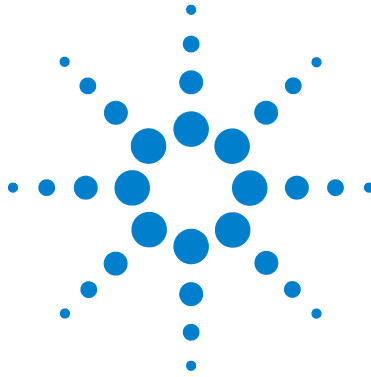




Agilent E5818A LXI Class-B Trigger Box

Programming Guide



Agilent Technologies

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Equipment Operation

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This is a Safety Class I product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the instrument, is likely to make the instrument dangerous. Intentional interruption is prohibited. If this instrument is not used as specified, the protection provided by the equipment could be impaired. This instrument must be used in a normal condition (in which all means of protection are intact) only.

No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers. For continued protection against fire hazard, replace the line fuse(s) only with fuses of the same type and rating (for example, normal blow, time delay, etc.). The use of other fuses or material is prohibited.

General Safety Considerations

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies, Inc. assumes no liability for the customer's failure to comply with these requirements.

WARNING

- **Before this instrument is switched on, make sure it has been properly grounded through the protective conductor of the ac power cable to a socket outlet provided with protective earth contact. Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal can result in personal injury.**
-

CAUTION

- Any adjustments or service procedures that require operation of the instrument with protective covers removed should be performed only by trained service personnel.
-

User Environment

This instrument is designed for indoor use only.

In This Guide...

- 1 **Trigger Box Remote Operation** Chapter 1 describes the remote operation configuration of the E5818A.
- 2 **LOG Subsystem** Chapter 2 describes how the LOG command subsystems are used to configure, records TTL output and EXT input, and retrieving data and status of the E5818A.
- 3 **LXI:EVENT Subsystem** Chapter 3 describes how the LXI:EVENT command subsystems is used to generate outbound event configurations from E5818A.
- 4 **LXI:ELOG Subsystem** Chapter 4 describes the how the LXI:ELOG command subsystems are used to configure and record LXI LAN event, as well as retrieving incoming and outgoing signals during data communication between trigger box.
- 5 **LXI:TIME Subsystem** Chapter 5 describes how the LXI:TIME command subsystems are used to configure and set the time as well as retrieving the IEEE 1588 clock status
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- 7 **STATus Subsystem** Chapter 7 describes how the STATus command subsystem is used to configure and retrieve the status information from E5818A.
- 8 **SYSTEM Subsystem** Chapter 8 describes how the SYSTem command subsystem is used to retrieve the system information from E5818A.
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- 10 **IEEE-488.2 Command Reference** Chapter 10 contains information about the IEEE-488.2 Common Commands that the trigger box supports.

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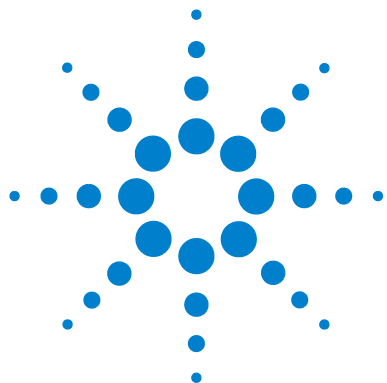
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1 Trigger Box Remote Operation

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This chapter describes the remote operation configuration of the E5818A.



Configuring the Remote Interface

This section briefly describes how to configure the LAN remote interface.

NOTE

For more information on configuring the remote interface connectivity, refer to the *Agilent Technologies USB/LAN/GPIB Interfaces Connectivity Guide*. If you have installed the *IO Libraries Suite*, you can access the *Connectivity Guide* via the Agilent IO Libraries Control icon. Alternatively, you can access the *Connectivity Guide* via the web at www.agilent.com/find/connectivity.

LAN Configuration

The E5818A has three LAN operating modes:

- Dynamic IP (Dynamic Host Configuration Protocol or DHCP)
- Auto IP (Local PC Control or isolated (non-site) LAN)
- Static IP (Manual mode)

These three modes can be set up from the web access. For web browser operation, refer to the *E5818A LXI Class-B Trigger Box User's Guide*.

Communicating with the E5818

There are two ways you can communicate with the E5818 via a network: use the E5818 Web access or use a supported programming language with the Agilent IO Libraries Suite.

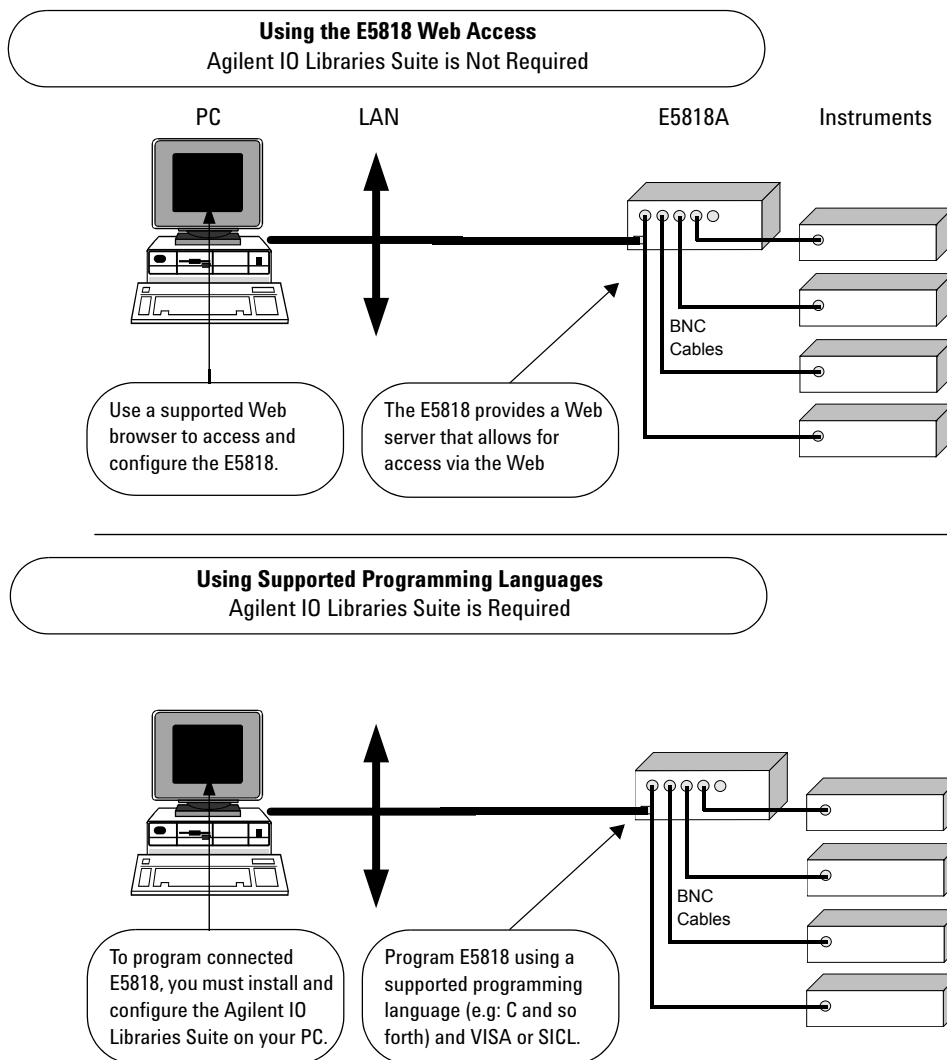


Figure 1-1 Two ways of communicating with the E5818 via a network

Using E5818 Web Access

Since the E5818 is Web-enabled, you can communicate with the E5818 from a supported Web browser. The E5818 supports Internet Explorer 6.0 or higher and Firefox 2.0 and higher. Typing in the E5818 IP address (or E5818 hostname, if known) on your Web browser address line and then pressing the **Enter** key displays the E5818 *Welcome* page.

The *Welcome* page is the home page. The banner and the navigation bar (on the left) are fixed frame for each page. The text within each page scrolls (as necessary) to display desired information.

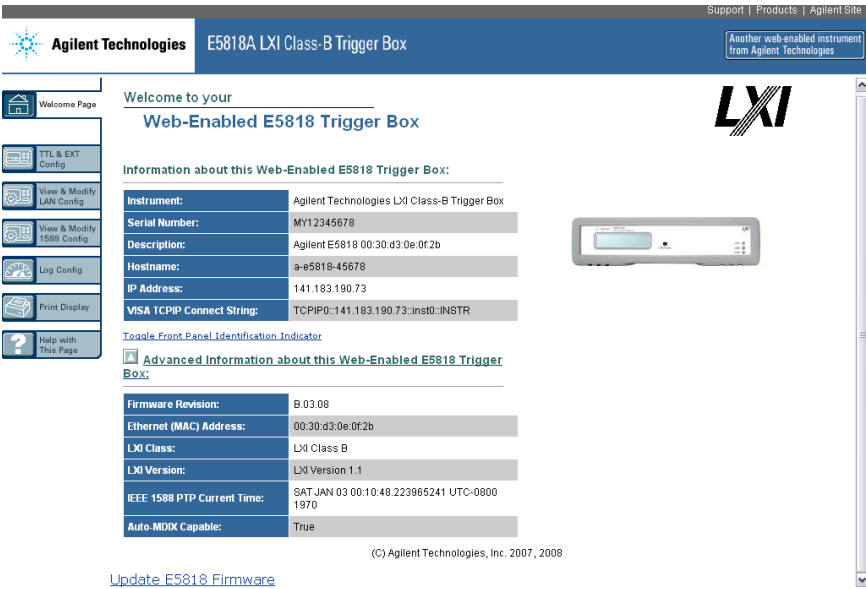


Figure 1-2 E5818 Welcome page

You can use the Web access to configure the E5818. For example, using the *Configuring E5818 Trigger Box (LAN Configuration)* page of the E5818 interface, you can view and modify the LAN configuration of the E5818. See Chapter 3 “Using Web Access” in *User’s Guide* for information on E5818 Web access.

Using a Supported Programming Language

To use applications that require the Agilent IO Libraries, you must install and configure the Agilent IO Libraries Suite on each PC to be used for programming. Then, you can program connected instruments using a supported programming language (such as C or Visual Basic) using the Agilent Virtual Instrument Software Architecture (VISA), VISA COM, or Standard Instrument Control Language (SICL). See the *Agilent IO Libraries Suite Getting Started Guide* and *Agilent IO Libraries Suite Online Help* for more information on the Agilent IO Libraries.

For detailed information on the IVI Driver, see *Agilent E5818 IVI Driver Helpfile* located in the *Product Reference CD*.

Basic Operation Settings

The E5818A operating features diagram is shown in Figure 1-3.

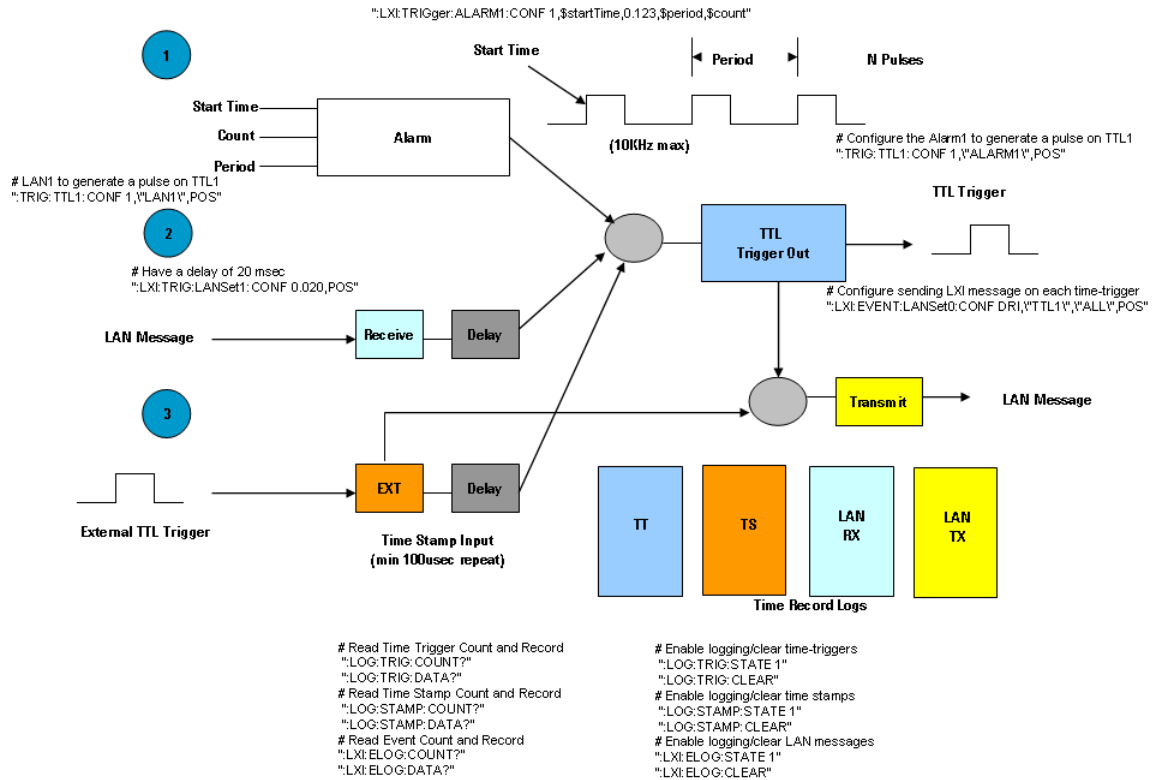


Figure 1-3 E5818A operating features

Generate TTL based on Alarm

You can configure the E5818A to enable an Alarm for TTL1 at a required time (<sec_value>,<fract_value>) based on <count_value> and a period of <period_value>.

TRIG:TTL1:SOUR "ALARM1" *This command associates TTL1 to ALARM1*

LXI:TRIG:ALARM1:SET:CONF ON,<sec_value>,<fract_value>,<period_value>,<count_value> *This command is used to configure and turns on the ALARM1.*

You can configure the E5818A to enable an infinite Alarm for TTL1 to start at required time (<sec_value>,<fract_value>) with period of <period_value> by using the following command sequences.

TRIG:TTL1:SOUR "ALARM1" *This command associates TTL1 to ALARM1*

LXI:TRIG:ALARM1:SET:CONF 1,<sec_value>,<fract_value>,<period_value>,0 *This command is used to configure and turns on the ALARM1.*

NOTE

A future time must be set for <sec_value> and <fract_value> during configuration.

Generate LAN based on TTL

You can configure E5818A to send LANSet0 based on TTL1 signal source by using the following command sequence.

LXI:EVENT:LANSet0:SOUR "TTL1" *This command associates LANSet0 to TTL1*

LXI:EVENT:LANSet0:CONF 1,"TTL1","ALL",POS *This command is used to configure LANSet0*

Generate TTL based on LAN

You can configure E5818A to setup TTL1 signal based on LANSet0 by using the following command sequences.

TRIG:TTL1:SOUR "LANSet0" *This command associates TTL1 to LANSet0*

TRIG:TTL1:STAT 1 *This command turns on TTL1*

Generate TTL based on EXT

You can configure E5818A to send TTL signal based on EXT1 signal source by using the following command sequences.

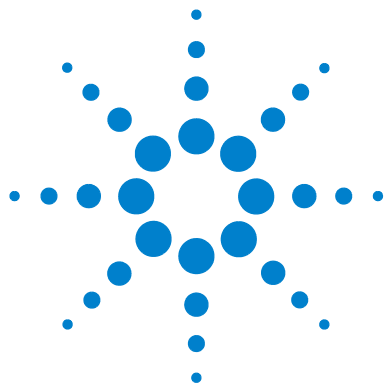
TRIG:TTL1:SOUR "EXT1" *This command associates TTL1 to EXT1*

TRIG:TTL1:STAT 1 *This command turns on TTL1*

Generate LAN based on EXT

You can configure E5818A to send LANSet0 based on EXT1 signal source by using the following command sequence.

```
LXI:EVENT:LANSet0:CONF WOR,"EXT1","ALL",POS
```

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LOG:TRIGger:STATe	18

This chapter explains how the LOG command subsystems are used to configure, records TTL output and EXT input, and retrieving data and status of the E5818A.



LOG Subsystem

This LOG subsystems are used to configure, retrieve and record the TTL output and EXT input data entry. By using this subsystem, you can enable or disable the logging features, check the number of entry status and clear old entries from all entries. It also provides user the access to record inbound or outbound TTL signals.

Keyword	Parameter Form	Notes	Page
LOG			
:STAMp			
:CLEar			page 11
:COUNT?			page 12
:DATA?			page 13
:STATe			page 14
:TRIGger			
:CLEar			page 15
:COUNT?			page 16
:DATA?			page 17
:STATe			page 18

LOG:STAMp:CLEar

This command is used to clear all existing entries in the EXT log. E5818A will stop logging when the event log is full. At *RST, the event log will be cleared.

Syntax

```
LOG:STAMp:CLEar
```

Example

```
LOG:STAM:CLE
```

This command clears all existing entries in the EXT log.

LOG:STAMp:COUNT?

This command is used to query the number of entries in the EXT log once it is executed. E5818A has a log size up to 5000 entries.

Syntax

LOG:STAMp:COUNT?

Example

LOG:STAM:COUNT?

This command queries the number of entries in the EXT log at the instant the query is executed.

LOG:STAMp:DATA?

This command is used to read and clear old EXT log entry. When EXT log is emptied after the query is executed, the string “NO Event” returned.

The maximum number of supported entry is 5000. When EXT log is full, the following 5001 entry is “Overflow”.

The return string consists of the following fields:

- Log entry second
- Log entry fractional second
- Timestamp (second)
- Timestamp (fractional second)
- Source (0 = EXT1 and 1 = EXT2)
- Slope

Syntax

LOG:STAMp:DATA?

Example

LOG:STAM:DATA?

This command reads and clears the oldest log entry.

Output Example

592629,0.877584139,592629,0.876586543,0,Rising

This output appears when LOG:STAM:DATA? is executed.

LOG:STAMp:STATe

This command is used to enable or disable the EXT logging feature. At *RST, the value is FALSE.

Syntax

```
LOG:STAMp:STATe <0|1>
```

Example

```
LOG:STAM:STAT 1
```

This command enables event logging feature.

LOG:TRIGger:CLEar

This command is used to clear all existing entries from the TTL log. E5818A will stop logging when the event log is full. At *RST, the event log will be cleared.

Syntax

```
LOG:TRIGger:CLEar
```

Example

```
LOG:TRIG:CLE
```

This command clears all existing entries from the TTL log.

LOG:TRIGger:COUNt?

This command is used to query the number of entries in the TTL log once it is executed. E5818A has a log size up to 5000 entries.

Syntax

```
LOG:TRIGger:COUNt?
```

Example

```
LOG:TRIG:COUN?
```

This command queries the number of entries in the TTL log at the instant the query is executed.

LOG:TRIGger:DATA?

This command is used to read and clear old TTL log entry. When the TTL log is emptied after the query is executed, the string “No Event” returned.

The maximum number of supported entry is 5000. When TTL log is full, the following 5001 entry is “Overflow”.

The return string consists of below fields:

- Log entry second
- Log entry fractional second
- Timestamp (second)
- Timestamp (fractional second)
- Source (0 = TTL1 and 1 = TTL2)
- Slope
- The last field is to indicate if this is an internal alarm or LAN trigger.

Syntax

```
LOG:TRIGger:DATA?
```

Example

```
LOG:TRIG:DATA?
```

This command reads and clears the oldest log entry.

Output Example

```
590272,0.227218450,590272, This output appears when
0.227073219,0,Rising,Inter LOG:TRIG:DATA? is executed.
nal 1588 Alarm
```

LOG:TRIGger:STATe

This command is used to enable or disable the TTL logging feature. At *RST, this value is FALSE.

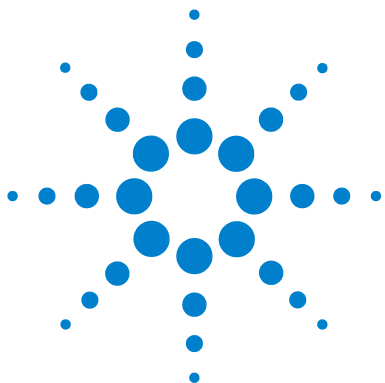
Syntax

```
LOG:TRIGger:STATe <0|1>
```

Example

```
LOG:TRIG:STAT 1
```

This command enables event logging feature.



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LXI:EVENT[:LANSet0 1 2 3 4 5 6 7]:SLOPe	29
LXI:EVENT[:LANSet0 1 2 3 4 5 6 7]:SOURce	31
LXI:EVENT[:LANSet0 1 2 3 4 5 6 7]:STATe	33

This chapter explains how the LXI:EVENT command subsystems is used to generate outbound event configurations from E5818A.



LXI:EVENT Subsystem

The LXI:EVENT interface provides a mechanism for the generation of outbound events configuration from a LXI device. This events are transmitted over as a LXI-defined LAN events.

In addition, this events can either be transmitted to a specific ports on specific hosts or multiple hosts.

There are 8 sets of configuration under this subsystem, ie: LANSet0|1|2|3|4|5|6|7. The parameters under each configuration are stated below:

Keyword	Parameter Form	Page
LXI		
:EVENT		
:DALL		page 21
[:LANSet0 1 2 3 4 5 6 7]		
:CONFigure	<boolean>,<string>,<string>, POSitive NEGative	page 22
:DESTination	<string>	page 24
:DOMAin	<numeric_value>	page 26
:IDENtifier	<numeric_value>	page 27
:SLOPe	POSitive NEGative	page 29
:SOURce	<string>	page 31
:STATe	<boolean>	page 33

LXI:EVENT:DALL

This command is used to disable all events.

Syntax

```
LXI:EVENT:DALL
```

Example

```
LXI:EVENT:DALL
```

This command disables all events.

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:CONFigure

This command sets all the parameters for the corresponding configuration.

Syntax

```
LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:CONFigure
<state_value>,<source_value>,<destpath_value>,
<slope_value>
```

Parameters

Item	Type	Range of Values	Default Value
state_value	Discrete	Specify the sending of LXI LAN event with wired-or or driven characteristics. {OFF DRI WOR}	“OFF”
source_value	Discrete	Specify the signal which causes an event to be transmitted. 'TTL1' 'TTL2' 'EXT1' 'EXT2'	This is a required parameter
destpath_value	String	Specify a place to send the event, <Destination Path>::=[host[:port]][/name] ¹ ,	“ALL”
slope_value	Discrete	Specifies the slope of the event that will cause the generation of an outbound event. POSitive NEGative	POSitive

¹ The syntax for specifying a destination path is as follows:
 <DestinationPath>==[(<tcp>|<udp>|<TriggerBus>)[, <DestinationPath>]]
 <tcp>==[host[:<port>]][/<LANIdent>]
 <udp>==[ALL[:<port>]][/<LAMIdent>]

Table 3-1 Example and description of destination path.

Example of Destination Path	Description
"192.168.0.1:23"	When the event designated by the event source property occurs, a TCP packet is sent to 192.168.0.0, port 23.
"ALL:23"	When the event designated by the event source property occurs, a UDP multicast packet is sent to the IANA assigned UDP multicast address port 23 with the event ID corresponding to the repeated capability name.
"192.168.0.1"	When the event designated by the event source property occurs, a TCP packet corresponding to the repeated capability name is sent to 192.168.0.1 on the IANA registered port for LXI events (lxi-eventsvc).
":23"	When the event designated by the event source property occurs, a UDP multicast packet with the event id corresponding to the repeated capability name is sent to the IANA designated multicast address, port 23.

Example

LXI:EVENT:LANSet0:CONF 1,

"TTL1","ALL",POS

This command configures LXI LAN event to be generated based on TTL1 sending to ALL with a positive edge. The default event ID is LAN<n>. But user can set any custom event ID using Identifier command (refer page 27).

Error Messages

- When each parameter carries more than nine characters, error message "Data out of range" occurs.

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:DESTination

This command sets the destination to send a LXI LAN event. At *RST, the value is set to “ALL”.

Syntax

```
LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:DESTination
<destpath_value>

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:DESTination?
```

Parameters

Item	Type	Range of Values	Default Value
destpath_value	String	Specifies a place to send the event, <DestinationPath>::=[host[:port]][/name] ¹ .	This is a required parameter

¹ The syntax for specifying a filter is as follows:

<DestinationPath>==[(<tcp>|<udp>|<TriggerBus>)][, <DestinationPath>]]

<tcp>==<host>[:<port>][/<LANIdent>]

<udp>==[ALL][:<port>][/<LAMIIdent>]

Table 3-2 Example and description of destination path

Example of Destination Path	Description
"192.168.0.1:23"	When the event designated by the event source property occurs, a TCP packet is sent to 192.168.0.1, port 23.
"ALL:23"	When the event designated by the event source property occurs, a UDP multicast packet is sent to the IANA assigned UDP multicast address port 23 with the event ID corresponding to the repeated capability name.
"192.168.0.1"	When the event designated by the event source property occurs, a TCP packet corresponding to the repeated capability name is sent to 192.168.0.1 on the IANA registered port for LXI events (lxi-eventsvc).
".:23"	When the event designated by the event source property occurs, a UDP multicast packet with the event id corresponding to the repeated capability name is sent to the IANA designated multicast address, port 23.

Example

LXI:EVENT:LANSet0:DEST
"192.168.1.1:1234" *This command sets the destination path to host 192.168.1.1 at TCP port 1234.*

LXI:EVENT:LANSet0:DEST? *This query will request for the destination path.*

Error Messages

- When each parameter carries more than nine characters, error message "Data out of range" occurs.
- When the despath_value is an empty string, error message "Illegal parameter value" occurs.

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:DOMain

This command sets the domain for the corresponding configuration. At *RST, the value set to 0.

Syntax

```
LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:DOMain <domain_value>
LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:DOMain?
```

Parameters

Item	Type	Range of Values	Default Value
domain_value	Numeric	Specifies the domain of the LXI LAN event (0 to 255)	0

Example

```
LXI:EVENT:LANSet0:DOMA 123 This command sets the domain to 123 for LANSet0 configuration.
```

Error Messages

- When the domain_value is not in between 0 and 255, error message “Data out of range” occurs.

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:IDENTifier

This command sets the LXI LAN event ID for the corresponding configuration. AT *RST, the value set to “LAN <n>”

NOTE

- This command cannot accept any ID_value start with “LXI”. The LXI Consortium reserves all strings used for LXI LAN event names beginning with LXI for future standardization.

Syntax

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:IDENTifier <ID_value>

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:IDENTifier?

Parameters

Item	Type	Range of Values	Default Value
ID_value	String	Specifies a 16 characters string as LXI LAN event ID. • This command cannot accept “LXI”. The LXI Consortium reserves all strings used for LXI LAN event names beginning with LXI for future standardization.	LAN<n>

Example

```
LXI:EVENT:LANSet0:IDEN  
"DONE"
```

This command sets the LXI LAN event ID to "DONE" for LANSet0 configuration.

Error Messages

- When the ID_value is carries more than 16 characters, error message "String data error" occurs.
- When the ID_value is an empty string or "LXI", error message "Illegal parameter value" occurs.

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:SLOPe

This command sets the event slope (hardware bit) for the corresponding configuration. The LXI LAN event is sent with the same slope as event that initiates the action. At *RST, the value is set to POSitive slope.

NOTE

E5818A only supports POSitive slope and NEGative slope, but not either slope.

Syntax

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:SLOPe <slope_value>

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:SLOPe?

Parameter

Item	Type	Range of Values	Default Value
slope_value	Discrete	Specifies the slope of the inbound event that will cause the generation of an outbound event. {POSitive NEGative}	POSitive

Example

`LXI:EVENT:LANSet0:SLOP POS` *This command sets the slope to positive edge for LANSet0 configuration. (rising edge)*

`LXI:EVENT:LANSet1:SLOP NEG` *This command sets the slope to negative edge for LANSet1 configuration. (falling edge)*

Error Messages

- When the value is not any of the discrete value, error message “Illegal parameter value” occurs.

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:SOURce

This command sets the source for the corresponding configuration. There are four different sources such as:

- TTL1
- TTL2
- EXT1
- EXT2

At *RST, the value for LANSet0 is “TTL1”, LANSet1 is “TTL2”, LANSet2 is “EXT1”, LANSet3 is “EXT2” and LANSet4|5|6|7 is empty string.

Syntax

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:SOURce <source_value>

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:SOURce?

Parameters

Item	Type	Range of Values	Default Value
source_value	Discrete	Specify the signal which causes an event to be transmitted. 'TTL1' 'TTL2' 'EXT1' 'EXT2'	This is a required parameter

Example

LXI:EVENT:LANSet0:SOUR
"EXT1"

*This command sets the source to "EXT1"
for LANSet0 configuration.*

LXI:EVENT:LANSet1:SOUR?

*This query will request for the source of
LANSet1 configuration.*

Error Messages

- This command is able to configure source to "TTL1, TTL2, EXT1, EXT2" only, error message "Character data not allowed" occurs for any other values.

LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:STATe

This command sets the state for the corresponding configuration. There are three different states such as:

- OFF – Disables the event
- DRI – Enables the event in driven mode
- WOR – Enables the event in wired-or mode

At *RST, the value is set to OFF.

Syntax

```
LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:STATe <OFF|DRI|WOR>
```

```
LXI:EVENT[:LANSet0|1|2|3|4|5|6|7]:STATe?
```

Example

```
LXI:EVENT:LANSet0:STAT WOR
```

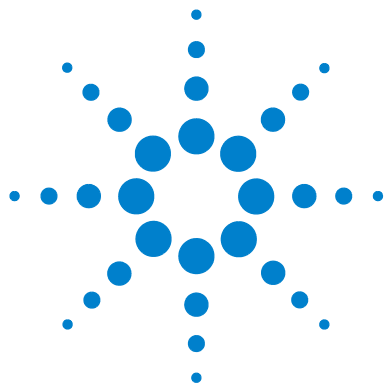
This command enables LXI LAN event in wired- or mode for LANSet0 configuration.

```
LXI:EVENT:LANSet7:STAT?
```

This query will request for the state of LANSet7 configuration.

Error Messages

- If LXI:EVENT:LANSet0:SOURce is not configured before LXI:EVENT:LANSet0:STATe is set, error message “Event source not set” occurs.



4 LXI:ELOG Subsystem

LXI:ELOG Subsystem	36
LXI:ELOG:CLEAr	37
LXI:ELOG:COUNt?	38
LXI:ELOG:STATe	39
LXI:ELOG[:DATA]?	40

This chapter explains the how the `LXI:ELOG` command subsystems are used to configure and record LXI LAN event, as well as retrieving incoming and outgoing signals during data communication between trigger box.



LXI:ELOG Subsystem

The LXI:ELOG interface provides a mechanism that uses the inbound events to control the incoming and outgoing signals, configure Event Log subsystems and record the LXI LAN event. This subsystems provide data correlation for the LXI LAN event.

Keyword	Parameter Form	Notes	Page
LXI			
:ELOG			
:CLEar			page 37
:COUNT?			page 38
:STATe	<boolean>		page 39
[:DATA]?			page 40

LXI:ELOG:CLEar

This command is used to clear all existing entries from the event log. E5818A will stop logging when the event log is full. At *RST, the event log will be cleared.

Syntax

```
LXI:ELOG:CLEar
```

Example

```
LXI:ELOG:CLE
```

This command clears all existing entries from the event log.

LXI:ELOG:COUNT?

This command is used to query the number of entries in the event log once it is executed. E5818A has an event log size up to 5000 entries.

Syntax

```
LXI:ELOG:COUNT?
```

Example

```
LXI:ELOG:COUN?
```

This command query the number of entries in the event log once it is executed.

LXI:ELOG:STATe

This command is used to enable or to disable the event logging feature. At *RST, this value is FALSE.

Syntax

```
LXI:ELOG:STATe <0|1>
```

Example

```
LXI:ELOG:STAT 1
```

This command enables event logging feature.

LXI:ELOG[:DATA]?

This command is used to read and clear old event log entry. When event log is emptied after the query is executed, the string “No Event” returned.

The maximum number of supported event is 5000. When event log is full, the following 5001 entry is “Overflow”.

The return string consists of following fields:

- Log entry second
- Log entry fractional second
- Hardware detect
- Domain
- Event ID
- Sequence number
- Timestamp (second)
- Timestamp (fractional second)
- Flag¹
- Length
- The last field is to indicate if this is an incoming LXI LAN event (ExternalLXIEvent) or outgoing LXI LAN event (InternalLXIEvent).

¹ A flag is an UInteger 16 that contains data about the packet. Bit within the flag byte are defined as in [Table 4-1](#).

Table 4-1 Bit Definitions - Flag byte

Bit Number	Definition	Meaning
0	Error Message	If set to 1, indicates that this packet is an error message.
1	Retransmission	If set to 1, indicates that this packet is a re-transmission of a prior packet and contains identical information. This allows LXI devices to transmit packets multiple times (for increased reliability), if desired. Modules are not required to implement this feature; however, those modules shall ignore packets if this bit is set.
2	Hardware value	A logical value that characterizes trigger events (particularly hardware events). If not used, this bit shall be set to zero.
3	Acknowledgement	If set to 1, indicates that this packet is an acknowledgement that a prior packet was successfully received. This allows LXI systems to implement UDP-based handshaking protocols (for increased reliability), if desired. Modules are not required to implement this feature; however, those modules shall ignore packets if this bit is set.
4-15	Reserved	All bits shall be set to zero.

Syntax

```
LXI:ELOG[:DATA]?
```

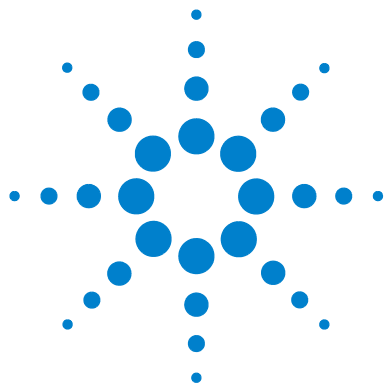
Example

```
LXI:ELOG?
```

This command reads and clears the oldest event log entry.

Output Example

```
589063,0.009506580,LXI,0,    This output appears when LXI:ELOG? is  
LAN0,1,0,0.000000000,4,0,    executed.  
External LXI Event
```

5 LXI:TIME Subsystem

LXI:TIME Subsystem	44
LXI:TIME:MASTer?	45
LXI:TIME:SYNChronized?	46
LXI:TIME[:VALue]	48

This chapter explains how the `LXI:TIME` command subsystems are used to configure and set the time as well as retrieving the IEEE 1588 clock status.



LXI:TIME Subsystem

This LXI:TIME subsystems are used to provide the IEEE 1588 clock status and allow users to read and set the current time of the clock.

Keyword	Parameter Form	Notes	Page
LXI			
:TIME			
:MASTer?			page 45
:SYNChronized?			page 46
[:VALue]	<numeric_value>, [numeric_value]		page 48

LXI:TIME:MASTer?

This command is used to query if E5818A is the 1588 master clock.

Syntax

```
LXI:TIME:MASTer?
```

Example

```
LXI:TIME:MAST?
```

This command queries the E5818A 1588 clock state, to determine it is a master clock or not a master clock.

LXI:TIME:SYNChronized?

This command is used to query if the 1588 clock for E5818A is currently synchronized to the master clock.

NOTE

- This command returns True when the difference between master and slave clock is less than or equal to 0.0000001 s.
-

Syntax

```
LXI:TIME:SYNChronized?
```

Example

```
LXI:TIME:SYNC?
```

This command queries E5818A 1588 clock state, to determine it is synchronized or not synchronized.

LXI:TIME[:VALue]

This command is used to set or read the current 1588 time. The current E5818A implementation can only support LXI:TIME 123456789,0.123456789 and LXI:TIME 123456789. For LXI:TIME 123456789, the fractional will be 0 by default.

Meanwhile, the LXI:TIME 123456789,0.123456789 is not supported as this command only accepts two parameters:

- The value of TAI seconds
- The fractional of TAI seconds

Syntax

LXI:TIME[:VALue] <sec_value>[,<fract_value>]

LXI:TIME[:VALue] ?

Parameters

Item	Type	Range of Values	Default Value
sec_value	Numeric	Specifies the TAI second the alarm will go off	This is a required parameter
fract_value	Numeric	Specifies the current TAI fractional second the alarm will go off	This is a required parameter

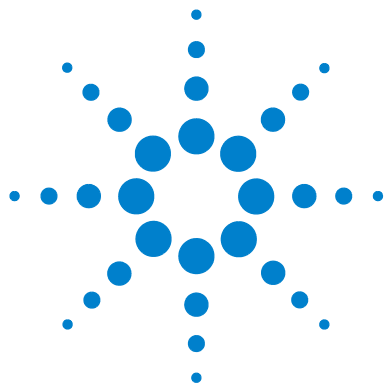
Example

```
LXI:TIME  
123456789,0.123456789
```

This command configures the trigger box clock's time to TAI 123456789.123456789.

Error Messages

- When each parameter carries more than nine characters, error message “Data out of range” occurs.



6 LXI:TRIGger Subsystem

LXI:TRIGger Subsystem	50
LXI:TRIGger:ALARM:DALL	52
LXI:TRIGger:ALARM1 2[:SET]:CONFigure	53
LXI:TRIGger:ALARM1 2[:SET]:COUNt	55
LXI:TRIGger:ALARM1 2[:SET]:ENABle	57
LXI:TRIGger:ALARM1 2[:SET]:PERiod	58
LXI:TRIGger:ALARM1 2[:SET]:TIME	60
LXI:TRIGger[:SOURce]:LANSet0 1 2 3 4 5 6 7:CONFigure	62
LXI:TRIGger[:SOURce]:LANSet0 1 2 3 4 5 6 7:DELay	66
LXI:TRIGger[:SOURce]:LANSet0 1 2 3 4 5 6 7:DOMAin	70
LXI:TRIGger[:SOURce]:LANSet0 1 2 3 4 5 6 7:FILter	71
LXI:TRIGger[:SOURce]:LANSet0 1 2 3 4 5 6 7:IDENtifier	74
LXI:TRIGger[:SOURce]:LANSet0 1 2 3 4 5 6 7:SLOPe	76
LXI:TRIGger[:SOURce]:EXT1 2:CONFigure	79
LXI:TRIGger[:SOURce]:EXT1 2:DELay	81
LXI:TRIGger[:SOURce]:EXT1 2:SLOPe	83

This chapter explains how the `LXI:TRIGger` command subsystem is used to set the trigger control configuration for the device.



LXI:TRIGger Subsystem

The LXI:TRIGger interface provides a mechanism for using inbound events to control when to generate trigger.

The inbound events for E5818A can be either

- Receive LXI LAN event; or
- A trigger that appears at EXT1 or EXT2.

In addition to inbound events, internal 1588 clock can also be used to control when to generate trigger.

Below are three different trigger sources that can be used to control when to generate a trigger at TTL1 or TTL2:

- Internal 1588 clock – generates a trigger at TTL1 or TTL2 when the internal alarm goes off.
- Receive LXI LAN event – generates a trigger at TTL1 or TTL2 when receiving a LXI LAN event.
- A trigger appears at EXT1 or EXT2 – generates a trigger at TTL1 or TTL2 when trigger appears at EXT1 or EXT2.

Keyword	Parameter Form	Page
LXI		
:TRIGger		
:ALARM[1] 2		
:DALL		page 52
[:SET]		
:CONFigure	<boolean>,<numeric_value>,<numeric_val ue>,<numeric_value>,<repeatcount>	page 53
:COUNt	<numeric_value>	page 55
:ENABle	<boolean>	page 57
:PERiod	<numeric_value>	page 58
:TIME	<numeric_value>[,<numeric_value>]	page 60

Keyword	Parameter Form	Page
[:SOURce]		
:LANSet0 1 2 3 4 5 6 7		
:CONFigure	<numeric_value>, POSitive NEGative	page 62
:DELaY	<numeric_value>	page 66
:DOMAin	<numeric_value>	page 70
:FILTer	<string>	page 71
:IDENtifier	<string>	page 74
:SLOPe	POSitive NEGative	page 76
:EXT1 2		
:CONFigure	<numeric_value>, POSitive NEGative	page 79
:DELaY	<numeric_value>	page 81
:SLOPe	POSitive NEGative	page 83

LXI:TRIGger:ALARM:DALL

This command disables all the trigger alarms.

Syntax

```
LXI:TRIGger:ALARM:DALL
```

Example

```
LXI:TRIG:ALARM:DALL
```

This command disables all the trigger alarms.

LXI:TRIGger:ALARM1 | 2[:SET]:CONFigure

This command sets all the parameters to configure a trigger alarm.

NOTE

E5818 has only 10000 buffer depth to store schedule alarm. When the buffer is full, ESR will be flagged and an error message “–321, Out of memory: The internal queue is full” will be recorded into system error log.

Syntax

```
LXI:TRIGger:ALARM1|2[:SET]:CONFigure <0|1>,<sec_value>,  
<fract_value>,<period_value>,<count_value>
```

Parameters

Item	Type	Range of Values	Default Value
sec_value	Numeric	Specify the TAI second the alarm will go off	This is a required parameter
fract_value	Numeric	Specify the TAI fractional second the alarm will go off	This is a required parameter
period_value	Numeric	Specify the time between two consecutive trigger (0.0001 to 43200)	1 s
count_value	Numeric	Specify the number of repeating alarm (0 ¹ to 5000)	1

¹ 0 is used to represent infinite value.

Example

```
LXI:TRIG:ALARM1:SET:CONF  
1,123.0,0.456,1,100
```

This command configures ALARM1 to go off at TAI 123.456, with a period of 1 s for 100 times.

Error Messages

- If TRIG:TTL1|2:SOURce is not configured before LXI:TRIGger:ALARM1|2[:SET]:CONFigure is set, error message “Trigger source invalid” occurs.
- When each parameter carries more than nine characters, error message “Data out of range” occurs.
- If TAI seconds configured is not a future time, error message “Execution error. Alarm time invalid” occurs.

LXI:TRIGger:ALARM1 | 2[:SET]:COUNT

This command sets the repetition number of trigger alarm. At *RST, the value is set to 0.

Syntax

```
LXI:TRIGger:ALARM1 | 2[:SET]:COUNT <count_value>  
LXI:TRIGger:ALARM1 | 2[:SET]:COUNT?
```

Parameters

Item	Type	Range of Values	Default Value
count_value	Numeric	Specify the number of repeating alarm (0 ¹ to 5000).	0

¹ 0 is used to represent infinite value.

Example

LXI:TRIG:ALARM1:SET:COUN 0 *This command sets the count of trigger alarm 1 to infinite.*

LXI:TRIG:ALARM1:SET:COUN
5000 *This command sets the count of trigger alarm 1 to 5000.*

LXI:TRIG:ALARM1:SET:COUN? *This query gets the count of trigger alarm 2.*

Error Message

- When the count_value not in between 0 to 5000, error message “Alarm repeat count invalid” occurs.

LXI:TRIGger:ALARM1 | 2[:SET]:ENABLE

This command is used to enable and disable the trigger alarm. At *RST, the value is set to 0.

The query returns the state of the trigger alarm.

Syntax

```
LXI:TRIGger:ALARM1|2[:SET]:ENABle <0|1>
```

```
LXI:TRIGger:ALARM1|2[:SET]:ENABle?
```

Example

```
LXI:TRIG:ALARM1:SET:ENAB 1 This command enables the trigger alarm 1.
```

```
LXI:TRIG:ALARM2:SET:ENABle? This query gets the state of trigger alarm 2.
```

Error Message

- If TRIG:TTL1|2:SOURce is not configured before LXI:TRIGger:ALARM1|2[:SET]:ENABle, error message “Trigger source invalid “ occurs.

LXI:TRIGger:ALARM1 | 2[:SET]:PERiod

This command sets the intervals between two consecutive trigger alarm. At *RST, the value is set to 0.

Syntax

```
LXI:TRIGger:ALARM1|2[:SET]:PERiod <period_value>  
LXI:TRIGger:ALARM1|2[:SET]:PERiod?
```

Parameters

Item	Type	Range of Values	Default Value
period_value	Numeric	Specify the time between two similar edge (0.0001 to 43200)	0 s

Example

```
LXI:TRIG:ALARM1:SET:PER 0.1      This command sets the period to 0.1 s for trigger alarm 1.  
  
LXI:TRIG:ALARM2:SET:PER?          This query gets the period of trigger alarm 2.
```

Error Message

- When the period_value not in between 0.0001 s to 43200 s, error message “Alarm period invalid” occurs.

LXI:TRIGger:ALARM1 | 2[:SET]:TIME

This command sets the start time for the alarm to generate a trigger. At *RST, these values are set to 0.

Syntax

```
LXI:TRIGger:ALARM1 | 2[:SET]:TIME <sec_value>[,<fract_value>]  
LXI:TRIGger:ALARM1 | 2[:SET]:TIME?
```

Parameters

Item	Type	Range of Values	Default Value
sec_value	Numeric	Specify the TAI second the alarm will go off	This is a required parameter
fract_value	Numeric	Specify the TAI fractional second the alarm will go off	This is a required parameter

Example

```
LXI:TRIG:ALARM1:SET:TIME 123.0,0.456  
LXI:TRIG:ALARM2:SET:TIME?
```

This command sets the TAI seconds to 123.456 for trigger alarm 1

This query gets the TAI seconds of trigger alarm 2.

Error Messages

- When each parameter carries more than nine characters, error message “Data out of range” occurs.
- If TAI seconds configured *is not a future time*, error message “Execution error. Alarm time invalid” occurs.

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:CONFigure

This command sets all the parameters to configure a LAN trigger.

There are 8 sets of configuration under LAN trigger, ie:
LANSet0|1|2|3|4|5|6|7. The parameter under each configuration are delay, domain, filter, identifier and slope

NOTE

This command can accept a delay_value that exceeds 0.000000001, but the value will be automatically rounded up to the closest 0.000000001.

E5818 has only 10000 buffer depth for the future time trigger. Therefore, in order not to miss any trigger in future, there is a maximum trigger delay that depends on the rate of the incoming LXI LAN event. User should ensure that incoming LXI LAN events do not fill up the 10000 buffer for the future LAN trigger.

Syntax

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:CONFigure
<delay_value>,<slope_value>

Parameters

Item	Type	Range of Values	Default Value
delay_value	Numeric	Specify the delay added to the timestamp in the LXI LAN event (0.000000001 to 43200	0 s
slope_value	Discrete	Specifies the slope of an outbound trigger {POSitive NEGative}	POSitive

Example

LXI:TRIG:SOUR:LANSet0:CONF 0, POS *This command sets the LAN trigger to trigger with zero delay, on a positive edge for LANSet0 configuration (rising edge).*

LXI:TRIG:SOUR:LANSet1:CONF 0.1, NEG *This command sets the LAN trigger to trigger with 0.1 s delay, on a negative edge for LANSet1 configuration (falling edge).*

NOTE

When 2 or more LAN trigger configurations have the same LAN event ID (IDENtifier), these configurations will be treated as the same.

For example, if we configure the first configuration (LXI:TRIG:LAN0) and the second configuration (LXI:TRIG:LAN1) to have the same identifier as "LAN0", then the 2 configurations will be treated as one. The changes in one configuration will be seen on the other configuration.

```
-> LXI:TRIG:LAN0:IDEN "LAN0"
-> LXI:TRIG:LAN1:IDEN "LAN0"
```

```
-> LXI:TRIG:LAN0:SLOP?
<- POS
-> LXI:TRIG:LAN1:SLOP?
<- POS
-> LXI:TRIG:LAN1:SLOP NEG
-> LXI:TRIG:LAN1:SLOP?
<- NEG
-> LXI:TRIG:LAN0:SLOP?
<- NEG
```

```
-> LXI:TRIG:LAN0:DELAY?
<- +1.000000000000000E+000
-> LXI:TRIG:LAN1:DELAY?
<- +1.000000000000000E+000
-> LXI:TRIG:LAN1:DELAY 2
-> LXI:TRIG:LAN0:DELAY?
<- +2.000000000000000E+000
-> LXI:TRIG:LAN1:DELAY?
<- +2.000000000000000E+000
```

To avoid this, configure a unique identifier for each LAN trigger configuration.

Error Messages

- When the delay_value is not in between 0.000000001 s to 43200 s, error message "Data out of range, LAN trigger delay invalid" occurs.

- When the slope_value is not any of the discrete value, error message “Illegal parameter value” occurs.

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:DElay

This command sets the delay that will be added to the timestamp carried in a received LXI LAN event. At *RST, the value is set to 0.

NOTE

This command can accept a delay_value that exceeds 0.000000001, but the value will be automatically rounded up to the closest 0.000000001.

E5818 has only 10000 buffer depth for the future time trigger. Therefore, in order not to miss any trigger in future, there is a maximum trigger delay that depends on the rate of the incoming LXI LAN event. User should ensure that incoming LXI LAN events do not fill up the 10000 buffer for the future LAN trigger.

Syntax

```
LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:DElay
<delay_value>

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:DElay?
```

Parameters

Item	Type	Range of Values	Default Value
delay_value	Numeric	Specify the delay added to the timestamp in the LXI LAN event (0.000000001 to 43200)	0 s

Example

LXI:TRIG:SOUR:LANSet0:DEL
0 *This command sets the LAN trigger to trigger with zero delay for LANSet0 configuration.*

LXI:TRIG:SOUR:LANSet1:DEL
0.1 *This command sets the LAN trigger to trigger with 0.1 s delay for LANSet1 configuration.*

NOTE

When 2 or more LAN trigger configurations have the same LAN event ID (IDENtifier), these configurations will be treated as the same.

For example, if we configure the first configuration (LXI:TRIG:LAN0) and the second configuration (LXI:TRIG:LAN1) to have the same identifier as "LAN0", then the 2 configurations will be treated as one. The changes in one configuration will be seen on the other configuration.

```
-> LXI:TRIG:LAN0:IDEN "LAN0"
-> LXI:TRIG:LAN1:IDEN "LAN0"
```

```
-> LXI:TRIG:LAN0:SLOP?
<- POS
-> LXI:TRIG:LAN1:SLOP?
<- POS
-> LXI:TRIG:LAN1:SLOP NEG
-> LXI:TRIG:LAN1:SLOP?
<- NEG
-> LXI:TRIG:LAN0:SLOP?
<- NEG
```

```
-> LXI:TRIG:LAN0:DELAY?
<- +1.000000000000000E+000
-> LXI:TRIG:LAN1:DELAY?
<- +1.000000000000000E+000
-> LXI:TRIG:LAN1:DELAY 2
-> LXI:TRIG:LAN0:DELAY?
<- +2.000000000000000E+000
-> LXI:TRIG:LAN1:DELAY?
<- +2.000000000000000E+000
```

To avoid this, configure a unique identifier for each LAN trigger configuration.

Error Message

- When the delay_value is not in between 0.000000001 s to 43200 s, error message “Data out of range, LAN trigger delay invalid” occurs.

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:DOMAin

This command sets the domain for the corresponding configuration. At *RST, the value is set to 0.

Syntax

```
LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:DOMAin
<domain_value>

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:DOMAin?
```

Parameters

Item	Type	Range of Values	Default Value
domain_value	Numeric	Specifies the domain of the LXI LAN event (0 to 255)	0

Example

```
LXI:TRIG:SOUR:LANSet0:DOMA 123 This command sets the domain to 123 for LANSet0 configuration.
```

Error Messages

- When the domain_value is not in between 0 to 255, error message “Data out of range” occurs.

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:FILter

This command sets the filter to receive a LXI LAN event. At *RST, the value is is an empty string.

Syntax

```
LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:FILter
<filter_value>
```

Parameters

Item	Type	Range of Values	Default Value
filter_value	string	Specifies a filter for restricting LAN sources. The filter specified by this attribute denotes the accepted sources. The syntax for specifying a filter is as follows: • <Filter> == [<tcp> <udp> <any>[,<Filter>]] • <tcp> ==<host>[:<port>] • <udp> == ALL[:<port>] • <any> == :<port>	"ALL"

Table 6-1 Example and description of filter

Example of Filter	Description
"192.168.0.1:23"	Accepts arm source packets via TCP on port 23 from the host at IP address 192.168.0.1.
"ALL:8543"	Accepts arm source packets arriving via UDP multicast on the IANA UDP multicast address on port 8543 from any host.
"192.168.0.1"	Accepts arm source packets from via TCP on the IANA registered port for LXi events (lxi-eventsvc) from the host at IP address 192.168.0.1.
""	Accepts arm source packets via TCP or UDP multicast on the IANA assigned multicast address on the IANA registered port for LXi events (lxi-eventsvc) from any host. This is equivalent to <any> with the IANA registered port for LXI events (lxi-eventsvc).
":23"	Accepts arm source packets arriving via either UDP multicast or TCP on port 23 from any host.

NOTE

This command will require a delay of 15 s before next command is issued.

Example

LXI:TRIG:SOUR:LANSet0:FIL
"192.168.0.1:23"

This command sets the filter to receive LXI LAN events via TCP port 23 from the host 192.168.0.1.

LXI:TRIG:SOUR:LANSet0:FIL
"A_SIGGEN1:23,A_SPECAN2:23"

This command sets the filter to receive LXI LAN events via TCP port 23 from both hosts with DNS name A_SIGGEN1 and A_SPECAN2.

LXI:TRIG:SOUR:LANSet0:FIL
"ALL"

This command sets the filter to receive LXI LAN events via UDP multicast on the IANA assigned multicast address on the IANA registered port.

Error Messages

- When the port number is not in between 0 to 65535, error message "Data out of range" occurs.

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:IDENtifier

This command sets the LXI LAN event ID for the corresponding configuration. At *RST, the value is set to “LAN<n>”

NOTE

- This command cannot accept any ID_value that start with “LXI”. The LXI Consortium reserves all strings used for LXI LAN event names beginning with LXI for future standardization.

Syntax

```
LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:IDENtifier
<ID_value>

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:IDENtifier?
```

Parameters

Item	Type	Range of Values	Default Value
ID_value	string	Specifies 16 characters string as LXI LAN event ID. • This command cannot accept “LXI”. The LXI Consortium reserves all strings used for LXI LAN event names beginning with LXI for future standardization.	LANSet0 1 2 3 4 5 6 7

Example

LXI:TRIG:SOUR:LANSet0:IDEN *This command sets the LXI LAN event ID*
"DONE" *to "DONE" for LANSet0 configuration.*

Error Message

- When the ID_value carries more than 16 characters, error message "String data error" occurs.
- When the ID_value is an empty string or "LXI", error message "Illegal parameter value" occurs.

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:SLOPe

This command sets the slope for LXI LAN event that will cause a trigger at TTL1 or TTL2. At *RST, the value is set to POSitive slope.

Syntax

```
LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:SLOPe
<slope_value>

LXI:TRIGger[:SOURce]:LANSet0|1|2|3|4|5|6|7:SLOPe?
```

Parameters

Item	Type	Range of Values	Default Value
slope_value	Discrete	Specifies the slope of an outbound trigger {POSitive NEGative}	POSitive

Example

```
LXI:TRIG:SOUR:LANSet0:SLOP POS This command sets the slope to positive edge for LANSet0 configuration. (rising edge)

LXI:TRIG:SOUR:LANSet1:SLOP NEG This command sets the slope to negative edge for LANSet1 configuration (falling edge)
```

NOTE

When 2 or more LAN trigger configurations have the same LAN event ID (IDENtifier), these configurations will be treated as the same.

For example, if we configure the first configuration (LXI:TRIG:LAN0) and the second configuration (LXI:TRIG:LAN1) to have the same identifier as "LAN0", then the 2 configurations will be treated as one. The changes in one configuration will be seen on the other configuration.

```
-> LXI:TRIG:LAN0:IDEN "LAN0"
-> LXI:TRIG:LAN1:IDEN "LAN0"
```

```
-> LXI:TRIG:LAN0:SLOP?
<- POS
-> LXI:TRIG:LAN1:SLOP?
<- POS
-> LXI:TRIG:LAN1:SLOP NEG
-> LXI:TRIG:LAN1:SLOP?
<- NEG
-> LXI:TRIG:LAN0:SLOP?
<- NEG
```

```
-> LXI:TRIG:LAN0:DELAY?
<- +1.000000000000000E+000
-> LXI:TRIG:LAN1:DELAY?
<- +1.000000000000000E+000
-> LXI:TRIG:LAN1:DELAY 2
-> LXI:TRIG:LAN0:DELAY?
<- +2.000000000000000E+000
-> LXI:TRIG:LAN1:DELAY?
<- +2.000000000000000E+000
```

To avoid this, configure a unique identifier for each LAN trigger configuration.

Error Messages

- When the slope_value is not any of the discrete value, error message “Illegal parameter value” occurs.

LXI:TRIGger[:SOURce]:EXT1|2:CONFigure

This command sets all the parameters to configure an external trigger.

NOTE

This command can accept a delay_value that exceeds 0.000000001, but the value will be automatically rounded up to the closest 0.000000001.

- E5818 has only 10000 buffer depth for the future time trigger. Therefore, in order not to miss any trigger in future, there is a maximum trigger delay that depends on the period of the input signal at EXT port. Refer example below to determine the maximum trigger delay.

Example:

Maximum trigger delay = period signal at EXT port x 10000

When there is a 0.0003 s period signal at EXT port, the maximum trigger delay will be 3 s. If the delay is more than 3 s, then the 10000 buffer will be filled up before the first trigger initiates. Hence, the trigger after 10000 will be lost.

Likewise, when there is 0.0009 s period signal at EXT port, then the maximum trigger delay will be 9 s.

Syntax

```
LXI:TRIGger[:SOURce]:EXT1|2:CONFigure
<delay_value>,<slope_value>
```

Parameters

Item	Type	Range of Values	Default Value
delay_value	Numeric	Specifies the delay of the trigger from the time when the edge of the signal is detected at EXT port. (0.0003 s to 43200 s)	0 s
slope_value	Discrete	Specifies the slope of an outbound trigger {POSitive NEGative}	POSitive

Example

LXI:TRIG:SOUR:EXT1:CONF
0, POS

This command sets the external trigger for EXT1 to trigger with zero delay, on a positive edge (rising edge)

LXI:TRIG:SOUR:EXT2:CONF
0.1, NEG

This command sets the external trigger for EXT2 to trigger with 0.1 s delay, on a negative edge (falling edge)

Error Messages

- When the delay_value is not in between 0.0003 s to 43200 s, error message “Data out of range invalid” occurs.
- When slope_value is not any of the discrete value, error message “Illegal parameter value” occurs.

LXI:TRIGger[:SOURce]:EXT1|2:DELay

This command sets the external trigger delay that will be added to the time when the edge of the signal is detected at EXT port. At *RST, the value is set to 1 s.

NOTE

- This command can accept a minimum delay value of 0.0003000000 s. Nevertheless it has a resolution of 0.0000000001 s and upon exceeding 0.0000000005 s, the value will be automatically rounded up to the closest nanosecond value 0.000000001 s.

Example:

0.0003000005 s will be rounded up to 0.000300001 s

- E5818 has only 10000 buffer depth for the future time trigger. Therefore, in order not to miss any trigger in future, there is a maximum trigger delay that depends on the period of the input signal at EXT port. Refer example below to determine the maximum trigger delay.

Example:

Maximum trigger delay = period signal at EXT port x 10000

When there is a 0.0003 s period signal at EXT port, the maximum trigger delay will be 3 s. If the delay is more than 3 s, then the 10000 buffer will be filled up before the first trigger initiates. Hence, the trigger after 10000 will be lost.

Likewise, when there is 0.0009 s period signal at EXT port, then the maximum trigger delay will be 9 s.

Syntax

```
LXI:TRIGger[:SOURce]:EXT1|2:DELay <delay_value>
```

```
LXI:TRIGger[:SOURce]:EXT1|2:DELay?
```

Parameters

Item	Type	Range of Values	Default Value
delay_value	Numeric	Specifies the delay of the trigger from the time when the edge of the signal is detected at EXT port. (0.0003 s to 43200 s)	1 s

Example

LXI:TRIG:SOUR:EXT1:DEL 0.0003 *This command sets the external trigger for EXT1 to trigger with 0.0003 s delay.*

LXI:TRIG:SOUR:EXT2:DEL 0.1 *This command sets the external trigger for EXT2 to trigger with 0.1 s delay.*

Error Messages

- When the value is not in between 0.0003 s to 43200 s, error message “Data out of range invalid” occurs.

LXI:TRIGger[:SOURce]:EXT1|2:SLOPe

This command sets the slope for external trigger that will cause a trigger at TTL1 or TTL2. At *RST, the value is set to POSitive slope.

Syntax

```
LXI:TRIGger[:SOURce]:EXT1|2:SLOPe <slope_value>
```

```
LXI:TRIGger[:SOURce]:EXT1|2:SLOPe?
```

Parameters

Item	Type	Range of Values	Default Value
slope_value	Discrete	Specifies the slope of an outbound trigger {POSitive NEGative}	POSitive

Example

```
LXI:TRIG:SOUR:EXT1:SLOP  
POS
```

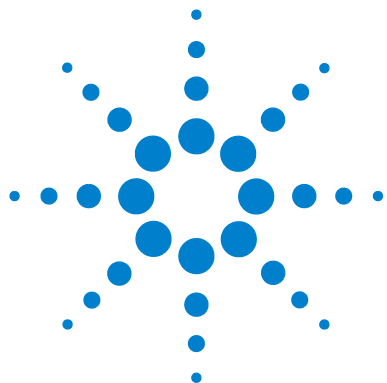
This command sets the external trigger for EXT1 to trigger on a positive edge (rising edge)

```
LXI:TRIG:SOUR:EXT2:SLOP  
NEG
```

This command sets the external trigger for EXT2 to trigger on a negative edge (falling edge)

Error Messages

- When the slope_value is not any of the discrete value, error message “Illegal parameter value” occurs.



7 STATus Subsystem

STATus:OPERation:CONDition? 87
STATus:OPERation:ENABLE 88
STATus:OPERation[:EVENT]? 90
STATus:QUESTionable:CONDition? 91
STATus:QUESTionable:ENABLE 92
STATus:QUESTionable[:EVENT]? 94

As part of SCPI 99 requirements, this commands are dummy functions on the E5818A and are not available for user configuration.



STATus Subsystem

Keyword	Parameter Form	Notes	Page
STATus			
:OPERation			
:CONDition?			page 87
:ENABle	<enable_value>		page 88
[:EVENT]?			page 90
:QUEStionable			
:CONDition?			page 91
:ENABle	<enable_value>		page 92
[:EVENT]?			page 94

STATus:OPERation:CONDition?

This command queries the condition register for the Standard Operation Register group. This is a read-only register and the bits are not cleared when you read the register.

Syntax

```
STATus:OPERation:CONDition?
```

Return Format

The command reads the condition register and returns a decimal value which corresponds to the binary-weighted sum of all bits set in the register. For example, if bit 4 (decimal value = 16) and bit 8 (decimal value = 256) are set, this command will return “272”. For this product, the command will only return the value of 0.

Examples

The following command reads the condition register.

```
STAT:OPER:COND?
```

Typical Response: 0

See Also

[STATus:OPERation:ENABLE](#)

[STATus:OPERation\[:EVENT\]?](#)

STATus:OPERation:ENABle

This command enables bits in the enable register for the Standard Operation Register group. The selected bits are then reported to the Status Byte.

Syntax

```
STATus:OPERation:ENABle <enable_value>

STATus:OPERation:ENABle?
```

Parameters

Name	Type	Range of Values	Default Value
<enable_value>	Numeric	A decimal value which corresponds to the binary-weighted sum of the bits in the register.	This is a required parameter.

Use the <enable_value> parameter to specify which bits will be reported to the Status Byte. The decimal value specified corresponds to the binary-weighted sum of the bits you wish to enable in the register. For example, to enable bit 4 (decimal value = 16), bit 8 (decimal value = 256), and bit 9 (decimal value = 512), the corresponding decimal value would be 784 (16 + 256 + 512). For this product, the command will not write any data to the enable register.

The *CLS (clear status) command will not clear the enable register but it does clear all bits in the event register.

The STATus:PRESet command will clear all bits in the enable register.

Return Format

The query command reads the enable register and returns a decimal value which corresponds to the binary-weighted sum of all bits set in the register. For example, if bit 4 (decimal value = 16) and bit 8 (decimal value = 256) are enabled, the query command will return “272”. For this product, the command will only return the value of 0.

Example

The following command enables bit 8 (decimal value = 256) in the enable register.

```
STAT:OPER:ENAB 256
```

The following query returns 0 as all the bits in enable register are not implemented.

```
STAT:OPER:ENAB?
```

Typical Response: 0

See Also

[STATus:OPERation:CONDition?](#)

[STATus:OPERation\[:EVENT\]?](#)

[STATus:QUESTionable:CONDition?](#)

STATus:OPERation[:EVENT]?

This command queries the event register for the Standard Operation Register group.

Syntax

```
STATus:OPERation[:EVENT]?
```

Return Format

The command reads the event register and returns a decimal value which corresponds to the binary-weighted sum of all bits set in the register. For example, if bit 4 (decimal value = 16) and bit 8 (decimal value = 256) are set, this command will return “272”. For this product, the command will only return the value of 0.

Examples

The following command reads the event register.

```
STAT:OPER?
```

Typical Response: 0

See Also

[STATus:OPERation:CONDition?](#)

[STATus:OPERation:ENABLE](#)

STATus:QUEStionable:CONDition?

This command queries the condition register for the Questionable Data Register group. This is a read-only register and the bits are not cleared when you read the register.

Syntax

```
STATus:QUEStionable:CONDition?
```

Return Format

The command reads the condition register and returns a decimal value which corresponds to the binary-weighted sum of all bits set in the register. For example, if bit 1 (decimal value = 2) and bit 9 (decimal value = 512) are set, this command will return “514”. For this product, the command will only return the value of 0.

Examples

The following command reads the condition register.

```
STAT:QUES:COND?
```

Typical Response: 0

See Also

[STATus:QUEStionable:ENABLE](#)
[STATus:QUEStionable\[:EVENT\]?](#)

STATus:QUEStionable:ENABle

This command enables bits in the enable register for the Questionable Data Register group. The selected bits are then reported to the Status Byte.

Syntax

```
STATus:QUEStionable:ENABle <enable_value>  
STATus:QUEStionable:ENABle?
```

Parameters

Name	Type	Range of Values	Default Value
<enable_value>	Numeric	A decimal value which corresponds to the binary-weighted sum of the bits in the register.	This is a required parameter.

Use the <enable_value> parameter to specify which bits will be reported to the Status Byte. The decimal value specified corresponds to the binary-weighted sum of the bits you wish to enable in the register. For example, to enable bit 0 (decimal value = 1), bit 1 (decimal value = 2), and bit 12 (decimal value = 4096), the corresponding decimal value would be 4099 (1 + 2 + 4096). For this product, the command will not write any data to the enable register.

The *CLS (clear status) command will not clear the enable register but it does clear all bits in the event register.

The STATus:PRESet command will clear all bits in the enable register.

Return Format

The query command reads the enable register and returns a decimal value which corresponds to the binary-weighted sum of all bits set in the register. For example, if bit 0 (decimal value = 1) and bit 1 (decimal value = 2) are enabled, the query command will return "3". For this product, the command will only return the value of 0.

Examples

The following command enables bit 9 (decimal value = 512) in the enable register.

```
STAT:QUES:ENAB 512
```

The following query returns 0 as all the bits in enable register are not implemented.

```
STAT:QUES:ENAB?
```

Typical Response: 0

See Also

[STATus:QUEStionable:CONDition?](#)

[STATus:QUEStionable:CONDition?](#)

[STATus:QUEStionable\[:EVENT\]?](#)

STATus:QUEStionable[:EVENTt]?

This command queries the event register for the Questionable Data Register group.

Syntax

```
STATus:QUEStionable[:EVENTt]?
```

Return Format

The command reads the event register and returns a decimal value which corresponds to the binary-weighted sum of all bits set in the register. For example, if bit 1 (decimal value = 2) and bit 9 (decimal value = 512) are set, this command will return “514”. For this product, the command will only return the value of 0.

Examples

The following command reads the event register.

```
STAT:QUES?
```

Typical Response: 0

See Also

[STATus:QUEStionable:ENABle](#)



8 SYSTem Subsystem

SYSTem Subsystem [96](#)

SYSTem:VERSion? [98](#)

This chapter explains how the SYSTem command subsystem is used to retrieve the system information from E5818A.



SYSTem Subsystem

Keyword	Parameter Form	Notes	Page
SYSTem			
:ERRor			
[:NEXT]?			page 97
:VERSion?			page 98

SYSTem:ERRor[:NEXT]?

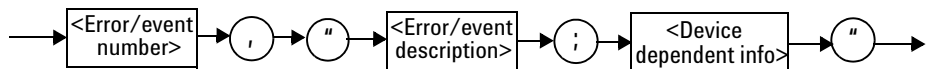
This command queries the error queued for the following error list and removes the oldest error in the queue once it is read.

Syntax

SYSTem:ERRor[:NEXT]?

Return Format

The command returns a response with the following syntax:



Examples

The following query returns the SCPI version.

SYST:ERR[:NEXT]?

Typical Response: -330,"Self-Test failed;ROM checksum error"

SYSTem:VERSion?

This command returns the SCPI (Standard Commands for Programmable Instruments) standard version with which the instrument is in compliance. The instrument complies with the rules and conventions of the indicated SCPI standard version.

Syntax

```
SYSTem:VERSion?
```

Return Format

The command returns a string in the form of “YYYY.V”, where “YYYY” represents the year and “V” represents the version (e.g., 1996.0).

Examples

The following query returns the SCPI version.

```
SYST:VERS?
```

Typical Response: 1996.0



9 TRIGger Subsystem

TRIGger:TTL1|2:CONFigure 101

TRIGger:TTL1|2:SLOPe 102

TRIGger:TTL1|2:SOURce 104

TRIGger:TTL1|2:STATe 106

This chapter explains how the TRIGger command subsystems is used to synchronize device actions with events.



TRIGger Subsystem

Keyword	Parameter Form	Page
TRIGger		
:TTL1 2		
:CONFigure	boolean>, <string>, POSitive NEGative	page 101
:SLOPe	POSitive NEGative	page 102
:SOURce	<string>	page 104
:STATe	<boolean>	page 106

TRIGger:TTL1|2:CONFigure

This command sets all the parameters to configure an event.

Syntax

```
TRIGger:TTL1|2:CONFigure
<0|1>,<source_value>,<slope_value>
```

Parameters

Item	Type	Range of Values	Default Value
source_value	Discrete	Specifies the signal which causes an event to be transmitted. "LANSet0 1 2 3 4 5 6 7", "EXT1 2" or "ALARM1 2"	This is a required parameter
slope_value	Discrete	Specifies the slope of an outbound event. {POSitive NEGative}	POSitive

Example

```
TRIG:TTL1:CONF
1,"ALARM1",POS
```

This command configures event TTL1 to be generated based on internal alarm 1 with a positive edge.

Error Messages

- When each parameter carries more than nine characters, error message "Data out of range" occurs.

TRIGger:TTL1 | 2: SLOPe

This command sets the slope of the trigger generated. At *RST, the value is set to POSitive slope.

NOTE

E5818 only supports both POSitive slope and NEGative slope, but not either slope.

Syntax

```
TRIGger:TTL1|2:SLOPe <slope_value>
TRIGger:TTL1|2:SLOPe?
```

Parameters

Item	Type	Range of Values	Default Value
slope_value	Discrete	Specifies the slope of an outbound event. {POSitive NEGative}	POSitive

Example

TRIG:TTL1:SLOP POS

This command sets the trigger event TTL1 slope to a positive edge (rising edge).

TRIG:TTL1:SLOP NEG

This command sets the trigger event TTL1 slope to a negative edge (falling edge).

Error Messages

- When the value is not any of the discrete value, error message “Illegal parameter value” occurs.

TRIGger:TTL1|2:SOURce

This command sets the source to generate trigger on the corresponding TTL1 or TTL2. The event source to generate the trigger are:

- ALARM1
- ALARM2
- LANSet0 to LANSet7
- EXT1
- EXT2"

At *RST, the value is empty string.

NOTE

TTL1 trigger source is affixed to "ALARM1" and TTL2 to "ALARM2".

Syntax

TRIGger:TTL1|2:SOURce <source_value>

TRIGger:TTL1|2:SOURce?

Parameters

Item	Type	Range of Values	Default Value
source_value	Discrete	Specifies the signal which causes an event to be transmitted. "LANSet0 1 2 3 4 5 6 7", "EXT1 2" or "ALARM1 2"	This is a required parameter

Example

TRIG:TTL1:SOUR "EXT1"

This command sets the trigger event TTL1 source to "EXT1"

TRIG:TTL1:SOUR?

This query will request for the source of trigger event TTL1

Error Messages

- This command is able to configure source to "LANSet0|1|2|3|4|5|6|7", "EXT1|2" or "ALARM1|2", error message "Character data not allowed" occurs for any other values.

TRIGger:TTL1|2:STATe

This command is used to enable or disable the trigger generation on the corresponding TTL1 or TTL2. At *RST, the value is set to FALSE.

NOTE

This command is only applicable when the trigger source is one of “LANSet0 to LANSet7”.

Syntax

```
TRIGger:TTL1|2:STATe <0|1>
```

```
TRIGger:TTL1|2:STATe?
```

Example

```
TRIG:TTL1:STAT 1
```

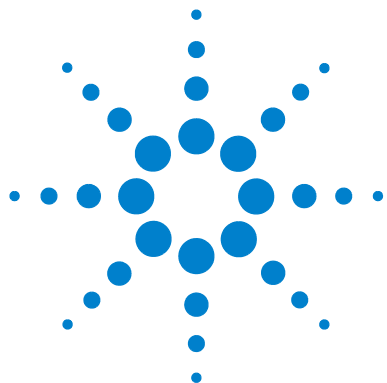
This command enables trigger event TTL1

```
TRIG:TTL1:STAT?
```

This query will request for the state of TTL1.

Error Messages

- If TRIG:TTL1:SOURce is not configured before TRIG:TTL1|2:STATe is set, error message “Event source not set” occurs.



10 IEEE-488.2 Command Reference

*CLS 109
*ESE 110
*ESR? 112
*IDN? 114
*RST 115
*STB? 116
*TST? 118

This contains information about the IEEE-488.2 Common Commands that the trigger box supports.



SCPI Compliance Information

This chapter contains information about the SCPI Common (*) Commands that the E5818A LXI-B trigger box supports. It also describes the GPIB Universal Command statements which form the nucleus of GPIB programming; they are understood by all instruments in the network. When combined with programming language codes, they provide all management and data communication instructions for the system.

The IEEE-488.2 Common Command descriptions are listed below in alphabetical order.

*CLS	Clear Status	page 109
*ESE and *ESE?	Event Status Enable	page 110
*ESR?	Event Status Register	page 112
*IDN?	Identify	page 114
*RST	Reset	page 115
*STB?	Status Byte	page 116
*TST?	Test	page 118

Remarks

The Standard Event Register is a stub on E5818A. For Status Byte Register, only bit 3, 5 and 7 are implemented.

- 1 Bit 3 - Questionable Status
- 2 Bit 5 - Standard Event Status
- 3 Bit 7 - Operational Status

NOTE

The *SRE, *SRE?, *OPC, *OPC? and *WAI are dummy functions on the E5818A and not available for user configuration.

***CLS**

Syntax

*CLS

Description

This command clears the event registers in all register groups and Error queue.

Example

The following command clears the event register bits.

*CLS

***ESE**

Syntax

```
*ESE <enable_value>
*ESE?
```

Description

This command enables bits in the enable register for the Standard Event Register group. The selected bits are then reported to bit 5 of the Status Byte Register.

Parameters

Name	Type	Range of Values	Default Value
<enable_value>	Numeric	A decimal value which corresponds to the binary-weighted sum of the bits in the register.	This is a required parameter.

Remarks

Use the <enable_value> parameter to specify which bits will be enabled. The decimal value specified corresponds to the binary-weighted sum of the bits you wish to enable in the register. For example, to enable bit 2 (decimal value = 4), bit 3 (decimal value = 8), and bit 7 (decimal value = 128), the corresponding decimal value would be 140 (4 + 8 + 128).

The *CLS (clear status) command will not clear the enable register but it does clear all bits in the event register.

An Instrument Preset (SYSTem:PRESet command) does not clear the bits in the Status Byte enable register.

Return Format

The query command reads the enable register and returns a decimal value which corresponds to the binary-weighted sum of all bits set in the register. For example, if bit 3 (decimal value = 8) and bit 7 (decimal value = 128) are enabled, the query command will return "136".

Examples

The following command enables bit 4 (decimal value = 16) in the enable register. If an Execution Error occurs, this condition will be reported to the Status Byte Register (bit 5 ESE will be set high).

```
*ESE 16
```

The following query returns the bit that is enabled in the register.

```
*ESE?
```

Typical Response: 16

See Also

[*ESR?](#)

***ESR?**

Syntax

*ESR?

Description

This command queries the event register for the Standard Event Register group.

Remarks

To enable report to the Standard Event Register, the corresponding bits in the event register must be enabled using the *ESE command.

Once a bit is set, it remains set until cleared by reading the event register or the *CLS (clear status) command.

Return Format

The command reads the event register and returns a decimal value, which corresponds to the binary-weighted sum of all bits set in the register. For example, if bit 1 (decimal value = 2) and bit 4 (decimal value = 16) are set and the corresponding bits are enabled, this command will return “18”.

Example

The following command reads the event register (bits 3 and 4 are set).

```
*ESR?
```

Typical Response: 24

See Also

[*ESE](#)

***IDN?**

Syntax

*IDN?

Description

This command reads the instrument's (mainframe) identification string which contains four comma-separated fields. The first field is the manufacturer's name, the second field is the instrument model number, the third field is the serial number, and the fourth field is the firmware revision code which contains four codes separated by dashes.

Return Format

The command returns a string with the following format (the response will be less than or equal to 72 characters).

AGILENT TECHNOLOGIES,U2121A,<Serial Number>,<Revision Number>

Example

The following query returns the instrument's identification string.

*IDN?

Typical Response: AGILENT TECHNOLOGIES,U2121A,MY12345678,1.00

***RST**

Syntax

*RST

Description

This command resets the internal functional block to the factory configuration.

Example

The following command resets the instrument.

*RST

***STB?**

Syntax

*STB?

Description

This command queries the condition register for the Status Byte Register group. This command is similar to a Serial Poll but it is processed like any other instrument command. This is a read-only register and the bits are not cleared when you read the register.

Remarks

This command returns the same results as a Serial Poll but the "Master Summary" bit (bit 6) is not cleared if a Serial Poll has occurred.

The Status Byte condition register is cleared when you execute the *CLS (clear status) command.

The Status Byte condition register is cleared when you read the event register from one of the other register groups (only the corresponding bits are cleared in the condition register).

Return Format

The command reads the condition register and returns a decimal value which corresponds to the binary-weighted sum of all bits set in the register. For example, if bit 1 (decimal value = 2) and bit 4 (decimal value = 16) are set and the corresponding bits are enabled, this command will return "18".

Example

The following command reads the condition register (bits 3 and 4 are set).

```
*STB?
```

Typical Response: 24

See Also

[*CLS](#)

*TST?

Syntax

*TST?

Description

This command performs a complete self-test of the instrument and all installed plug-in devices, and returns a pass/fail indication. The self-test runs a series of tests and will take approximately 30 s to complete.

Remarks

- If any of the tests fail, the device will return a non “0” value
- Before the *TST? command, the instrument issues a Factory Reset (*RST command)

Return Format

The command returns "0" (all tests passed) or non "0" (one or more tests failed) value.

Example

The following command performs a self-test and returns a pass/fail indication:

*TST?

Typical Response: 0

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