQ - User Request

DB7 PON - Power On

Status Byte

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
OSR	RQS	ESB	MAV	QSR		-	-

DBO – DB2 Not used

DB3 QSR - Questionable Summary bit

DB4 MAV - Message Available Summary bit. This shows that there is a message that can be read.

DB5 ESB - Event Status Summary bit as defined by IEEE488.2

DB6 RQS - Master Summary bit as defined by IEEE488.2

DB7 OSR - Operation Summary bit

OPERation Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	INST	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	-	-	-	-

DB0 – DB12 Not used

DB13 INSTrument - Register Summary bit

DB14 – DB15 Not used

OPERation:INSTrument Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	SELERR	-	-	-	-	-

DB0 – DB4 Not used

DB5 SLFERR – Self-Test Error

DB6 – DB15 Not used

QUEStionable Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	DATA	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	-	-	-	-

DB0 – DB8 Not used

DB9 DATA – Register Summary bit

DB10 – DB15 Not used

QUEStionable:DATA[1] Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	PWF	TMPF	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	DATA3	-	-	-

DB0 – DB2 Not used

DB3 DATA3 – Register Summary bit

DB4 – DB12 Not used

DB13 TMPF – Temperature Fail

DB14 PWF – Power Fail

DB15 Not used

QUEStionable:DATA[1] :DATA3 Status Register

DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8
-	-	-	-	-	-	-	-

DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
-	-	-	-	-	-	NOINSER	NOCLOCK

DB0 NOCLOCK – No Clock

DB1 NOINSER – Insertion abnormality

DB2 – DB15 Not used

Chapter 7
Instrument Measurement Timing

Introduction

Measurements are controlled by two signals present on the VXI backplane. A 100 ms Measurement "Heartbeat" signal and a Synchronous Command pulse. The Receiver Module can be configured to transmit these signals on any one of 4 pairs of signal lines on the VXI backplane. The Receiver Module can also be configured to receive these signals on any one of the 4 pairs. Normally, when the Receiver Module is the only measurement instrument in a system, it will be configured to both transmit and receive the signals on the same pair.

The Heartbeat signal is a train of pulses occurring every 100 ms and is used to control the update of measurement results. The Synchronous Command pulse is a single pulse that causes some pre-defined action to occur in the modules which receive it. It is used to start and stop measurement periods.

Control of the transmission and processing of these signals is the responsibility of three SCPI sub-systems.

TRIGger2 Controls processing of the 100 ms Heartbeat signal.

TRIGger3 Controls processing of the Synchronous Command pulse signal.

OUTPut5 & SOURce5 Control transmission of both the 100 ms Heartbeat Signal and the Synchronous Command pulse.

The function of the various sub-systems is shown schematically in Figure 7-1 below.

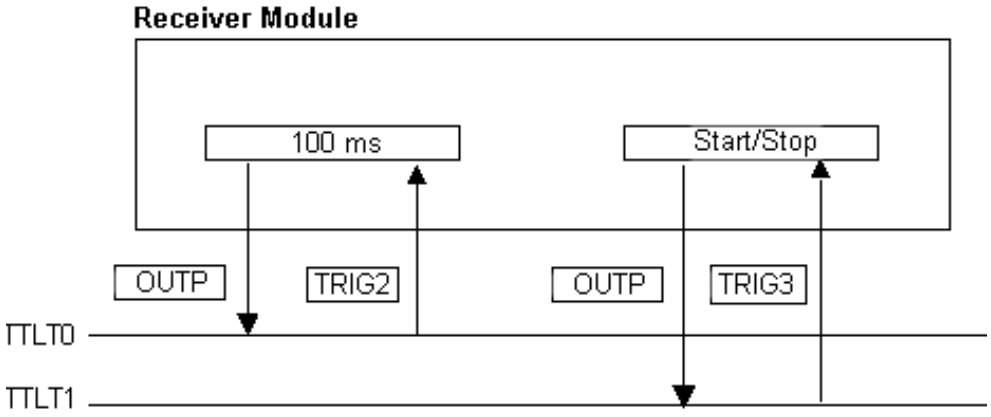

Figure 7-1. Trigger System

When the Receiver Module is the only measurement module in the VXI rack, you will rarely need to exercise control over these signals. Measurements can be started and stopped using the command sequences described in Chapter 8.

However, when the Receiver co-exists with another measurement instrument in the same VXI rack, you will need to make sure that the system is set up according to you measurement requirements. For example, if two or more instruments are to make measurements independently you need to ensure that they are not using the same lines on the VXI backplane. An example of how this can be achieved is shown in Figure 7-2.

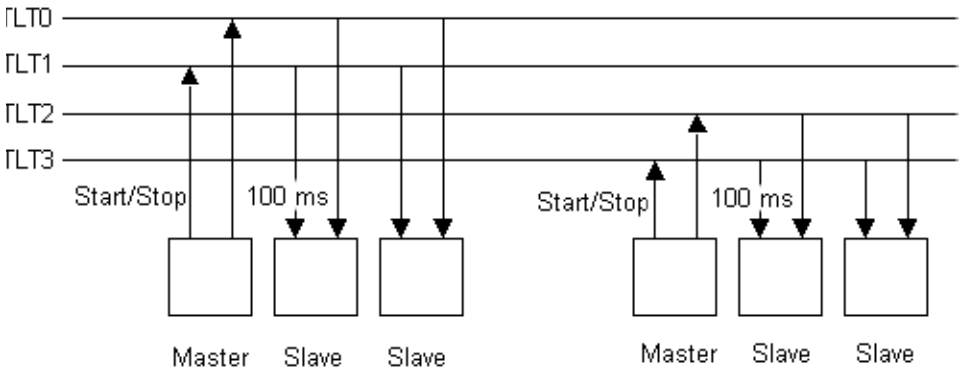

Figure 7-2. Two Measurement System

If you need to make coordinated measurements, you must ensure that the instruments are using the same VXI signals but that these are sourced from only one of them (The Master). This situation is shown in Figure 7-3 below.

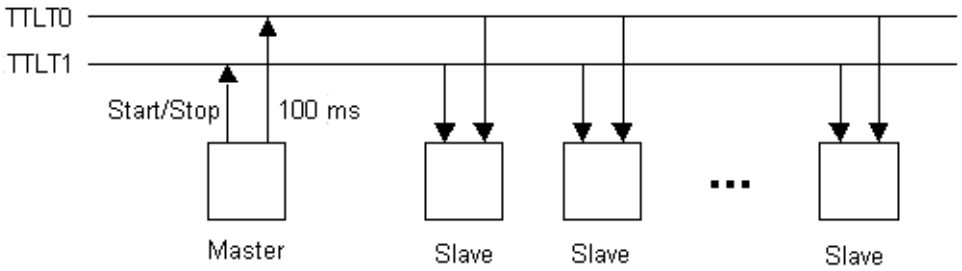

Figure 7-3. Single Measurement System

TRIGger2 subsystem

The TRIGger2 subsystem controls the timing of the Receiver Module measurement updates. This is done from a 10 Hz “heartbeat” signal supplied on one of the VXI TTL Trigger lines. When the Receiver Module is the only measurement module in the system, it will normally supply it’s own signal. However, the commands in this section operate in the same way if the pulse is supplied from another instrument in the VXI rack.

Three commands are available:

1. A command to continuously initiate the system.
2. A command to return the system to an idle state.
3. A command to select the TTL line on which the Receiver Module expects the heartbeat.

:INITiate2:CONTinuous <state>

This command continuously initiates the system.

<state>	discrete	OFF/0 | 1/ON

Sending this command with the ON parameter causes the Receiver Module measurement system to be continuously initiated. Hence all measurements will be continuously updated on receipt of a 10 Hz heartbeat signal.

The default state for this subsystem is OFF, which means that the system is idle. When the INIT2:CONT ON command is sent, the trigger system is initiated and enters the “wait for trigger” state. The trigger in this case is the 10 Hz heartbeat. On completion of a trigger cycle, the system immediately enters the “wait for trigger” state again without first returning to the idle state.

:INITiate2:CONTinuous?

The query version of the command returns the presently configured state of the subsystem.

Returns :	<state>

:ABORt2

This command resets the TRIGger2 subsystem to the idle state.

In this state the module will not respond to any heartbeat signals and measurement system updates will not take place. Note, that the effect of the command depends on the state of the subsystem as configured by the previous INITiate2:CONTinuous command. If the subsystem has been placed in the Continuous Triggering state by INITiate2:CONTinuous ON, then on receiving the ABORT2 command the system will enter the idle state and immediately exit it and go back to the wait for trigger state.If the

subsystem has been exited from the Continuous Triggering state by a INITiate2:CONTinuous OFF command, the ABORt2 command causes the subsystem to return to the idle state and stay there.This means that to ensure the TRIGger2 sub-system in the idle state, you must send two commands. A INITiate2:CONTinous OFF followed by an ABORt2.

:TRIGger2:SOURce <source>

This command selects the VXI signal line pair on which the Receiver Module expects to find the Heartbeat and Synchronous Command pulses that control TRIGger2 and TRIGer3 subsystems respectively. These signals together provide control of the Receiver Module measurement system. The Heartbeat signal controls measurement updates while the Synchronous Command Pulse controls the periods over which measurements are made. The signal for the TRIGger2 subsystem is a 10 Hz clock signal while the signal for the TRIGger3 subsystem is a pulse.

In the situation where the Receiver Module is the only measurement instrument in the system, this command should be used to select the same VXI TTL trigger lines onto which the Receiver Module has been configured to transmit the signals by the OUTP5:TTLT<n> command.

In a multi-instrument system where the Receiver module does not source the signals, this command is used to select the VXI TTL pair on which these signals are expected to be transmitted by the master instrument in the system.

This command selects which pair of lines are used.

<source>	TTLTRG0	TTLT0 Heartbeat TTLT1 Sync Pulse
	TTLTRG2	TTLT2 Heartbeat TTLT3 Sync Pulse
	TTLTRG4	TTLT4 Heartbeat TTLT5 Sync Pulse
	TTLTRG6	TTLT6 Heartbeat TTLT7 Sync Pulse

Both trigger systems must be in the idle state for this command to work. This can be done by sending the following commands:

```
-- INIT2:CONT OFF
-- INIT3:CONT OFF
-- ABOR2
-- ABOR3
```

:TRIGger2:SOURce?

The query version of the command returns the currently selected pair in the short-form shown above.

Returns : <source>

TRIGger3 subsystem

This subsystem controls how the Receiver Module processes Synchronous Command Pulses received from the VXI backplane. The purpose of this signal is to provide a means of synchronising the execution of commands across several VXI modules allowing the execution of those commands to be precisely controlled by eliminating the effects of command transmission and parsing delays inherent in the normal system.

For example, to synchronize a measurement across several instruments you would first set them all up to operate from the same VXI trigger pair. Next you select one of the instruments to be the, source for the Heartbeat and Synchronous Command pulse signals. Now, you issue a START command to each of the other instruments. At this point, none of the instruments has begun a measurement but they are all primed to do so when they receive a Synchronous Command Pulse. Finally, you issue a Synchronous Command pulse from the source instrument and all the instruments that you have primed begin to measure.

Four commands are available to control this subsystem. These are:

1. A command to continuously initiate the system.
2. A command to select the Synchronous Command to be executed.
3. A command to cause the subsystem to trigger independently of the Synchronous Command Pulse.
4. A command to query the TTL line configured for the Synchronous Command Pulse.

:ABORt3

This command resets the TRIGger3 subsystem to the idle state.

If the INITiate3:CONTinuous command is set to ON, the Trigger3 subsystem will immediately go back to the wait for trigger state.

If the TRIGger3 subsystem is in the idle state, the Receiver Module will not respond to any synchronous command pulse or immediate trigger commands.

If the INITiate3:CONTinuous command is set to OFF, this command causes the Synchronous Command system to abort its operation.

:INITiate3:CONTinuous <state>

This command continuously initiates the system.

<state>	discrete	OFF/0 | ON/1

Sending this command with the ON parameter causes the Synchronous Command system to be continuously initiated. This causes the Receiver

Module measurement system to react to all external synchronous command pulses or immediate trigger commands.

The default value for the subsystem is OFF. In this state the system is idle. When the INIT3:CONT ON command is sent, the trigger system is initiated and enters the “wait for trigger” state. On completion of a trigger cycle, the system immediately enters the “wait for trigger” state again without first returning to the idle state.

:INITiate3:CONTinuous?

The query version of the command returns the presently configured state of the subsystem.

Returns : <state>

:TRIGger3:COMMand <command>

This command selects the Synchronous Command to be executed when the sub-system receives its trigger. Commands are:

<command>	discrete	STARt STOP ONCE

Commands are executed on the heartbeat pulse (TRIGger2) immediately following the Synchronous Command Pulse (TRIGger3) or a TRIG3:IMM command.

A selected command is active and will be executed on each command pulse or trigger immediate command until replaced by another command.

The default command is STOP.

The STARt command resets all measurement counters to zero and starts continuous measurement updates controlled by the Heartbeat signal. The EIPER status bit in the OPERation status register is also updated.

The measurement period is determined by the time between Synchronous Command Pulses on the selected VXI trigger line or TRIG3:IMM commands. These events cause a re-triggering of the STARt command and hence the beginning of a new measurement period. There is no “dead time” between measurement periods.

The STOP command stops the measurement system and freezes all measurement counters.

The ONCE command causes the system to enter a transient state during which one measurement period occurs. On the first Synchronous Command Pulse or TRIG3:IMM after this command has been set by the TRIG3:COMM command a measurement period is started. At this point, the ONCE command is changed to a STOP command by the system. Hence on the next Synchronous Command Pulse or TRIG3:IMM the measurement period is stopped. Note that the EIPER status bit in the OPERation status register is not updated until another measurement period has begun. Also

note that after the ONCE command is issued, it cannot be replaced by another command. Only a Synchronous Command Pulse or a TRIG3:IMM command can change it.

The CONT command resumes a measurement from where it was stopped retaining the values in the current measurement store.

:TRIG3:COMMand?

The query version of the command returns the currently selected command.

Returns : <command>

:TRIGger3:IMMediate

This command causes the TRIGger3 sub-system to trigger immediately. It behaves as if a Synchronous Command Pulse had been received on the appropriate VXI TTL trigger line. This overrides normal operation where the subsystem waits for a Synchronous Command Pulse before triggering. Note that the TRIGger3 Subsystem must be in a “wait for trigger” state for this command to have an effect.

:TRIGger3:SOURce?

This command returns the identity of the VXI TTL line which has been selected as the trigger source for the TRIgger3 subsystem. This is selected by the TRIGger2:SOURce command along with the TRIGger2 subsystem source. The TRIGger3 subsystem source is always an odd-numbered line one higher than that selected for the TRIGger2 subsystem.

Returns : TTLT1
TTLT3
TTLT5
TTLT7

OUTPut5 subsystem

This subsystem is used to control the transmission of the Heartbeat and Synchronous Command pulses from the Receiver Module onto the VXI trigger lines. When enabled the signals are transmitted on a pair of VXI TTL trigger lines. Alternatively, these signals can be sourced from other VXI modules which have the capability of generating them. In this case the signals from the Receiver module should be disabled. A further possibility is to source them from a Slot0 controller which has the capability to route signals from its TRIGGER IN port onto the VXI trigger bus and to route signals from that bus onto its TRIGGER OUT port. Using this method these signals can be transmitted between VXI racks and hence allow co-ordination of measurements between racks. Note however that this scheme is limited by the fact that the Slot0 controllers have only one input and one output port. Hence, two racks can be coordinated by “swapping” heartbeat and Synchronous Command Pulse signals but a scheme involving more than two racks can share only one signal. In this situation generation of these signals from the Receiver Module should again be disabled.

The Heartbeat is a 10 Hz square wave signal which is injected onto an even numbered trigger line (TTLT0,2,4,6) under the control of the OUTP5:TTLT<n> command. The Synchronous Command Pulse is injected onto an odd-numbered trigger line (TTLT1,3,5,7) under the control of the OUTP5:TTLT<n> command or the OUTP5:TTLT<n>:IMM command. The TRIG2:SOUR command selects which pair of trigger lines will carry the Heartbeat and Synchronous Command Pulse.

:OUTPut5:TTLTrigger<n>:IMMediate

This command causes a Synchronous Command Pulse to be issued on the selected VXI Trigger line. It allows the Receiver Module to synchronize command execution to other modules.

<n>	numeric	1 | 3 | 5 | 7

The selected VXI Trigger line must be odd-numbered and must have been previously enabled by the OUTPut5:TTLTrigger<n> command.

:OUTP5:TTLTrigger<n>:STATe <state>

This command either enables or disables the generation of Heartbeat and Synchronous Command Pulse from the Receiver Module on the designated VXI Trigger lines.

<n>	numeric	0 to 7
<state>	boolean	OFF/0 | ON/1

The command will work only for that pair of lines previously selected by the TRIG2:SOURce command. Each line in the pair must be enabled or disabled by a separate instance of this command.

If a TRIG2:SOUR command is issued to change the selected pair while they are enabled then the lines are forced to a disabled state.

:OUTP5:TTLTrigger<n>:STATe?

The query version of the command returns the enabled/disabled state of the selected trigger line.

Returns : <state>

SOURce5 Subsystem

The SOURce5 subsystem is used to configure the VXI trigger lines selected by the TRIG2:SOUR command to produce a specific measurement period.

:SOURce5:PULSe1:PERiod?

This command returns the time interval between the heartbeats in seconds. The response is always 0.1 seconds.

Returns :	<numeric>	1.000E-001

:SOURce5:PULSe2:PERiod <period>

This command selects the period in seconds between the transmission of Synchronous Command pluses and hence controls the period over which the measurement system will accumulate measurements, that is, the measurement period..

<period>	<numeric>	1 to 3596400 (60*60*999)

Once set up by this command, the Receiver module will produce a Synchronous Command Pulse to signal the end of a measurement period on the previously selected (and enabled) TTL Trigger line. To be effective, the configured Synchronous Command must be STOP.

After enabling the OUTPut5 subsystem, any change in period made using this command will not take effect until after the next Synchronous Command Pulse.

The default period is 10 seconds.

:SOURce5:PULSe2:PERiod?

The query version of this command returns the currently selected period.

Returns :	<period>

Chapter 8
Measurement Start and Stop Sequences

This chapter describes sequences of the commands described in Chapter 7 that you can use to start and stop measurement sequences. The following sequences assume that the VXI TTL trigger lines TTLT0 and TTLT1 are available for use by the Receiver Module and that the Receiver Module is the only measurement module using these lines.

Start Gating

The following sequence can be used to begin a measurement on the Receiver Module.

The instrument will start gating and continue to gate for 3596400 seconds or until instructed to stop by the sequence described later. This is achieved using the START command as described in Chapter 7 in the TRIGger3 sub-system.

1. OUTP5:TTLT0 0
2. OUTP5:TTLT1 0
3. INIT2:CONT 0
4. INIT3:CONT 0
5. ABOR2
6. ABOR3
7. TRIG2:SOUR TTLT0
8. INIT2:CONT ON
9. INIT3:CONT ON
10. SOUR5:PULS:PER 3596400
11. OUTP5:TTLT0:STAT 1
12. OUTP5:TTLT1:STAT 1
13. TRIG3:COMM START
14. OUTP5:TTLT1:IMM

Explanation

1, 2 Ensure that the Receiver Module is not transmitting signals on the TTLT0 and TTLT1 lines.

3 - 6 Ensure that the TRIGger3 and TRIGger2 sub-systems begin the sequence in the IDLE state.

7	Configures the Receiver Module to expect the 100 ms heartbeat signal on TTLT0 and to expect the Synchronous Command pulses on TTLT1.
8, 9	Put the TRIGger2 and TRIGer3 sub-systems into continuous trigger mode.
10	Sets the period in seconds for the Synchronous Command pulse.
11, 12	Enables the Receiver Modules to transmit the 100 ms heartbeat signal on TTLT0. Command 12 enables it to transmit the Synchronous Command pulses on TTLT1.
13	Primes the TRIgger3 sub-system to execute a START command when it gets the next Synchronous Command pulse.
14	Issues the Synchronous Command pulse and the Receiver begins to gate.

Stop Gating

This sequence of commands will stop a measurement as started in the sequence given above.

1. TRIG3:COMM STOP
2. OUTP5:TTLT1:IMM
3. OUTP5:TTLT1 0
4. OUTP5:TTLT0 0
5. INIT2:CONT OFF
6. INIT3:CONT OFF
7. ABOR2
8. ABOR3

Explanation

1	Primes the TRIGger3 sub-system to execute a STOP command when it gets the next Synchronous Command pulse.
2	Issues the Synchronous Command pulse and the instrument stops gating.
3, 4	Stop the transmission of the heartbeat and synchronous command pulses from the Receiver module
5 - 8	Return the TRIGger2 and TRIGger3 subsystems to their idle states.

Chapter 9
Example Programs

Introduction

The Agilent SpectralBER system can be controlled from a PC or workstation using either SCPI commands, Universal Instrument Drivers or manually using a Graphical User Interface (or soft front panel). This chapter provides examples of how SCPI commands can be used to control the system.

For more information on the Graphical User Interface and the Universal Instrument Drivers, see the *Installation & System reference Manual.*

The examples given here are written in "C", but the general principles and sequence of SCPI commands apply to and can be adapted easily to other programming languages.

Start Gating

This program illustrates the sequence of SCPI commands required to start a measurement.

```
/*"start_gating.c"
This example program starts the SpectralBER system gating.
Note: You must change the address to suit your system.) */

#include <conio.h>
#include <stdio.h>
#include "c:\vxipnp\win95\include\visa.h" /* Change the file path to suit.
                        Note: This header file is supplied with HP Visa. */

void main () {

  ViSession defaultRM, vi;

  /* Open session to GPIB device at address 0904
                                  (Change the address to suit)*/
  viOpenDefaultRM (&defaultRM);
  viOpen (defaultRM, "GPIB0::09::04::INSTR", VI_NULL,VI_NULL, &vi);

  /* Initialize device */
  viPrintf (vi, "*RST\n");

  /* Set Maximum Measurement Period */
  viPrintf (vi, ":SOUR5:PULS2:PER 3596400\n");

  /* Disable 100ms Heartbeat generation */
  viPrintf (vi, ":OUTP5:TTLT0 OFF\n");
```

```
  /* Disable Synchronous Pulse generation */
  viPrintf (vi, ":OUTP5:TTLT1 OFF\n");

  /* Disable 100ms Heartbeat control system */
  viPrintf (vi, ":INIT2:CONT OFF\n");

  /* Disable Synchronous Command Pulse system */
  viPrintf (vi, ":INIT3:CONT OFF\n");

  /* Set Idle state for Trigger 2 system */
  viPrintf (vi, ":ABOR2\n");

  /* Set Idle state for Trigger 3 system */
  viPrintf (vi, ":ABOR3\n");

  /* Select source of Trigger 2 system */
  viPrintf (vi, ":TRIG2:SOUR TTL0\n");

  /* Enable 100ms Heartbeat control system */
  viPrintf (vi, ":INIT2:CONT ON\n");

  /* Enable Synchronous Command Pulse system */
  viPrintf (vi, ":INIT3:CONT ON\n");

  /* Enable 100ms Heartbeat generation */
  viPrintf (vi, ":OUTP5:TTLT0 ON\n");

  /* Enable Synchronous Pulse generation */
  viPrintf (vi, ":OUTP5:TTLT1 ON\n");

  /* Set Synchronous Command to start */
  viPrintf (vi, ":TRIG3:COMM START\n");

  /* Issue a Synchronous Pulse to START */
  viPrintf (vi, ":OUTP5:TTLT1:IMM\n");

  /* Close session */
  viClose (vi);
  viClose (defaultRM);
}
```

Stop Gating

This program illustrates the sequence of SCPI commands required to stop a measurement.

```
/*"stop_gating.c"
This example program stops the SpectralBER system gating.
Note: You must change the address to suit your system.) */

#include <conio.h>
#include <stdio.h>
#include "c:\vxipnp\win95\include\visa.h" /* Change the file path to suit.
                      Note: This header file is supplied with HP Visa. */
```

```
void main () {

    ViSession defaultRM, vi;

    /* Open session to GPIB device at address 0904
                                (Change the address to suit)*/
    viOpenDefaultRM (&defaultRM);
    viOpen (defaultRM, "GPIB0::09::04::INSTR", VI_NULL,VI_NULL, &vi);

    /* Set Synchronous Command to STOP */
    viPrintf (vi, ":TRIG3:COMM STOP\n");

    /* Issue a Synchronous Pulse to STOP */
    viPrintf (vi, ":OUTP5:TTLT1:IMM\n");

    /* Issue a Synchronous Pulse to STOP */
    viPrintf (vi, ":OUTP5:TTLT1 OFF\n");

    /* Disable 100ms Heartbeat control system */
    viPrintf (vi, ":INIT2:CONT OFF\n");

    /* Disable Synchronous Command Pulse system */
    viPrintf (vi, ":INIT3:CONT OFF\n");

    /* Ensure Heartbeat system is IDLE */
    viPrintf (vi, ":ABORT2\n");

    /* Ensure Synchronous Command System is IDLE*/
    viPrintf (vi, ":ABORT3\n");

    /* Close session */
    viClose (vi);
    viClose (defaultRM);
}
```

Chapter 10
SCPI Error Messages

The system-defined error/event numbers are chosen on an enumerated ("1 of N") basis. The SCPI defined error/event numbers and the error description portions of the ERRor Query Response are listed here. The first error/event described in each class (for example, -100, -200, -300, -400) is a “generic” error. In selecting the proper error/event number to report, more specific error/event codes are preferred, and the generic error/event is used only if the others are inappropriate.

No Errors

No error

This message indicates that the device has no errors.

Module Errors [101 … 116]

101 Flash programming error

This is a Flash write-in error.

102 Flash erasure error

This is a Flash erase error.

103 Checksum error

This is a Flash CRC error.

104 Invalid word addr

This means that an odd-number address is selected for L.A (PEEK/POOK)

108 Instrument failed

There are abnormalities in a self-test (at the time of system starting).

109 Temperature warning

There are abnormalities in temperature.

110 Power warning

This means that configuration is not completed.

111 FPGA error

This means that the configuration of FPGA is not completed.

116 Module Missing

This means that a module cannot be recognized.

Command Errors [-109 ... -102]

-109 Missing parameter

Fewer parameters were received than required for the header. For example, the *ESE common command requires one parameter, so receiving *ESE is not allowed.

-108 Parameter not allowed

More parameters were received than expected for the header. For example, the *RCL common command only accepts one parameter, so receiving *RCL 0,1 is not allowed.

-102 Syntax error

An unrecognized command or data type was encountered. For example, a string was received when the device does not accept strings.

Execution Errors [-241 ... -200]

-241 Hardware missing

Indicates that a legal program command or query could not be executed because the hardware in the device could not be found.

-240 Hardware error

Indicates that a legal program command or query could not be executed because of a hardware problem in the device.

-224 Illegal parameter value

Indicates that an exact value, from a list of possible values, was invalid.

-222 Data out of range

Indicates that an accepted legal program data element was passed but could not be executed because the interpreted value was outside the legal range.

-221 Setting conflict

This indicates that a legal program data element was passed but could not be executed due to the current device state. This is also used to indicate that a requested alarm or error measurement is invalid due to the instrument configuration.

-213 Init ignored

Indicates that a capture start command was transmitted when the TRIGger subsystem was in the wait for trigger state.

-211 Trigger ignored

Indicates that a trigger arrived when the TRIGger subsystem is in the idle state.

-210 Trigger error

This is displayed when the Start/Stop pulse state is in disagreement, or when a trigger doesn't arrive even after 999 hours have elapsed.

-200 Execution error

This error indicates that an attempt to set up a receiver parameter was made during gating.

Device Related Errors [-330 ... -313]

-330 Self-test failed

-313 Calibration memory lost

Indicates that a calibration failure has occurred.

Query Errors [-420 ... -410]

-420 Query Unterminated

Indicates that a condition causing an UNTERMINATED Query Error occurred (see IEEE 488.2, 6.3.2.2). For example, the device was sent a query and an incomplete program message was received.

-410 Query Interrupted

Indicates that a condition causing an INTERRUPTED Query Error occurred (see IEEE 488.2, 6.3.2.3). For example, a query followed by DAB or GET before a response was completely sent.

Appendix A
Error Rate Range

Error	B1		B2		REI		B3					HP-REI					BIT (no POH)		BIT (with POH)				
Rate/ Mapping	10G	2.5G	10G	2.5G	10G	2.5G	VC4-64c	VC4-16c	VC4-4c	VC4	VC3	VC4-64c	VC4-16c	VC4-4c	VC4	VC3	10G	2.5G	VC4-64c	VC4-16c	VC4-4c	VC4	VC3
3E-03																							
2E-03																							
1E-03			•	•							•					•							•
9E-04			•	•							•					•							•
8E-04			•	•		•					•					•							•
7E-04			•	•		•					•					•							•
6E-04			•	•		•					•					•							•
5E-04			•	•		•					•					•							•
4E-04			•	•		•				•	•				•	•		•	•	•	•	•	•
3E-04			•	•		•				•	•				•	•		•	•	•	•	•	•
2E-04			•	•	•	•				•	•				•	•		•	•	•	•	•	•
1E-04			•	•	•	•			•	•	•			•	•	•	•	•	•	•	•	•	•
9E-05			•	•	•	•			•	•	•			•	•	•	•	•	•	•	•	•	•
8E-05			•	•	•	•			•	•	•			•	•	•	•	•	•	•	•	•	•
7E-05			•	•	•	•			•	•	•			•	•	•	•	•	•	•	•	•	•
6E-05			•	•	•	•			•	•	•			•	•	•	•	•	•	•	•	•	•
5E-05			•	•	•	•			•	•	•			•	•	•	•	•	•	•	•	•	•
4E-05			•	•	•	•			•	•	•			•	•	•	•	•	•	•	•	•	•
3E-05			•	•	•	•			•	•	•			•	•	•	•	•	•	•	•	•	•
2E-05		•	•	•	•	•		•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
1E-05		•	•	•	•	•		•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
9E-06		•	•	•	•	•		•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
8E-06		•	•	•	•	•		•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
7E-06		•	•	•	•	•		•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
6E-06	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
5E-06	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
4E-06	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
3E-06	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2E-06	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1E-06	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
9E-07	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8E-07	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
8E-12	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
7E-12	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6E-12	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
5E-12	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
4E-12	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
3E-12	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2E-12	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1E-12	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

SCPI Commands