CsTool-AbortCapture.vi
This VI aborts the current acquisition by the CompuScope system identified by Handle Cluster, which is obtained by using the CsTool-GetSystem.vi. In Multiple Record Mode, if CsTool-AbortCapture.vi is called between the acquisition of successive segments, data from segments already acquired may be accessed.

If the call is successful, a 1 is returned in the Error Code indicator. Otherwise an appropriate error code is returned. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Connector Pane

Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Error Code

CsTool-BoardNameToType.vi
This VI returns the Board Type associated with the Board Name that is passed as its input parameter. The Board Name is a string variable that has the form CSx, where x is the CompuScope model number (e.g. "CS12400" for the CompuScope 12400). The Board Type is a numeric constant used internally by the CompuScope drivers. It can be used as an optional parameter in a call to CsTool_GetSystem.vi

If the return value is 0, either the call was unsuccessful or the Board Name does not exist.

Connector Pane

Controls and Indicators

Board Name

Board Type

CsTool-Capture.vi
Calling this VI starts an acquisition by the CompuScope system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. The CompuScope system will start digitizing

pre-trigger data into on-board memory until a trigger event occurs. Once the trigger event occurs, the specified number of post-trigger points will be captured and then the acquisition will terminate.

If the call is successful, a 1 is returned in the Error Code indicator. Otherwise, an error code is returned. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Connector Pane

Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Error Code

CsTool-Commit.vi

This VI configures a CompuScope system with the configuration settings that are set in the driver. The configuration settings may be set in the driver using the CsTool-ConfigureAcquisition, CsTool-ConfigureChannel, CsTool-ConfigureTrigger, or CsTool-ConfigureTimeStamp VIs. CsTool-Commit.vi must be called in order to actually pass any configuration settings to the CompuScope hardware. The CompuScope system is identified by Handle Cluster, which is obtained with CsTool-GetSystem.vi.

If set to TRUE, the Coerce flag will coerce all configuration settings to valid available settings for the current CompuScope system. The coercion procedure varies for the different types of configuration settings. For the internal sampling rate, for instance, the coercion procedure chooses the closest available sampling rate. If this flag is set to FALSE, invalid values will not be coerced and the VI will return an error code. The default value is FALSE.

If set to TRUE, the OnlyOnChange flag will only load configuration settings to the CompuScope hardware if there has been a change to one or more of the settings since the last call to CsTool-Commit.vi. If this flag is set to FALSE, the configuration settings are sent to the CompuScope system even if there have been no changes. The parameter is useful to avoid unnecessary CompuScope system adjustments. The default value is TRUE.

The Committed output is returned as FALSE if the OnlyOnChange flag is set to TRUE and the settings were unchanged so that no adjustments were performed. Otherwise, it is set to TRUE.

If the CompuScope hardware was configured correctly by CsTool-Commit.vi, a 1 is returned by the VI. If the return value is 2, the operation was successful but one or more of the settings had to be coerced. Otherwise, an error code is returned. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Connector Pane

Controls and Indicators

- **Coerce Flag (f)**
- **Handle Cluster**
  - **Handle**
  - **Sample size**
  - **Resolution**
  - **Offset**
  - **Channels**
  - **Boards**
- **OnlyOnChange (t)**
- **Error Code**
- **Committed**

CsTool-ConfigureAcquisition.vi
This VI sends the requested Acquisition configuration settings to the driver for the system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. The requested settings are not actually sent to the CompuScope hardware until CsTool-Commit.vi is called.

The Acquisition cluster settings are Sample Rate, Clock Mode, Mode, Depth, Segment Size, Trigger Timeout, Trigger Delay, and Trigger Holdoff. There are also the Segment Count, Invert Clock and Extended Options input settings. Valid values for the system identified by Handle Cluster must be supplied for all settings. If no connection is made to an input, the default value for that input will be used.

If the VI fails, an appropriate error code is returned in the Error Code indicator. A descriptive error string may be obtained by calling CsTool-ErrorHandler.vi.

Input Value Descriptions:

Sample Rate (default = 100000000)
This double variable value is the rate, in samples per second, at which the CompuScope system will sample input signals. If the desired sampling rate is not valid for the CompuScope system identified by the Handle Cluster, an appropriate error code is returned.

Clock Mode (default = Internal)
This Enum value defines the clock mode of the CompuScope system. Valid values are Internal, External or Reference. If an external clock is being used, the rate entered in the Sample Rate

field must be set to the correct external clock signal frequency. Reference clock mode means that the internal oscillator will be synchronized with a 10 MHz reference clock that is connected to the external clock input. If Internal is selected, the Sample Rate field selects the frequency of the internal oscillator. Note: The Reference clock mode is not supported by all CompuScope models.

Mode (default = Dual)
This string sets the operating mode for the CompuScope system. Available modes for most CompuScope cards are Single and Dual. Some newer models also have Quad and Octal modes. Digital input CompuScope cards, like the CS3200, may be set to 8-bit, 16-bit, or 32-bit modes. If the requested mode is invalid for the CompuScope system, an appropriate error code is returned.

Depth (default =8192)
This double variable value is the number of post-trigger samples that the CompuScope system will acquire after the occurrence of the trigger event.

Segment Size (default = 8192)
This double variable controls the total amount of memory allocated to the acquisition. The maximum possible amount of pre-trigger data that can be acquired, therefore, is (Segment Size - Depth).

Trigger Timeout (default = 1000000)
This double variable value is the amount of time, in microseconds, that the CompuScope system will wait for a trigger to occur before forcing a trigger. An input value of -1 indicates no trigger timeout, so that the CompuScope system will wait forever for a trigger event.

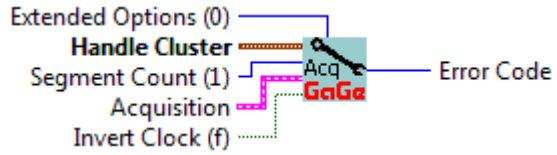
Trigger Delay (default = 0)
This double variable value is the duration, in Samples, between the time that the trigger event actually occurs and the time that the trigger event will be logged in the data record. Setting a non-zero trigger delay is useful for signals where the region of interest in the signal occurs long after the trigger event. Trigger Delay is not supported on all CompuScope models. If the CompuScope system identified by Handle Cluster does not support Trigger Delay, this value will be ignored.

Trigger Holdoff (default = 0)
This double variable value is the number of samples during which the CompuScope hardware will ignore trigger events after starting an acquisition. Trigger Holdoff is useful in order to ensure the accumulation of a specified number of pre-trigger points. This is achieved by ignoring trigger events until the specified number of pre-trigger points has been acquired.

Segment Count (default = 1)
This integer value sets how many segments (or records) will be acquired in a Multiple Record acquisition. For Single Record acquisitions, Segment Count must be set to 1.

Invert Clock (default = FALSE)
When TRUE, this Boolean value inverts the external clock supplied to a digital input CompuScope cards, like the CS3200, so that it samples on the falling edge of the clocking signal rather than on the rising edge. This setting is ignored on analog input CompuScope cards.

Connector Pane



Controls and Indicators

Handle Cluster

Handle

Sample size

Resolution

Offset

Channels

Boards

Segment Count (1)

Acquisition

Sample Rate

Clock Mode

Mode

Depth

Segment Size

Trigger Timeout

Trigger Holdoff

Trigger Delay

Invert Clock (f)

Extended Options (0)

Error Code

CsTool-ConfigureChannel.vi
This VI sends the requested Channel configuration settings to the driver for the system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. The requested settings are not actually sent to the CompuScope hardware until CsTool-Commit.vi is called.

The Channel configuration settings are Channel, Coupling, Differential Input, Direct-to-ADC, Input Range, Impedance, and DC Offset. Valid values must be supplied for all settings. If no connection is made to an input, the default value for that input will be used. If an invalid setting is sent to the VI, an appropriate error code is returned.

If the VI fails, an appropriate error code is returned in the Error Code indicator. A descriptive error string may be obtained by calling CsTool-ErrorHandler.vi.

Input Value Descriptions:

Channel (default = 0)
This integer value selects the channel number for which the Channel configuration settings will be applied. Channel numbers in a LabVIEW CompuScope system begin at 0. If an invalid channel number is specified, an appropriate error code is returned.

Coupling (default = DC)
This string value sets the current input coupling. Possible values are:
DC - for DC input coupling
AC - for AC input coupling
An invalid string will result in an error code being returned.

Differential Input (default = FALSE)
This Boolean value sets the channel configuration to use differential input coupling. Possible values are:
TRUE - sets differential input coupling
FALSE - sets single-ended input coupling
If the CompuScope system identified by Handle Cluster does not support differential input coupling and the Differential Input setting is set to TRUE, an appropriate error code is returned.

Direct-to-ADC (default = FALSE)
This Boolean value sets the channel configuration to the Direct-to-ADC input range. Possible values are:
TRUE - to select Direct-to-ADC input range
FALSE - do not Direct-to-ADC input range
If the CompuScope system identified by Handle Cluster does not support a Direct-to-ADC input range and the Direct-to-ADC setting is set to TRUE, an appropriate error code is returned.

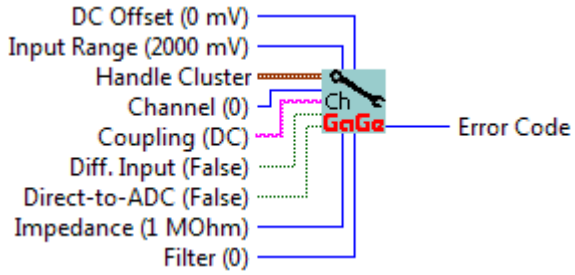
Input Range (default = 2000 millivolts)
This value sets the current full scale input range (in millivolts) for the current channel. For instance, for the +/-1 Volt input range, 2000 must be entered. See the CompuScope hardware manual for the input ranges available for your CompuScope model. If invalid values are sent to the VI, an appropriate error code is returned.

Impedance (default = 1000000)
This integer value sets the terminating input impedance for the channel. Possible values are:
1000000 - to set 1 MOhm input termination
50 - to set 50 Ohm input termination
If the input value is not supported for the specified CompuScope system, an appropriate error code is returned.

DC Offset (default = 0 millivolts)
This integer value sets the current DC offset (in millivolts) for the specified channel. The value raises or lowers the mid point of the CompuScope input range. The value is in millivolts (plus or minus) and must be within the CompuScope channel's input range. For instance, if a +100 mV DC offset is specified in the +/-1 V range, then the effective input range becomes -0.9 Volts to 1.1 Volts. Not all CompuScope models support DC offsets. If an invalid value is entered, an appropriate error code is returned.

Filter (default = 0 no filter)
This is an index to filter of the CompuScope front end. Zero value is valid for all CompuScope models and means no filter or full bandwidth. The filter parameters for higher indecies may be obtained via GetCaps funtionality or from model data sheet.
For the CompuScope model that do not support filter selection this parameter is ignored.

Connector Pane



Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Channel (0)

Coupling (DC)

Diff. Input (False)

Input Range (2000 mV)

Impedance (1 MOhm)

DC Offset (0 mV)

Direct-to-ADC (False)

Filter (0)

Error Code

CsTool-ConfigureChannelArray.vi

This VI is identical to CsTool-ConfigureChannel.vi except that instead of only adjusting settings for one channel, a cluster containing the Channel configuration settings for all channels in the CompuScope system are passed to the driver. The requested settings are not actually sent to the CompuScope hardware until CsTool-Commit.vi is called.

Channels is an array of clusters that contains the Channel configuration settings for each channel. The Channel configuration settings are Channel, Coupling, Differential Input, Direct-to-ADC, Input Range, Impedance, and DC Offset. Valid values must be supplied for all settings. If no connection is made to an input, the default value for that input will be used.

Use caution when adjusting the Channels array for a Master/Slave multi-card CompuScope system. For instance, a 4-card CS14200 Master/Slave CompuScope system has 8 input channels when operated in Dual Channel Mode. The configuration settings for each channel are set using elements 0, 1, 2, 3, 4, 5, 6, and 7 of the Channels array. If, however, this same CompuScope system is operated in Single Channel Mode, only 4 input channels are available. In this case, the configuration settings for each channel are set using elements 0, 2, 4, and 6 of the Channels array. This issue does not apply to single-channel CompuScope cards like the CS8500. Please refer to the CompuScope hardware manual for more information on channel enumeration.

If the VI fails, an appropriate error code is returned in the Error Code indicator. A descriptive error string may be obtained by calling CsTool-ErrorHandler.vi.

Input Value Descriptions for Cluster elements within the Channels array:

Index of Channels array (default = 0)
This integer index value selects the channel number for which the corresponding Channels configuration settings will be applied. Channel numbers in a CompuScope system begin at 0. If an invalid channel number is specified, an error will occur and an appropriate error code is returned.

Coupling (default = DC)
This string value sets the current input coupling. Possible values are:
DC - for DC input coupling
AC - for AC input coupling
An invalid string will result in an error code being returned.

Differential Input (default = FALSE)
This Boolean value sets the channel configuration to use differential input coupling. Possible values are:
TRUE - sets differential input coupling
FALSE - sets single-ended input coupling
If the CompuScope system identified by Handle Cluster does not support differential input coupling and the Differential Input setting is set to TRUE, an appropriate error code is returned.

Direct-to-ADC (default = FALSE)
This Boolean value sets the channel configuration to the Direct-to-ADC input range. Possible values are:
TRUE - to select Direct-to-ADC input range
FALSE - do not Direct-to-ADC input range
If the CompuScope system identified by Handle Cluster does not support a Direct-to-ADC input range and the Direct-to-ADC setting is set to TRUE, an appropriate error code is returned.

Input Range (default = 2000 millivolts)
This value sets the current full scale input range (in millivolts) for the current channel. For instance, for the +/-1 Volt input range, 2000 must be entered. See the CompuScope hardware manual for the input ranges available for your CompuScope model. If invalid values are sent to the VI, an appropriate error code is returned.

Impedance (default = 1000000)
This integer value sets the terminating input impedance for the channel. Possible values are:
1000000 - to set 1 MOhm input termination
50 - to set 50 Ohm input termination

If the input value is not supported for the specified CompuScope system, an appropriate error code is returned.

DC Offset (default = 0 millivolts)
This integer value sets the current DC offset (in millivolts) for the specified channel. The value raises or lowers the mid point of the CompuScope input range. The value is in millivolts (plus or minus) and must be within the CompuScope channel's input range. For instance, if a +100 mV DC offset is specified in the +/-1 V range, then the effective input range becomes -0.9 Volts to 1.1 Volts. Not all CompuScope models support DC offsets. If an invalid value is entered, an appropriate error code is returned.

Filter (default = 0 no filter)
This is an index to filter of the CompuScope front end. Zero value is valid for all CompuScope models and means no filter or full bandwidth. The filter parameters for higher indecies may be obtained via GetCaps funtionality or from model data sheet.
For the CompuScope model that do not support filter selection this parameter is ignored.

Connector Pane

Controls and Indicators

- **Handle Cluster**
  - **Handle**
  - **Sample size**
  - **Resolution**
  - **Offset**
  - **Channels**
  - **Boards**
- **Channels**
  - **Cluster**
    - **Coupling**
    - **Diff. Input**
    - **Direct-to-ADC**
    - **Input Range**
    - **Impedance**
    - **DC Offset**
    - **Filter(0)**
- **Error Code**

CsTool-ConfigureTimeStamp.vi
This VI sends the Time Stamping configuration settings to the driver for the CompuScope system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. The requested settings are not actually sent to the CompuScope hardware until CsTool-Commit.vi is called.

Time Stamping functionality is provided by an on-board counter whose value is latched upon each trigger event - thus time stamping the record's trigger event. The counter source may be derived from the CompuScope sampling oscillator or by a separate on-board fixed frequency oscillator.

If the settings are correctly sent to the driver, a 1 is returned in the Error Code indicator. Otherwise, an appropriate error code is returned. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Input Value Descriptions:

Sample Clock (default = FALSE)
This Boolean value determines the source of the Time Stamping counter. If the value is set to FALSE, the counter source is derived from the sampling oscillator. Otherwise, an on-board fixed frequency oscillator is used. If the sampling oscillator is selected, then the counter source frequency is one half of the sampling rate in Dual-channel Mode and one quarter of the sampling rate in Single-channel Mode. The actual time stamping counter clock frequency in use may be obtained by calling CsTool-TransferTimeStamp.vi.

Reset (default = FALSE)
This Boolean value determines whether the Time Stamping counter is reset after every acquisition. If the value is set to TRUE, the counter is reset. Otherwise, the counter is not reset.

Connector Pane

Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Reset

Sample Clock

Error Code

CsTool-ConfigureTrigger.vi
This VI sends the requested Trigger configuration settings to the driver for the system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. The requested settings are not actually sent to the CompuScope hardware until CsTool-Commit.vi is called.

Many CompuScope cards are equipped with two trigger engines that may be independently configured. The outputs of the two trigger engines are bitwise ORed together so that either engine may cause a trigger event. For simple triggering, the second engine is disabled. The second engine may be used to implement more complex triggering schemes.

The Trigger configuration settings are Trigger Engine, Slope, Level, Source, External Trigger, Disable Trigger, External Coupling, and External Range. Valid values for the system identified by Handle Cluster must be supplied for all settings. If no connection is made to an input, the default value for that input will be used. If an error occurs, an appropriate error code is returned. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Input Value Descriptions:

Trigger Engine (default = 0)
This value specifies the number of the trigger engine in the CompuScope system for which the Trigger configuration settings will be applied. Trigger Engine numbers in a LabVIEW CompuScope system begin at 0.

Slope (default = Rising)
This string value sets the trigger signal slope that will cause a trigger event to occur. Possible values are:
Rising - to configure the trigger signal slope to Rising
Falling - to configure the trigger signal slope to Falling

Level (default = 0)
This integer value sets the trigger level as a percentage of the input range of the trigger source. Possible values are between -100% and +100%. For example, in the +/- 1 Volt range, 100% corresponds to a +1 Volt trigger level, 50% is +500 millivolts, and -100% is -1 Volt.

Source (default = 0)
This integer value is used for internal triggering from a CompuScope input channel only, and not for external triggering. The value sets the channel trigger source for the specified Trigger Engine. Channel trigger sources begin at 0. For internal triggering, the coupling and input range of the trigger input are those of the source channel. The settings for the External Range and External Coupling fields are therefore ignored. Note that even if settings are ignored, however, they should still be set to valid values.

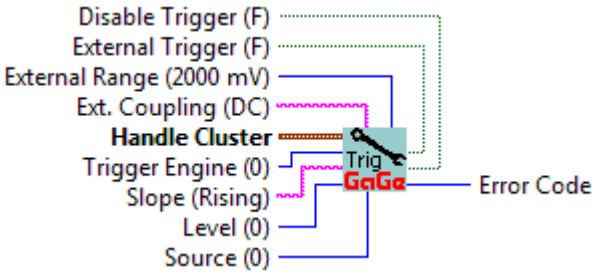
External Trigger (default = false)
This Boolean value is used to select the external trigger input as the trigger source. If this value is set to true, then the external trigger is used, the Source field is ignored and the External Range and External Coupling fields are used. If both External Trigger and Disable Trigger are set to true, an error will occur.

Disable Trigger (default = false)
This Boolean value is used to disable the trigger source. If this value is set to true, then the Source field is ignored. If both External Trigger and Disable Trigger are set to true, an error will occur.

External Coupling (default = DC)
This string value sets the coupling of the external trigger input. Possible values are:
DC - to set DC external trigger coupling
AC - to set AC external trigger coupling

External Range (default = 2000)
This return value sets the input range of the external trigger input in millivolts. Possible values are:
2000 - to set the +/-1 Volt external trigger input range
10000 - to set the +/-5 Volt external trigger input range

Connector Pane



Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Trigger Engine (0)

Slope (Rising)

Level (0)

Source (0)

Ext. Coupling (DC)

External Range (2000 mV)

External Trigger (F)

Disable Trigger (F)

Error Code

CsTool-ConfigureTriggerArray.vi
This VI is identical to CsTool-ConfigureTrigger.vi except that instead of only adjusting settings for the first trigger engine, a cluster containing the Trigger configuration settings for all trigger engines in the CompuScope systems are passed to the driver. The requested settings are not actually sent to the CompuScope hardware until CsTool-Commit.vi is called.

Triggers is an array of clusters that contains the Trigger configuration settings for each trigger engine. The Trigger configuration settings are Slope, Level, Source, External Trigger, Disable Trigger, External Coupling, and External Range. If the number of activated elements in the Trigger array is less than the number of trigger engines in the system, default values are used as the trigger configuration settings for the remaining inactive elements of the Trigger array. If the number of elements in the Trigger array is greater than the number of trigger engines, then an error will occur.

If the VI fails, an appropriate error code is returned in the Error Code indicator. A descriptive error string may be obtained by calling CsTool-ErrorHandler.vi. Error Code Array returns an array of error codes whose elements indicate the error code for the call to each trigger engine. The Error Code indicator, in fact, outputs the minimum value in the Error Code Array.

Input Value Descriptions for Trigger Cluster:

Trigger Engine (default = 0)
This value specifies the number of the trigger engine in the CompuScope system for which the Trigger configuration settings will be applied. Trigger Engine numbers in a LabVIEW CompuScope system begin at 0.

Slope (default = Rising)
This string value sets the trigger signal slope that will cause a trigger event to occur. Possible values are:

Rising - to configure the trigger signal slope to Rising
Falling - to configure the trigger signal slope to Falling

Level (default = 0)
This integer value sets the trigger level as a percentage of the input range of the trigger source. Possible values are between -100% and +100%. For example, in the +/- 1 Volt range, 100% corresponds to a +1 Volt trigger level, 50% is +500 millivolts, and -100% is -1 Volt.

Source (default = 0)
This integer value is used for internal triggering from a CompuScope input channel only, and not for external triggering. The value sets the channel trigger source for the specified Trigger Engine. Channel trigger sources begin at 0. For internal triggering, the coupling and input range of the trigger input are those of the source channel. The settings for the External Range and External Coupling fields are therefore ignored. Note that even if settings are ignored, however, they should still be set to valid values.

External Trigger (default = false)
This Boolean value is used to select the external trigger input as the trigger source. If this value is set to true, then the external trigger is used, the Source field is ignored and the External Range and External Coupling fields are used. If both External Trigger and Disable Trigger are set to true, an error will occur.

Disable Trigger (default = false)

This Boolean value is used to disable the trigger source. If this value is set to true, then the Source field is ignored. If both External Trigger and Disable Trigger are set to true, an error will occur.

External Coupling (default = DC)
This string value sets the coupling of the external trigger input. Possible values are:
DC - to set DC external trigger coupling
AC - to set AC external trigger coupling

External Range (default = 2000)
This return value sets the input range of the external trigger input in millivolts. Possible values are:
2000 - to set the +/-1 Volt external trigger input range
10000 - to set the +/-5 Volt external trigger input range

External Impedance (default = HiZ)
This return value sets the impedance of the external trigger. Possible values are:
50 Ohm - to set the 50 Ohm external trigger input impedances
HiZ - to set the high impedance external trigger input impedance

Connector Pane

Controls and Indicators

Handle Cluster

Handle

Sample size

Resolution

Offset

Channels

Boards

Triggers

Cluster

Slope

Level

Source

External Range

External Coupling

External Trigger

 **Disable Trigger**

 **External Impedance**

 **Error Code**

CsTool-ConvertFromSigHeader.vi
CsTool_ConvertFromSigHeader converts a GageScope signal (sig) file header passed as a parameter into a Sig Struct cluster (described below) containing the relevant information in the header. The comment and name fields of the header are returned as strings in the comment and name parameters. The sigheader parameter passed to the function is an array of 512 int8's read from the beginning of a GageScope SIG file.

If the value returned in the Error Code indicator is positive, the function succeeded. If the value is negative it represents an error code. A descriptive error string may be obtained by calling the CsTool_ErrorHandler.vi.

The Input parameters are:

Sig Struct
An empty sig struct cluster is passed to the vi and filled with values converted from the SIG file header.

The Sig Struct cluster contains the following fields:

Sample Rate
A double representing the sample rate of the acquistion in Hz.

Record Start
A double representing the start address (in samples) of each segment in the file.

Record Length
A double representing the length (in samples) of each segment in the file.

Record Count
A uInt32 which represents the number of segments saved in the file.

Sample Bits
A uInt32 which represents the actual vertical resolution (in bits) of the data in the file.

Sample Size
A uInt32 representing the actual size, in bytes, of each data value in the file.

Sample Offset
An int32 which is the sample offset of the data in the file.

Sample Res
An int32 which is the actual sample resolution of the data.

Channel
A uInt32 which is the Channel number that was saved to the file. 1 represents the first channel of the system.

Input Range
A uInt32 which is the Channel full scale input range, in millivolts peak to peak.

Dc Offset
An int32 which is the Channel DC offset in millivolts.

Time Stamp
An array of 4 uInt16 values, which represent (in order) the hour, minute, second and 100th's of a second of the trigger event.

Sig Header

An array of 512 int8 values which is obtained by reading the first 512 bytes of a GageScope SIG file.

Name
an empty string that will end up containg the name field of the header of GageScope SIG file. Should be able to hold up to 14 characters

Comment
an empty string that will end up containg the comment field of the header of GageScope SIG file. Should be able to hold up to 256 characters

Connector Pane

Controls and Indicators

Sig Header

- **Numeric**

Error Code

Sig Struct

- **Sample Rate**
- **Record Start**
- **Record Length**
- **Record Count**
- **Sample Bits**
- **Sample Size**
- **Sample Offset**
- **Sample Res**
- **Channel**
- **Input Range**


Dc Offset


Time Stamp


Numeric


Comment


Name

CsTool-ConvertToSigHeader.vi
CsTool_ConvertToSigHeader converts a Sig Struct cluster (described below) passed as a parameter into a GageScope SIG file header, which is put at the beginning of a GageScope SIG file. The Sig Struct cluster can be filled in from values in the AcquisitionConfig and ChannelConfig clusters obtained by calling the CsTool_QueryAcquisitonParameters and CsTool_QueryChannelParameters vi's.

If the value returned in the Error Code indicator is positive, the function succeeded. If the value is negative it represents an error code. A descriptive error string may be obtained by calling the CsTool_ErrorHandler.vi.

If the vi is successful, a 512 byte array is returned which can be used as the header for a GageScope SIG file.

The Input parameters are:

Sig Struct
A sig struct cluster with valid values that is passed to the vi and used to create the SIG file header.

The Sig Struct cluster contains the following fields:

Sample Rate
A double representing the sample rate of the acquistion in Hz.

Record Start
A double representing the start address (in samples) of each segment in the file.

Record Length
A double representing the length (in samples) of each segment in the file.

Record Count
A uInt32 which represents the number of segments saved in the file.

Sample Bits
A uInt32 which represents the actual vertical resolution (in bits) of the data in the file.

Sample Size
A uInt32 representing the actual size, in bytes, of each data value in the file.

Sample Offset
An int32 which is the sample offset of the data in the file.

Sample Res

An int32 which is the actual sample resolution of the data.

Channel
A uInt32 which is the Channel number that was saved to the file. 1 represents the first channel of the system.

Input Range
A uInt32 which is the Channel full scale input range, in millivolts peak to peak.

Dc Offset
An int32 which is the Channel DC offset in millivolts.

Time Stamp
An array of 4 uInt16 values, which represent (in order) the hour, minute, second and 100th's of a second of the trigger event. This parameter can be filled with values from the LabVIEW time and date functions.

Name
A string that will be used to fill the name field of the SIG header. A maximum of 14 characters is allowed. The default is an empty string.

Comment
A string that will be used to fill the comment field of the SIG header. A maximum of 256 characters is allowed. The default is an empty string.

Connector Pane

Controls and Indicators

Sig Struct

Sample Rate

Record Start

Record Length

Record Count

Sample Bits

Sample Size

Sample Offset

Sample Res

Channel

Input Range

Dc Offset

Time Stamp

Numeric

Comment

Name

Error Code

Sig Header

Numeric

CsTool-ErrorHandler.vi
This VI converts an error code, returned from a CsTool or CsLv VI, into a string that describes the error. Optionally, the VI can be configured to stop VI operation upon an error.

If the StopOnError flag is set to TRUE and the input error code indicates an error, the LabVIEW STOP function is called, which terminates VI operation. If StopOnError is set to FALSE, the error string is returned but VI execution will continue, if possible. The StopOnError default value is TRUE.

If the Handle Cluster is valid, the StopOnError input is set to TRUE, and the error code indicates an error, then CsTool-ErrorHandler.vi will free the specified CompuScope system so that it may be used by another program. The Handle Cluster uniquely identifies a CompuScope system and is obtained by using CsTool-GetSystem.vi.

Connector Pane

Controls and Indicators

Handle Cluster

Handle

Sample size

Resolution

Offset

Channels

Boards

StopOnError (true)

Error Code

Error String

CsTool-ForceCapture.vi
This VI forces a trigger event on the CompuScope system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. This VI is useful in order to terminate acquisitions that are judged to have taken longer than acceptable in the application. The VI may also be used to create a trigger event as soon as possible. This is useful in applications where the signal of interest is associated not with any electrical signal feature, but with a software event, such as a button press.

If the call is successful, a 1 is returned in the Error Code indicator. Otherwise, an error code is returned. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Connector Pane

Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Error Code

CsTool-FreeSystem.vi
This VI frees the CompuScope system identified by Handle Cluster, which should have been obtained by using CsTool-GetSystem.vi.

If the call is successful, a 1 is returned in the Error Code indicator. Otherwise, an error code is returned. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Until CsTool-FreeSystem.vi is called, a system that was obtained by CsTool-GetSystem.vi, will be considered to be in use by the driver and will be unavailable for other processes.

If the user exits a LabVIEW CompuScope VI without freeing a CompuScope system handle, the system will remain inaccessible to other applications. The system can be manually freed using the driver's CompuScope Manager utility.

Connector Pane

Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Error Code

CsTool-GetSampleInfo.vi
This VI returns information about the Samples acquired by the CompuScope system identified by Handle Cluster, which is obtained with CsTool-GetSystem.vi.

The returned values are: Sample Size, Resolution, and Offset. Sample Size is the number of bytes per CompuScope sample in the current CompuScope Mode. For instance, for 8-bit CompuScope models, the Sample Size is 1. For 12, 14, and 16-bit CompuScope models, the Sample Size is 2. Digital input CompuScope models allow 32-bit mode, which has a Sample Size of 4. Resolution is the number of levels between 0 and positive full scale, or 0 and negative full scale. Offset is the value that represents 0 Volts. Resolution and Offset may be used to convert raw ADC CompuScope data into voltage values, as described in the CompuScope SDK for LabVIEW manual.

Connector Pane

Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Sample Size

Offset

Resolution

CsTool-GetSystem.vi
This VI returns a unique Handle Cluster for an available CompuScope system. This Handle Cluster is used as an input to most other CsTool VIs. The Board Type, Channel Count, Sample Bits, and Index input fields may be used to search only for CompuScope systems with capabilities specified in these input fields. An "any" in the Board Type field will cause the VI to search for any CompuScope model and return the Handle Cluster for the first available CompuScope system. Similarly, a 0 in any of the numerical fields means that the VI will not narrow its search using this field. If all fields are "any" or 0, the VI returns the Handle Cluster for the first available CompuScope system. The Index input may be used to select a specific CompuScope system by ordinal number.

If the call is successful, a 1 is returned in the Error Code indicator and a valid Handle Cluster is returned as the Handle Cluster output.

If the call is unsuccessful, and if the Index input is zero, all CompuScope handles that were allocated within LabVIEW will be freed. The VI will then attempt to obtain a CompuScope system handle again. This procedure of freeing all CompuScope system handles and re-attempting to obtain a handle is done in order to recover from cases where VI operation was aborted without correctly freeing associated handles. If this second attempt also fails, a zero is returned in the Handle Cluster field and an appropriate error code is returned in the Error Code indicator. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Valid Input Parameters:

Board Name (Default = Any for "not specified"):
A value of "Any" means the board is not specified and the VI will find the first available system. To have the VI look for a specific CompuScope board, use the Board Name (e.g. CS82G, CS14200, CSVS8, etc.).

Channel Count (Default = 0 for "not specified")
0
1
2
,...

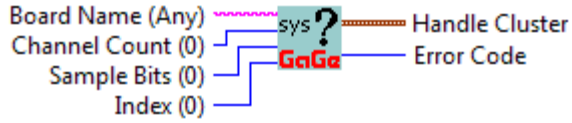
Sample Bits (Default = 0 for "not specified"):
0
8
12
14
16
32

Index (Default = 0 for "not specified"):
0
1
2
,...

The Handle Cluster that is returned uniquely identifies the CompuScope system and is used in most subsequent calls to CsTool VIs. The Handle Cluster includes the Handle variable, which is an integer value that is used as the CompuScope system handle for calls to CsLv VIs. The Handle Cluster also contains the Sample Size, the sample Resolution, the sample Offset, the number of Channels and number of Boards for the system. The Sample Size is the size of one data sample in bytes. Offset is the value that represents 0 Volts. Resolution is the number of

levels between 0 and full scale, or between negative full scale and 0. Resolution and Offset may be used to convert raw ADC CompuScope data into voltage values, as described in the CompuScope SDK for LabVIEW manual.
Please note that the Sample Size, Resolution and Offset returned in the Handle Cluster apply for the CompuScope system when it uses standard on-board firmware. Optional CompuScope firmware may change these values. For more information, see CsTool QueryAcquisitionParameters.vi.

Connector Pane



Controls and Indicators

Channel Count (0)

Sample Bits (0)

Board Name (Any)

Index (0)

Error Code

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

CsTool-GetSystemInfo.vi
This VI returns information about the CompuScope system identified by Handle Cluster, which is obtained with CsTool-GetSystem.vi.

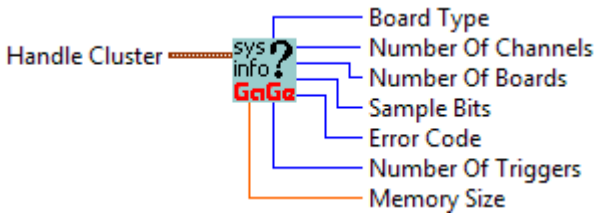
The available information is as follows:
Memory Size (of each CompuScope board in the system)
Board Type
Number Of Triggers (number of trigger engines in the system)
Number Of Channels (in the system)
Number Of Boards (in the system)
Sample Bits (vertical resolution for the CompuScope system)

Board Type is an integer constant used by the CompuScope driver to identify each type of CompuScope board. CsTool-BoardNameToType.vi may be used to determine the Board Type for any CompuScope model.

Board Type, Number Of Triggers, Number Of Channels, Number Of Boards and Sample Bits are all integer values. Memory Size is a double variable that indicates the amount of on-board CompuScope memory in samples.

If the call is successful, a 1 is returned in the Error Code indicator. Otherwise, an error code is returned. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Connector Pane



Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Number Of Boards

Number Of Channels

Number Of Triggers

Memory Size

Board Type

Error Code

Sample Bits

CsTool-GetSystemName.vi

This VI returns the System name for the CompuScope system identified by Handle Cluster, which is obtained with CsTool-GetSystem.vi.

If the return value is 1, the call was successful and the System Name is returned. Otherwise, an error code is returned and the System Name is blank. A descriptive error string may be obtained using CsTool-ErrorHandler.vi.

Connector Pane

Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

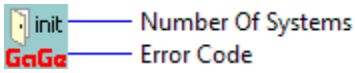
System Name

Error Code

CsTool-Initialize.vi
This VI initializes the CompuScope driver and returns the total number of CompuScope systems.

If the call is successful, the Error Code will show the number of systems. If the call is unsuccessful, the Number Of Systems is returned as 0 and an appropriate error code is returned in the Error Code indicator. A descriptive error string may be obtained by calling CsTool-ErrorHandler.vi.

Connector Pane



Controls and Indicators

Number Of Systems

Error Code

CsTool-QueryAcquisitionParameters.vi
This VI returns the acquisition configuration settings that have been set in the driver for the system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. If the call cannot be completed, an appropriate error code is returned. A descriptive error string may be obtained by calling CsTool-ErrorHandler.vi.

The returned acquisition configuration settings are: Sample Rate, Clock Mode, Mode, Segment Count, Depth, Segment Size, Trigger Timeout, Trigger Holdoff and Trigger Delay. An Output Handle Cluster is also returned. The returned values are those that were successfully set on the CompuScope hardware by the last call to CsTool-Commit.vi. The returned values are not valid until CsTool-Commit.vi has been called at least once.

Return Value Descriptions:

Sample Rate
This double variable value is the rate at which the CompuScope system will sample the input waveform. It is specified in Samples per second.

Clock Mode
This integer value is returned as 0 if the system is using Internal clocking, 1 if it is using External clocking, and 2 if it is using the 10 MHz Reference clocking.

Mode
This string value indicates the current operating mode for the CompuScope system. Possible values are:

single
dual
quad
octal

Note that for digital input CompuScope cards, like the CS3200 and CS3200C, "single" is equivalent to 8-bit mode, "dual" is equivalent to 16-bit mode and "quad" is equivalent to 32-bit mode.

Segment Count
This integer value indicates how many segments (or records) will be captured in a Multiple Record acquisition. For Single Record acquisitions, the variable is always returned as 1.

Depth
This double variable value indicates the number of post-trigger samples that the CompuScope system is set to acquire.

Segment Size
This double variable indicates the total amount of memory allocated to the acquisition. The maximum possible amount of pre-trigger data that can be acquired, therefore, is (Segment Size - Depth).

Trigger Timeout
This double variable value indicates the amount of time that the CompuScope system will wait before forcing a trigger. The value is in microseconds.

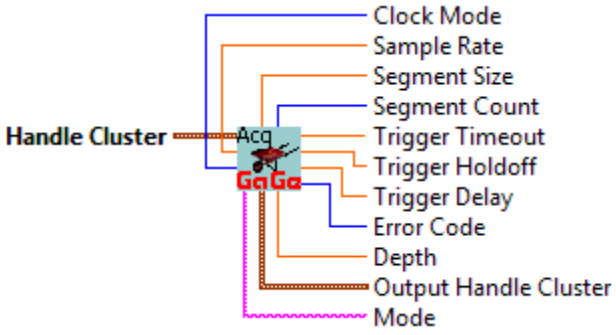
Trigger Delay
This double variable value indicates the number of Samples between the time that the trigger event actually occurs and the time that the trigger event will be logged in the data record. Setting a non-zero trigger delay is useful for signals where the region of interest in the signal occurs long after the trigger event. Trigger Delay is not supported on all CompuScope models.

Trigger Holdoff
This double variable value indicates the amount of time in Samples during which the CompuScope hardware will ignore trigger events after beginning an acquisition. Trigger Holdoff is useful in order to ensure the accumulation of specified number of pre-trigger points by ignoring trigger events until the specified number has been acquired.

Output Handle Cluster
The Output Handle Cluster is provided in order to correctly account for the presence of optional CompuScope firmware, which may cause changes to the CompuScope data format. The Handle Cluster provided by CsTool-GetSystem only applies for the CompuScope system using standard on-board firmware. Optional firmware, however, may change the sample data format, for

example, from 16-bit samples to 32-bit samples. Because of this, CsTool-QueryAcquistionParameters provides the Output Handle Cluster, which accounts for any data format changes due to optional firmware. The Output Handle Cluster contains the Sample Size, Sample Resolution and Sample Offset updated to account for optional firmware.

Connector Pane



Controls and Indicators

- **Handle Cluster**
  - **Handle**
  - **Sample size**
  - **Resolution**
  - **Offset**
  - **Channels**
  - **Boards**
- **Sample Rate**
- **Mode**
- **Segment Count**
- **Depth**
- **Trigger Timeout**
- **Trigger Holdoff**
- **Trigger Delay**
- **Error Code**
- **Segment Size**
- **Output Handle Cluster**
  - **Handle**

 **Sample Size**

 **Resolution**

 **Offset**

 **Channels**

 **Boards**

 **Clock Mode**

CsTool-QueryChannelParameters.vi
This VI returns the channel configuration settings for the specified Channel identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. If the call is successful, a 1 is returned in the Error Code indicator. If the call cannot be completed, an appropriate error code is returned. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

This VI returns the following values for the channel identified by the Channel input: Coupling, Differential Input, Direct-to-ADC, Input Range, Impedance, and DC Offset. If an invalid channel is specified, an appropriate error code is returned. The returned values are those that were successfully set on the CompuScope hardware by the last call to CsTool-Commit.vi. The returned values are not valid until CsTool-Commit.vi has been called at least once.

The integer Channel input value identifies the number of the channel in the CompuScope system for which the parameters are to be queried. Channel numbers in a LabVIEW CompuScope system start at 0. If an invalid Channel input number is supplied, an error will occur and an appropriate error code is returned.

Return Value Descriptions:

Coupling
This string value indicates the current input coupling. Possible values are:
DC - for DC input coupling
AC - for AC input coupling

Differential Input
This Boolean value indicates whether the channel is configured to use differential input coupling. Possible values are:
TRUE - if differential input is activated
FALSE - differential input is not activated

Direct-to-ADC
This Boolean value indicates whether the channel is configured to use Direct-to-ADC input range. Possible values are:
TRUE - if Direct-to-ADC is activated
FALSE - if Direct-to-ADC is not activated

Input Range
This value indicates the current full scale input range (in millivolts) setting for the current channel. For instance, for the +/- 1 Volt input range, the Input Range value is 2000. Values may differ depending on the CompuScope system.

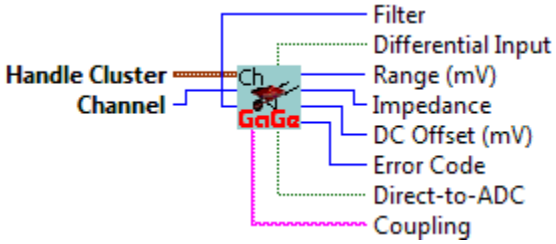
Impedance

This integer value indicates the terminating input impedance for the channel. Possible values are:

1000000 - if 1 MOhm input termination is activated
50 - if 50 Ohms input termination is activated

DC Offset
This integer value indicates the current DC offset (in millivolts) for the specified channel. Not all CompuScope models support DC offsets. If DC offset is not supported, the returned value will be 0.

Connector Pane



Controls and Indicators

Channel

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Error Code

Coupling

Differential Input

Range (mV)

Impedance

DC Offset (mV)

Direct-to-ADC

Filter

CsTool-QueryStatus.vi

This VI returns the current acquisition status of the CompuScope system identified by Handle Cluster, which is obtained by calling CsTool-GetSystem.vi.

If the call is successful, a positive or zero status code is returned. The possible status return values are:

0 - indicates that the system has finished acquiring data.
1 - indicates that the system is acquiring, but has not yet been triggered.
2 - indicates that the system is acquiring, and has been triggered.
3 - indicates that the system is transferring data.

A negative number is an error code. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Connector Pane

Controls and Indicators

Handle Cluster

Handle

Sample size

Resolution

Offset

Channels

Boards

Status

CsTool-QueryTimeStampInfo.vi

This VI returns information about the CompuScope Time Stamping functionality associated with the CompuScope system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi.

Time Stamping functionality is provided by an on-board counter whose value is latched upon each trigger event - thus time stamping the record's trigger event. The counter source may be derived from the CompuScope sampling oscillator or by a separate on-board fixed frequency oscillator.

If the VI is successful, a 1 is returned in the Error Code indicator. If the call is unsuccessful, an error is returned. A descriptive error string may be obtained by using CsTool-ErrorHandler.vi.

Return Value Descriptions:

Sample Clock
This returned Boolean value indicates which clock source the time stamping counter is using. Possible values are:

TRUE - indicates that the time stamping counter source is derived from the

CompuScope sampling clock.
FALSE - indicates that the time stamping counter source is the on-board fixed frequency oscillator.

Reset
This returned Boolean value indicates whether the time stamping counter is to be reset after every acquisition. Possible values are:
TRUE - indicates that the time stamping counter is to be reset after every acquisition
FALSE - indicates that the time stamping counter is not reset after every acquisition

Connector Pane

Controls and Indicators

Handle Cluster

Handle

Sample size

Resolution

Offset

Channels

Boards

Reset

Sample Clock

Error Code

CsTool-QueryTriggerParameters.vi
This VI returns the trigger configuration settings for the trigger engine identified by Trigger within the system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. If the call is successful, a 1 is returned in the Error Code indicator. If the call is unsuccessful, an appropriate error code is returned. For a descriptive error string, use CsTool-ErrorHandler.vi.

The VI queries the trigger engine identified by Trigger for its Slope, Level, Source, External Trigger, Disable Trigger, External Coupling, and External Range values. The returned values are those that were successfully set on the CompuScope hardware by the last call to CsTool-Commit.vi. The returned values are not valid until CsTool-Commit.vi has been called at least once.

The integer Trigger input value identifies the number of the trigger engine in the system for which the parameters are to be queried. Trigger engine numbers in a LabVIEW CompuScope system start at 0. If an invalid Trigger input number is supplied, an error will occur and an appropriate error code is returned.

Return Value Descriptions:

Slope
This returned string indicates the trigger signal slope that will cause a trigger event to occur. Possible values are:

Rising - if rising edge is activated
Falling - if falling edge is activated

Level
This integer return value indicates the trigger level as a percentage of the input range of the trigger source. Possible values are between -100% and +100%. For example, in the +/- 1 Volt range, 100% corresponds to a +1 Volt trigger level, 50% is +500 millivolts, and -100% is -1 Volt.

Source
This integer indicates the channel trigger source for the current trigger engine. Channel sources in a LabVIEW CompuScope system begin at 0. If either the External Source or the Disable Source controls are true, then the channel Source is not valid and will be set to 0. If the External Source and Disable Source indicators are false, then the channel Source value is the current trigger source.

External Trigger
This is a Boolean value that indicates whether the trigger engine source is set to the external trigger input. If it is true, then the source is set to the external trigger input and the External Range and External Coupling fields reflect the current range and coupling of the trigger source.

Disable Trigger
This Boolean value indicates whether the trigger engine is disabled.

External Coupling
This returned string indicates the coupling of the external trigger input. Possible values are:

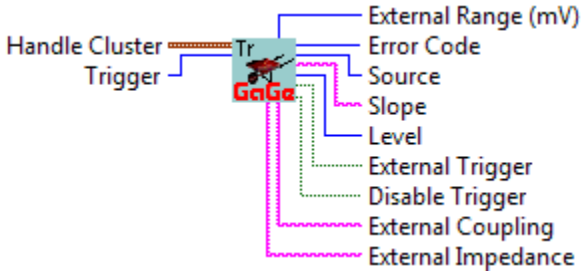
DC - if the external trigger coupling is set to DC
AC - if the external trigger coupling is set to AC

External Range
This integer return value indicates the input range of the external trigger input in millivolts. Possible values are:

2000 millivolts if the +/-1 Volt external trigger range is activated
10000 millivolts if the +/-5 Volt external trigger range is activated

External Impedance
This integer return value indicates the mpedance of the external trigger input.

Connector Pane



Controls and Indicators

U32 **Trigger**

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Error Code

Slope

Source

Level

External Coupling

External Range (mV)

External Trigger

Disable Trigger

External Impedance

CsTool-ResetTimeStamp.vi
This VI resets the Time Stamping counter associated with the CompuScope system identified by Handle Cluster, which is obtained by calling CsTool-GetSystem.vi. Subsequent time stamps will be measured with respect to this reset event. The Time Stamp should be reset at the beginning of VI execution in order to clear any initial large counter values.

If the call is successful, a 1 is returned in the Error Code indicator. Otherwise, an appropriate error code is returned. A descriptive error string may be obtained by calling CsTool-ErrorHandler.vi.

Connector Pane

Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**

Offset

Channels

Boards

Error Code

CsTool-Transfer.vi
This VI transfers the data from one channel of the CompuScope system identified by Handle Cluster, which is obtained by calling CsTool-GetSystem.vi. For accurate interpretation of the transferred data, the user should always use the returned Actual Start and Actual Length, and not the requested values.

This VI can be used for transferring data from 8, 12, 14, and 16 bit CompuScope hardware. Data are transferred from on-board CompuScope memory to PC RAM using PCI Bus Mastering at rates of up to 200 MB/s.

Internally, CsTool-Transfer.vi converts the raw integer ADC code values into double variable voltage values. For more rapid data access, the user may remove the voltage conversion step. The VI will not return programmatic control to LabVIEW until all of the data have been transferred.

If the call is successful, a 1 is returned in the Error Code indicator. If the call is unsuccessful, an appropriate error code is returned. A descriptive error string may be obtained by calling CsTool-ErrorHandler.vi.

Input Value Descriptions:

Channel
This integer value specifies the channel from which data are to be transferred. The default value is 0 for the first channel in the CompuScope system. Channels in a LabVIEW CompuScope system begin at 0. If an invalid channel number is given, an error will be returned. Please see the CompuScope hardware manual for more information on channel enumeration.

Mode
This integer value determines the current transfer mode. Currently, the only valid value for this input is 0.

Segment(1)
This integer value determines which Multiple Record segment is to be transferred, if the CompuScope hardware was operating in Multiple Record Mode. For Single Record Mode acquisitions, the user must always set the Record value to 1, which is the default value. If the Record value is too large, an error code will be returned.

Start
This double variable value determines the requested starting point of the data transfer from CompuScope memory to PC RAM. Start is specified relative to the trigger address for the acquisition. A Start value of 0 will cause data transfer to begin at the trigger address. Negative Start values are used for the transfer of pre-trigger data. Positive Start values may be used to begin transfer after the trigger address. The default Start value is 0.

Length

This double variable value specifies the amount of data, in samples, to be transferred. The default value is 4096.

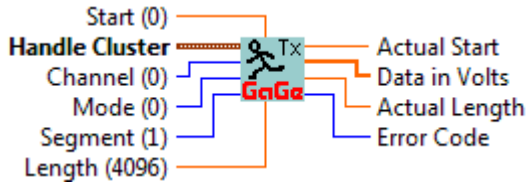
Data in Volts
This array variable, of type double, is the LabVIEW buffer variable into which transferred data are returned. The size of the array will be at least Length samples. Data are returned as voltage values, whose conversion depends upon the resolution of the CompuScope system and on the current input range.

Actual Start
This double variable value returns the actual start point of the data array. The Actual Start may be lower than the requested Start value. This is because the CompuScope memory architecture may force the drivers to download data from an earlier point than the start position. For example, if Start is input to CsTool-Transfer.vi as 0, the Actual Start may return as -2, indicating that two extra samples were returned before the Start position.

The user must account for the discrepancy between the Start and the Actual Start. The user may choose to ignore samples transferred from before the Start position. Alternatively, the user may conserve these samples, accounting for the fact that the values begin at Actual Start.

Actual Length
This double variable value returns the actual amount of data transferred, which may be different from the requested Length. The difference, if any, results from CompuScope memory architecture.

Connector Pane



Controls and Indicators

Channel (0)

Segment (1)

Start (0)

Length (4096)

Mode (0)

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**

Boards

Data in Volts

Numeric

Actual Length

Error Code

Actual Start

CsTool-TransferEx16.vi
This VI transfers 16-bit data from the CompuScope system identified by Handle Cluster, which is obtained by using the CsTool-GetSystem.vi. Segment Count transfers for either all channels or 1 channel of the CompuScope system can be transferred. The raw data is returned in a 3-dimensional array (Channels * Segments * Data).

This VI should only be used for transferring data from 16 bit CompuScope cards. Data are transferred from on-board CompuScope memory to PC RAM using PCI Bus Mastering at rates of up to 200 MB/s.

CsTool-TransferEx16.vi transfers raw integer ADC code values. The VI will not return programmatic control to LabVIEW until all of the data have been transferred.

If the call is successful, a 1 is returned in the Error Code indicator and the transferred data will be available in Data Buffer. If the call is unsuccessful, an appropriate error code is returned. A descriptive error string may be obtained by using the CsTool-ErrorHandler.vi.

Input Value Descriptions:

Handle Cluster
A cluster which uniquely describes a CompuScope system. The value is obtained by calling CsTool-GetSystem.vi

Transfer In Cluster
The controls of the Transfer In Cluster are:
Channel
This integer value specifies the channel(s) from which data are to be transferred. A value of -1 means all the current channels in the CompuScope system. For individual channels, Channel numbers in a LabVIEW CompuScope system begin at 0. (The channel numbers are incremented by 1 before being sent down to the driver, as required by the C API.) This vi can return either all the channels in the system or 1 channel in the system. If an invalid channel number is specified, an appropriate error code is returned.

Start Segment
This integer value determines which Multiple Record segment to start transferring from, if the CompuScope hardware was operating in Multiple Record Mode. For Single Record acquisitions, the user must always set the Segment to 1. If the Segment value is too large, an error will occur.

Segment Count
The number of segments to transfer, starting from Start Segment. If an invalid value is given for Segment Count, an error will be returned.

Start

This double variable value determines the requested starting point of the data transfer from the CompuScope memory to PC RAM. Start is specified relative to the trigger address for the acquisition. A Start value of 0 will cause data transfer to begin at the trigger address. Negative Start values are for the transfer of pre-trigger data. Positive Start values may be used to begin transfer after the trigger address.

XFer Length
This double variable value specifies the amount of data, in samples, to be transferred.

Buffer In
A 1 dimensional int16 array that will be used during the data transfer. The size of the array must be Channels * Segment Count * Length. The user is responsible for ensuring that the buffer is at least the proper length.

Data Buffer In
A 3 dimensional array of int16's that is used by the vi to reshape the 1 dimensional transfer buffer into a 3 dimensional array of Channels, Segments and Data. The user must ensure that each dimension is the proper size for the tranasfer.

Return Value Descriptions:

Data Buffer
This is the Data Buffer In variable filled with raw ADC values. The 3 dimensions are Channels * Segment Count * Length.

Error Code
An integer that represents the return code of the call. A positive value indicates success and a negative value indicates failure. A descriptive error string can be obtained by calling the CsTool-ErrorHandler.vi.

Connector Pane

Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

Transfer In Cluster

- **Channel**
- **Start Segment**

 **Segment Count**

 **Start**

 **Xfer Length**

 **Buffer In**

 **Numeric**

 **Data Buffer In**

 **Numeric**

 **Data Buffer**

 **Numeric**

 **Error Code**

CsTool-TransferEx32.vi
This VI transfers 32-bit data from the CompuScope system identified by Handle Cluster, which is obtained by using the CsTool-GetSystem.vi. Segment Count transfers for either all channels or 1 channel of the CompuScope system can be transferred. The raw data is returned in a 3-dimensional array (Channels * Segments * Data).

This VI should only be used for transferring data from 32 bit CompuScope cards. Data are transferred from on-board CompuScope memory to PC RAM using PCI Bus Mastering at rates of up to 200 MB/s.

CsTool-TransferEx32.vi transfers raw integer ADC code values. The VI will not return programmatic control to LabVIEW until all of the data have been transferred.

If the call is successful, a 1 is returned in the Error Code indicator and the transferred data will be available in Data Buffer. If the call is unsuccessful, an appropriate error code is returned. A descriptive error string may be obtained by using the CsTool-ErrorHandler.vi.

Input Value Descriptions:

Handle Cluster
A cluster which uniquely describes a CompuScope system. The value is obtained by calling CsTool-GetSystem.vi

Transfer In Cluster
The controls of the Transfer In Cluster are:
Channel
This integer value specifies the channel(s) from which data are to be transferred. A value of -1 means all the current channels in the CompuScope system. For individual channels, Channel numbers in a LabVIEW CompuScope system begin at 0. (The channel numbers are incremented by 1 before being sent down to the driver, as required by the C API.) This vi can return either all the channels in the system or 1 channel in the system. If an invalid channel number is specified, an appropriate error code is returned.

Start Segment

This integer value determines which Multiple Record segment to start transferring from, if the CompuScope hardware was operating in Multiple Record Mode. For Single Record acquisitions, the user must always set the Segment to 1. If the Segment value is too large, an error will occur.

Segment Count
The number of segments to transfer, starting from Start Segment. If an invalid value is given for Segment Count, an error will be returned.

Start
This double variable value determines the requested starting point of the data transfer from the CompuScope memory to PC RAM. Start is specified relative to the trigger address for the acquisition. A Start value of 0 will cause data transfer to begin at the trigger address. Negative Start values are for the transfer of pre-trigger data. Positive Start values may be used to begin transfer after the trigger address.

XFer Length
This double variable value specifies the amount of data, in samples, to be transferred.

Buffer In
A 1 dimensional int32 array that will be used during the data transfer. The size of the array must be Channels * Segment Count * Length. The user is responsible for ensuring that the buffer is at least the proper length.

Data Buffer In
A 3 dimensional array of int32 values that is used by the vi to reshape the 1 dimensional transfer buffer into a 3 dimensional array of Channels, Segments and Data. The user must ensure that each dimension is the proper size for the tranasfer.

Return Value Descriptions:

Data Buffer
This is the Data Buffer In variable filled with raw ADC values. The 3 dimensions are Channels * Segment Count * Length.

Error Code
An integer that represents the return code of the call. A positive value indicates success and a negative value indicates failure. A descriptive error string can be obtained by calling the CsTool-ErrorHandler.vi.

Connector Pane

Controls and Indicators

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**


Channels


Boards


Transfer In Cluster


Channel


Start Segment


Segment Count


Start


Xfer Length


Buffer In


Numeric


Data Buffer In


Numeric


Data Buffer


Numeric


Error Code

CsTool-TransferEx8.vi
This VI transfers 8-bit data from the CompuScope system identified by Handle Cluster, which is obtained by using the CsTool-GetSystem.vi. Segment Count transfers for either all channels or 1 channel of the CompuScope system can be transferred. The raw data is returned in a 3-dimensional array (Channels * Segments * Data).

This VI should only be used for transferring data from 8 bit CompuScope cards. Data are transferred from on-board CompuScope memory to PC RAM using PCI Bus Mastering at rates of up to 200 MB/s.

CsTool-TransferEx8.vi transfers raw integer ADC code values. The VI will not return programmatic control to LabVIEW until all of the data have been transferred.

If the call is successful, a 1 is returned in the Error Code indicator and the transferred data will be available in Data Buffer. If the call is unsuccessful, an appropriate error code is returned. A descriptive error string may be obtained by using the CsTool-ErrorHandler.vi.

Input Value Descriptions:

Handle Cluster
A cluster which uniquely describes a CompuScope system. The value is obtained by calling CsTool-GetSystem.vi

Transfer In Cluster

The controls of the Transfer In Cluster are:
Channel
This integer value specifies the channel(s) from which data are to be transferred. A value of -1 means all the current channels in the CompuScope system. For individual channels, Channel numbers in a LabVIEW CompuScope system begin at 0. (The channel numbers are incremented by 1 before being sent down to the driver, as required by the C API.) This vi can return either all the channels in the system or 1 channel in the system. If an invalid channel number is specified, an appropriate error code is returned.

Start Segment
This integer value determines which Multiple Record segment to start transferring from, if the CompuScope hardware was operating in Multiple Record Mode. For Single Record acquisitions, the user must always set the Segment to 1. If the Segment value is too large, an error will occur.

Segment Count
The number of segments to transfer, starting from Start Segment. If an invalid value is given for Segment Count, an error will be returned.

Start
This double variable value determines the requested starting point of the data transfer from the CompuScope memory to PC RAM. Start is specified relative to the trigger address for the acquisition. A Start value of 0 will cause data transfer to begin at the trigger address. Negative Start values are for the transfer of pre-trigger data. Positive Start values may be used to begin transfer after the trigger address.

XFer Length
This double variable value specifies the amount of data, in samples, to be transferred.

Buffer In
A 1 dimensional uInt8 array that will be used during the data transfer. The size of the array must be Channels * Segment Count * Length. The user is responsible for ensuring that the buffer is at least the proper length.

Data Buffer In
A 3 dimensional array that is used by the vi to reshape the 1 dimensional transfer buffer into a 3 dimensional array of Channels, Segments and Data. The user must ensure that each dimension is the proper size for the tranasfer.

Return Value Descriptions:

Data Buffer
This is the Data Buffer In variable filled with raw ADC values. The 3 dimensions are Channels * Segment Count * Length.

Error Code
An integer that represents the return code of the call. A positive value indicates success and a negative value indicates failure. A descriptive error string can be obtained by calling the CsTool-ErrorHandler.vi.

Connector Pane

Controls and Indicators

Handle Cluster

Handle

Sample size

Resolution

Offset

Channels

Boards

Transfer In Cluster

Channel

Start Segment

Segment Count

Start

Xfer Length

Buffer In

Numeric

Data Buffer In

Numeric

Data Buffer

Numeric

Error Code

CsTool-TransferTimeStamp.vi
This VI transfers time stamp data from the CompuScope system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. Time stamps may be retrieved for any segment of a Multiple Record acquisition. The VI will not return programmatic control to LabVIEW until all of the transfer is complete. Note that not all CompuScope models support Time Stamping.

If the VI is successful, a 1 is returned in the Error Code indicator. If the VI is unsuccessful, an appropriate error code is returned. A descriptive error string may be obtained by calling CsTool-ErrorHandler.vi.

Input Value Descriptions:

Segment

This integer value selects the segment from which transfer of time stamp values will begin. The default value is 1. If you try to transfer time stamp values for an invalid segment (e.g. a segment value that is less than 1 or that is greater than the number of segments acquired), an error code is returned.

Length
This double variable value sets the number of time stamp values to be transferred, starting from the segment specified by Segment. The default value is 1. If Length is invalid (e.g. if it is less than 1 or is greater than the number of segments acquired), an error code is returned.

Return Value Descriptions:

TS Time
This array of double variable values contains the time stamp readings in microseconds. Time stamp values indicate the time that has elapsed, in microseconds, between the trigger time stamp for the corresponding segment and the last reset of the time stamping counter.

Tick Frequency
This integer value indicates the time stamping counter frequency, in Hertz, that was used for the acquisition of the returned time stamps. The inverse of this frequency indicates the time for one time stamp count and is therefore the minimum possible time between two time stamp values.

Connector Pane

Controls and Indicators

Segment (1)

Length (1)

Handle Cluster

- **Handle**
- **Sample size**
- **Resolution**
- **Offset**
- **Channels**
- **Boards**

TS Time

- **Numeric**

Error Code

Tick Frequency

CsTool-TransferTimeStampEx.vi
This VI transfers time stamp data from the CompuScope system identified by Handle Cluster, which is obtained by using CsTool-GetSystem.vi. Time stamps may be retrieved for any segment of a Multiple Record acquisition. The VI will not return programmatic control to LabVIEW until all of the transfer is complete. Note that not all CompuScope models support Time Stamping.

If the VI is successful, a 1 is returned in the Error Code indicator. If the VI is unsuccessful, an appropriate error code is returned. A descriptive error string may be obtained by calling CsTool-ErrorHandler.vi.

Input Value Descriptions:

TS Values In
An Segment Count size array of doubles. The size of the array must be the same as the Segment Count that is to be transferred. This array is used as the TS Values Out array.

Start Segment
This integer value selects the segment from which to start transferring the time stamp values for. The default value is 1. If you try to transfer time stamp values for an invalid segment (e.g. if it is less than 1 or greater than the number of segments acquired), an error code is returned.

SegmentCount
This integer value determines the number of segments to transfer the time stamp data for. If the value is greater than the actual number of segments acquired, an error code is returned.

Return Value Descriptions:

TS Values Out
This array of double variable values contains the time stamp readings in microseconds. Time stamp values indicate the time that has elapsed, in microseconds, between the trigger time stamp for the corresponding segment and the last reset of the time stamping counter.

Error Code
An integer that represents the return code of the call. A positive value indicates success and a negative value indicates failure. A descriptive error string can be obtained by calling CsLv_GetErrorString.vi.

Connector Pane

Controls and Indicators

Start Segment (1)

Segment Count (1)

Handle Cluster

- **Handle**
- **Sample size**

Resolution

Offset

Channels

Boards

TS Values In

Numeric

Error Code

TS Values Out

Numeric