instruNetLV

LabVIEW™ Drivers for instruNet™

User's Guide

Software Version 2.1
Manual Version 2.1.2
8/11/02

Important Addendum

- **Determining the actual sample rate**
  The sample rate (Hz) returned by **Config Timing** may be incorrect.

  Due to the behavior of the controller, the actual sample rate used during digitization may not be equal to the desired sample rate set using **Config Timing** or **Set Sample Rate**. Unfortunately, the controller does not set the sample rate until after digitization has been started. This means that the sample rate returned by **Config Timing** may not be correct! By experimentation, sample rates can be found where the desired sample rate will be the same as the actual sample rate.

  It is important to call **Get Sample Rate** once after digitization has begun to determine the actual sample rate.

  The example VIs illustrate calling **Get Sample Rate** just after beginning digitization, but before any loops are begun that handle servicing the buffers. The sample rate returned can easily be passed into the loop for any real-time processing.

- **LabVIEW 6i and front panel controls**
  Opening some VIs in LV6i yields an error.

  LabVIEW 6i no longer supports coercing the values of a sub-VIs controls when they are passed from a calling VI. LabVIEW 6i also no longer supports suspending a VI when the value of a control is out of range. Some of the instruNetLV VIs have front panel controls set to coerce the value or suspend the VI if a control is out of range.

  When these VIs are opened by LV6i, a warning will be given that this setting is not supported. This is *not* an indication that the VI will not work. If the values passed to the VI are out of range, the appropriate instruNet error will be returned.

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Introduction

Assumptions

The following documentation assumes that the instruNet hardware, instruNet driver files and LabVIEW are installed and functioning. If necessary, please refer to the respective manuals for details. This documentation also assumes that you are familiar with the operation and terminology of the computer (MacOS or Windows), instruNet World and LabVIEW. Again, please refer to the documentation that comes with those packages for any details.

System Requirements

instruNetLV requires at least LabVIEW 4. Therefore, system requirements are the same as LabVIEW. An additional 6MB of free disk space is required for the instruNetLV files. Using instruNetLV will require 500KB of RAM outside of the amount required by the LabVIEW VIs due to the requirements of the instruNet driver called by instruNetLV. instruNetLV supports both the NuBus and the PCI version of the instruNet controller cards.

About instruNetLV

instruNetLV is a collection of LabVIEW VIs that provide the LabVIEW programmer with an interface to GWI's instruNet hardware. The advanced VIs allow direct access to the entire instruNet World and to the GWI driver that controls instruNet. These VIs are platform specific LabVIEW calls to the iNetLV() routine in the source code that ships with instruNet. Under the MacOS this consists of CINs that call the GWI Code Resource, while under Windows this consists of calls to the GWI DLL. Additional VIs for a platform are built from the appropriate advanced VIs and provide simplified access to specific features of the instruNet hardware. These VIs replicate many of the routines found throughout the source code provided with instruNet.

Installation

The instruNetLV collection of VIs ship as a self-extracting archive. Double-clicking on the .sea or .exe file will produce folders and VI libraries containing the collection. The Examples library contains several examples to help illustrate the use of the instruNetLV VIs and may be placed anywhere you find convienent. The iNetLV 2 VIs folder contains the VIs divided by function into a number of other folders or libraries. This folder is best placed in the user.lib folder to provide access to the VIs from the function menu.

By default, the MacOS version of the instruNetLV VIs use the PPC specific **iNetLV(PPC).vi** as their core subVI. To use the instruNetLV VIs on a 68K MacOS computer replace this subVI call with the 68K specific **iNetLV(68K).vi**. The VIs have identical terminal arrangements, so no change in the wiring is necessary. LabVIEW will ask you to save the changes to the instruNetLV VIs.

Since LabVIEW implements PPC CINs using the Shared Library Manager, the iNetLV(PPC).lsb file must be in the same location as the **iNetLV(PPC).vi.** Since 68K CINs are implemented using a Code Resource, the information within the iNetLV(68K).lsb can be saved within the **iNetLV(68K).vi**. The iNetLV(68K).lsb file does not have to be kept with the **iNetLV(68K).vi**, although this is recommended.

Using instruNetLV

Initialization (MacOS only)

Under the MacOS, when the core **iNetLV(XXX).vi** is first loaded into memory by LabVIEW, an initialization procedure is performed. Any error during initialization is stored and returned when the core VI is first called by LabVIEW. If an error occurs during initialization, the core VI (and any other VIs that calls it) must be unloaded from memory, the error corrected, and then the VIs may be loaded back into memory for another attempt at initialization.

Accessing instruNet Fields

The key to understanding instruNet and the instruNetLV VIs is to know which field within the instruNet World stores the desired information. Each aspect of the instruNet hardware and driver has an associated field(s). Using instruNet is a matter of specifying the appropriate field and how you wish to access the field. The instruNet manual contains descriptions of the fields and their functions. The instruNet manual and Appendix A of this manual contain listings of the useful numbers needed when specifying and accessing fields. The instruNetLV VIs simplify this process by already specifying the appropriate numbers for the desired action the VI is to perform. Most of the instruNetLV VIs function in a straightforward manner; calling upon instruNet to perform the action (e.g. returning a value) and then both instruNet and the VI stop activity. Digitizing waveforms is a more complicated process that is discussed below.

Configuring instruNet with the Probe Dialog

The **Show Probe** VIs are a convenient method for providing the user with the ability to configure aspects of instruNet. The dialog presented by these VIs provide a convenient pre-built user interface. When your LabVIEW program calls the **Show Probe** VI you can specify which aspect of instruNet for which to present the configuration dialog. The user will then have the chance to specify the settings that are desired and click a button to exit the dialog. For example, to bring up the probe dialog appropriate for configuring all of the hardware settings of a channel (Sensor, Wiring, Range, etc.) call **Show Probe(full) 2.vi** with the necessary *network*, *device*, *module* and *channel* and with *settingGroup in* equal to -3 (see SettingGroup Types in Appendix A). To bring up a dialog for configuring just the input range for a channel call **Show Probe(field)** with the same above inputs plus *fieldNum in* equal to 5 (see HARDWARE Settings in Appendix A).

Selecting Channels with the Probe Dialog

When the user clicks one of the buttons, the **Show Probe** VIs return the currently accessed settings, such as the *network*, *device*, *module*, *channel*, *settingGroup out*, and *fieldNum out*. This allows the **Show Probe** VIs to be used to give the user a simple way to select a channel, field, etc. and return the choice to LabVIEW for further activity.

Saving and Recalling instruNet Configurations

Two VIs allow the complete configuration of the instruNet World to be saved and recalled. **Get Network Settings(XXX).vi** will return the complete settings of the instruNet World as an array and a scalar that can be saved to disk for later recall. **Set Network Settings(XXX).vi** can then be used later with this data to completely configure the instruNet World based on the stored settings.

Digitizing Waveforms

Digitizing waveforms requires that the instruNet driver be active in the background even if no VI is currently running. This background activity begins when the instruNet Start Record button is 'pressed' using **Press Button 2.vi**. The instruNet driver begins digitization in the background using whatever settings for digitizing (e.g. which channels are enabled), timing (e.g. sample rate) and triggering (e.g. trigger mode) were specified beforehand. In order for the background activity to succeed, the instruNet driver must be called periodically to allow the servicing of the buffers used to store the incoming data. This is accomplished by calling **Service All Buffers 2.vi** several times a second within a loop for as long as digitization is happening. To access the data (even while digitization is occurring) you call **Access Buffer 2.vi** once for each channel that has been enabled. This will return any new data in the channel's buffer and does allow for the display of data without interrupting digitization. Digitization will stop once the specified number of scans have occurred. Digitization can also be stopped at any time by using **Press Button 2.vi** to 'press' the instruNet Stop Record button. This should be done even if digitization has ended normally, since it ends the background activity of the instruNet driver.

Digitize Channel Example.vi demonstrates the technique outlined above. The sequence of steps is outlined below. All of these steps check for an error before they execute.
1) Call **Press Button 2.vi** with Network Clear as the input. This tells instruNet to clear the state of the network allowing the remaining VIs to configure the digitization with a clear state. This will disable digitization of all channels. This call takes several seconds and isn't necessary if you know the state of the network.
2) Call **Set Timing Values 2.vi** to configure the timing values used by instruNet during the digitization. Needs to be done only once if you know they have been already defined.
3) Call **Set Trigger Values 2.vi** to configure the trigger values used by instruNet during the digitization. Needs to be done only once if you know they have already been defined.
4) Call **Channel On-Off 2.vi** to enable digitization of the desired channel of instruNet. Needs to be done only once if this has already been defined.
5) Call **Press Button 2.vi** with Record Start as the input. This tells instruNet to begin digitization of the enabled channel. Digitization will use the trigger values and timing values specified in earlier steps.
6) From within a loop call **Service All Buffers 2.vi** repeatedly to give instruNet the chance to service the digitization process. Check the values returned for the status of the digitization. Also from within the loop, call **Access Buffer 2.vi** to pull any new data from the channel's buffer, display it on a chart and append it to an array with any previous data. This loop stops when the user presses the Front Panel's Stop button, if there is an error reported, or once the digitization is complete.

7) Call **Press Button 2.vi** with Record Stop as the input to tell instruNet to stop the digitization process.

Digitizing Multiple Channels

Acquiring waveforms from multiple channels requires enabling multiple channels and handling multiple buffers with repeated calls to **Channel On-Off.vi** and **Access Buffer 2.vi**. If multiple networks are available this may also require additional calls to **Service All Buffers.vi**. This process is simplified by using the three VIs designed to work with a list of channels (**Enable List.vi**, **Access List.vi** and **Service List.vi**). All of these VIs use an array to specify a list of input channels to process. **Digitize List Example.vi** illustrates the use of these VIs to acquire multiple channesl. This example uses the same VIs as **Digitize Channel Example.vi** to configure the timing and triggering of the digitization.

Outputting Waveforms

The instruNetLV VIs can be used to output a waveform during digitization. The first step is to enable digitization of an output channel (e.g. Vout 3) with **Channel On-Off 2.vi**. Once the channel has been enabled for digitization, the channels' buffer needs to be filled with the waveform to output. **Load Buffer 2.vi** accomplishes this step. Once the buffer is filled with the waveform, the process of digitization will output the waveform. The sample rate, etc. of the output is determined by the same timing values used to acquire a waveform.

In-Out Example.vi illustrates the output of a waveform simultaneously with acquisition by adding the output of a sine wave to **Digitize Channel Example.vi**.

Output of a waveform only requires that **Service All Buffers 2.vi** be called periodically. **Access Buffer 2.vi** is only required to acquire an input channel's data.

instruNetLV 2.1 VIs

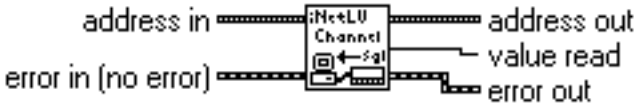
This section is an annotated list of the VIs grouped by function. Some of the VIs are identical in function to VIs present in version 1 of instruNetLV but have modified inputs and outputs. These VIs have a Roman numeral two appended to the original VIs name (e.g. Get Field(SGL) 2.vi). Many of the controls and indicators are shared by the VIs and are only described the first time they are encountered.

Channel Values

These VIs read or write to the specified channel's valueEu field of the GENERAL settingGroup. The value is in engineering units and as a SGL.

Get Channel(SGL) 2.vi

Returns the value as a 32bit floating point (SGL).



address in Cluster
address out Cluster

A cluster that specifies an address within the instruNet World. The value of *address in* is passed to *address out* to facilitate dataflow programming.

network U8
NETWORK number {0...numNetworks}, 0 = Driver, 1 = 1st controller installed in the computer.

device U8
DEVICE number {0...numDevices}, 0 = Controller, 1 = 1st device on network

module U8
MODULE number within a hardware DEVICE {1...32}. Many devices have only 1 module.

channel U8
Hardware CHANNEL number {1...32}. Each device contains a number of channels, each of which has it's own channel number.

error in Cluster
error out Cluster

If the value for *status* in the *error in* cluster is true than no action is taken and the *error in* passed to *error out.* Otherwise, any error reported by the VI is passed to *error out*.

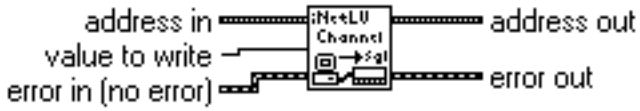
status Boolean
True if an error has been reported.

code I32
The error code generated by the call to the instruNet driver. See the instruNet manual or the listing in Appendix A for details.

source String
The VI responsible for the error.

value read SGL
The value read from the channel in engineering units.

Set Channel(SGL) 2.vi
Sets the value using a 32bit floating point (SGL).

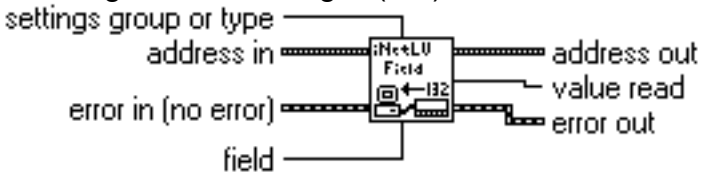


value to write SGL
The value to write to the channel in engineering units.

Field Values

These VIs return the value of the specified field (the *value read* or *string read* indicators) in the representation indicated.

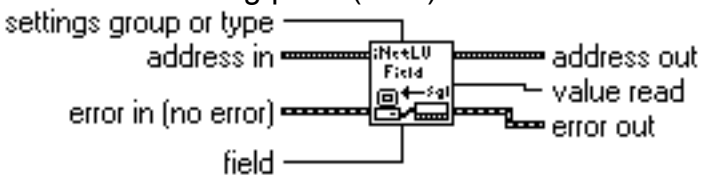
Get Field(I32) 2.vi
Returns the value as a signed 32bit integer (I32).



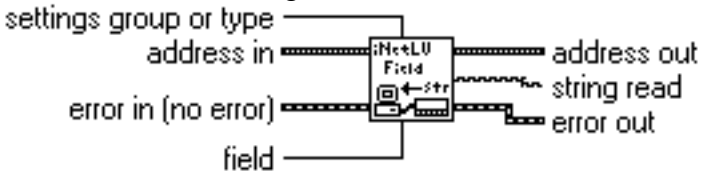
settings group or type I16
If> 0, this is a settings group Number: {1...numSettingGroups}, which corresponds to the order in which the settingGroup appears in the Setting popup menu (when using the instruNet World application), with the first item in the menu is #1. If < 0, this is a settings group Type. See the listing for settingGroup Types (sgt_VinHardware (-3) etc) in Appendix A for details.

field I16
Field number within the settingGroup. The 1st field is #1, the next #2, etc. See fgNums_... in Appendix A.

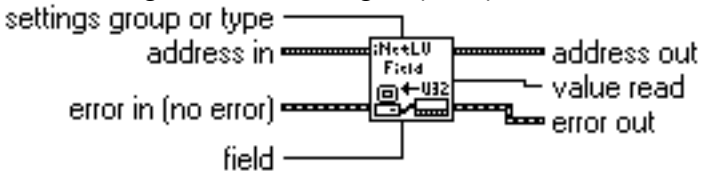
Get Field(SGL) 2.vi
Returns the value as a 32bit floating point (SGL).



Get Field(String) 2.vi
Returns the value as a LabVIEW string.

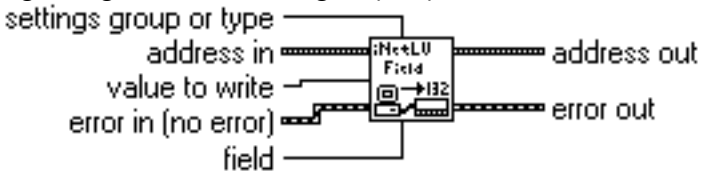


Get Field(U32) 2.vi
Returns the value as a unsigned 32bit integer (U32).

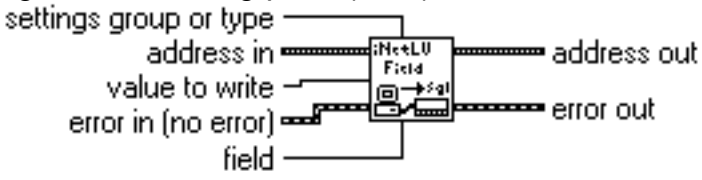


These VIs set the value of the specified field (the *value to write* or *string to write* controls) using the representation indicated.

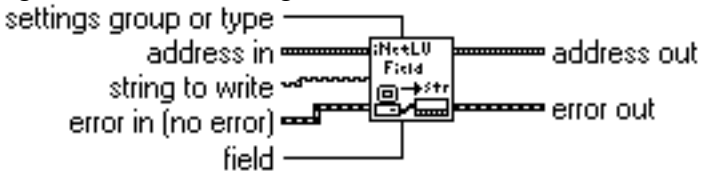
Set Field(I32) 2.vi
Sets the value using a signed 32bit integer (I32).



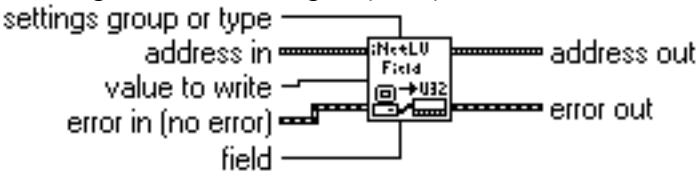
Set Field(SGL) 2.vi
Sets the value using a 32bit floating point (SGL).



Set Field(String) 2.vi
Sets the value using a LabVIEW string.

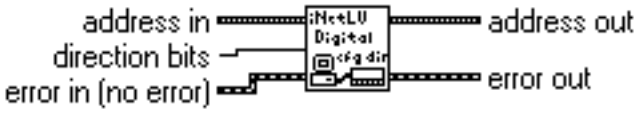


Set Field(U32) 2.vi
Sets the value as a unsigned 32bit integer (U32).



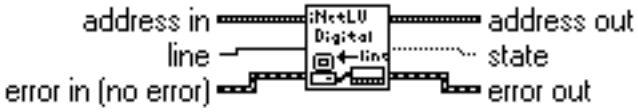
Digital
These VIs are useful for using the digital port.

Config Digital Directions.vi
Configures the direction of each line of an 8-bit digital port.



direction bits U8
Each bit sets the direction of a line of the specified digital port. Use 0 for an input line and 1 for an output line. Line 1 of the port is specified by bit 1 (of 8) of *directions bits.*

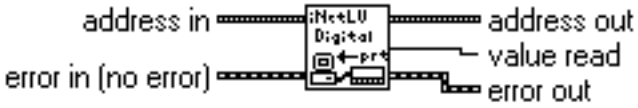
Get Digital Line.vi
Returns the value of the specified line (1..8) of an 8-bit digital port. The *address in* needs to be a digital channel (e.g. Ch 25).



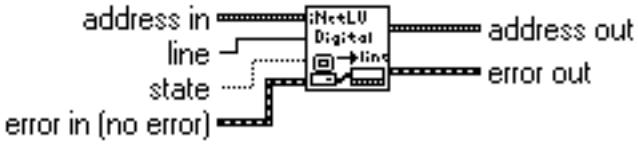
line U8
Specifies which line (1..8) of the port.

state Boolean
The state of the line (true if high).

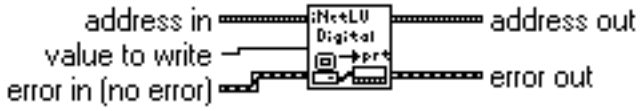
Get Digital Port.vi
Returns the value of the specifed channel's ValueEU field as an unsigned byte. Useful for reading the value of a digital port (e.g. Ch 25).



Set Digital Line.vi
Sets the value of a single line (1..8) of an 8-bit digital port. The channel needs to be a digital channel (e.g. Ch 25). The line also needs to be configured as an output line.



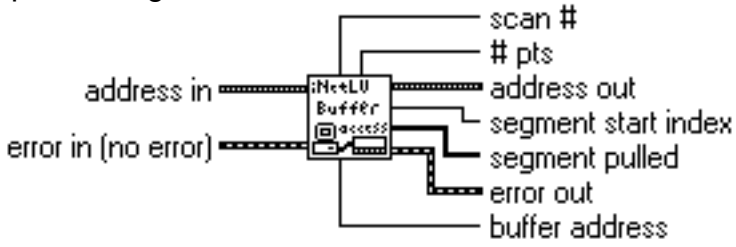
Set Digital Port.vi
Sets the value of the specifed channel's ValueEU field as an unsigned byte. Useful for writing the value of a digital port (e.g. Ch 25).



Digitizing

These VIs are used to control the process of digitizing data. An example called **Digitize Channel Example.vi** demonstrates how to use the instruNetLV VIs to acquire a waveform from a single channel. **Digitize List Example.vi** demonstrates how to acquire waveforms from a list of channels. The DRIVER RAM buffer must be used, since the USER RAM buffer is currently not supported by instruNetLV.

Access Buffer 2.vi
While digitizing, this VI pulls a segment of data out of the driver RAM buffer.



scan # U32
The scan number of the scan that is currently being pulled from the buffer (base 1).

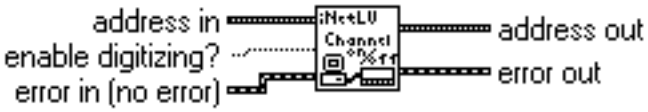
 # pts U32
The number of points pulled from the buffer. Equal to the size of the *segment pulled* array.

segment start index U32
The index of the first point returned in *segment pulled* relative to the start of the buffer (base 1 index).

segment pulled [SGL]
The most recent segment of data pulled from the buffer in engineering units.

buffer address U32
The location in memory of the first point in the buffer.

Channel On-Off 2.vi
Enables or disables digitizing for the specified channel by setting the DISPLAY field in the DISPLAY settingGroup.



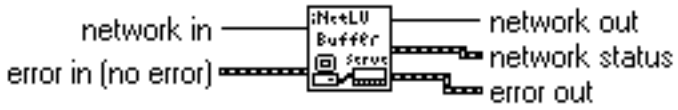
enable digitizing? Boolean

Set to true to enable digitizing of the specified channel, false to disable digitizing.

Channels Off 2.vi
Disables digitizing for all channels in the specified network. Makes sure that the DISPLAY field is off in the DISPLAY settingGroup and that the DIGITIZE field is off in the FILE, USERBUFFER, and DRIVERBUFFER settingGroups.

network in U8
network out U8
NETWORK number {0...numNetworks}, 0 = Driver, 1 = 1st controller installed in the computer.

Service All Buffers 2.vi
This VI must be called continuously while digitizing to allow the processor to service all of the digitization buffers and to let LabVIEW monitor the status of the digitization.



network status Cluster
Contains the status information for the digitization.

Controller Is Finished Boolean
Returns true if the controller has completed the digitization as specified by the timing values.

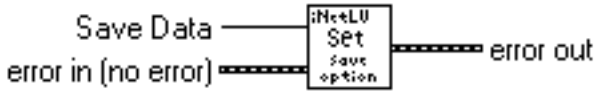
Last Scan # Pulled In Full U32
The scan number of the last scan that was pulled in full from the buffer (base 1).

Last Scan # Pushed In Full U32
The scan number of the last scan that was pushed in full to the buffer (base 1).

Next Access Ends Digitization Boolean
True if the next segment of data pulled from the buffer will complete digitization.

Next Access Pulls to End of Scan Boolean
Returns true if the next segment of data pulled from the buffer will complete the current scan.

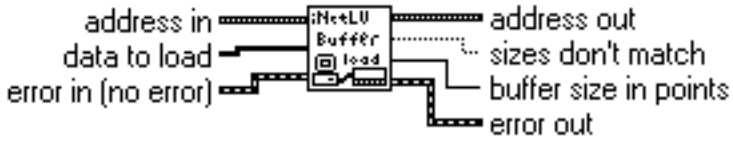
Save Option 2.vi
Specifies how the data acquired by digitization should be saved; either off, to RAM, to disk, or user controlled.



Save Data I32
(1) Off, data is not saved.
(2) RAM, data is saved to a RAM buffer.

(3) Disk, data is streamed to a file on disk. The file must be specified in the appropriate fields.
(4) User, data is controlled in a user defined location. This is currently NOT supported by instruNetLV.

Load Buffer 2.vi
This VI loads the input SGL array into the buffer of the specified channel. The channel must be an output channel (e.g. Vout 3). Additionally, the size of the input array must match the size of the buffer. If not, **Load Buffer** will finish without loading the buffer and set *sizes don't match* to true. **Load Buffer** returns the size of the buffer, so a second attempt may be made after resizing the input array. The first attempt does no harm, so a channel's buffer size can be determined by calling **Load Buffer** with an empty array. The buffer size will usually be the same as the value for *Points Per Scan*.



data to load SGL Array
The waveform data (in the channel's engineering units) to load into the buffer.

sizes don't match Boolean
Returns true if the data array is not the same size as the buffer.

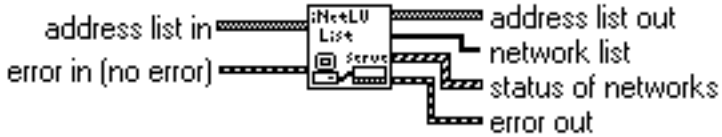
buffer size in points U32
The buffer size in number of points, the actual size in bytes will be four times larger.

Enable List.vi
Enables digitization for the channels specified in *address list in*. Digitization for all other channels in the networks is disabled.

address list in [Cluster]
address list out [Cluster]
An array of address clusters (*network, device, module* and *channel*).

network list out [U8]
An array containing all the networks within *address list in*.

Service List.vi
Services the buffers for each network in *address list in*.



network list [U8]
An array containing all the networks within *address list in*.

status of networks [Cluster]
An array of the *network status* cluster (see **Service All Buffers 2.vi**). The data for each element of the array is from the network specified in the corresponding element of the *network list* array.

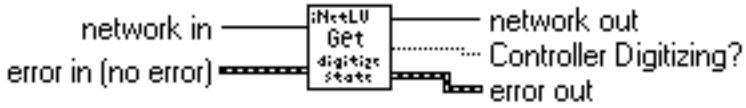
Access List.vi
Access the buffers for each channel in the *address list in*.

info from buffers [Cluster]
An array of clusters. Each cluster bundles the information for one buffer (see **Access Buffer 2.vi**). Each element of the array contains the buffer information for the corresponding element of the *address list in*.

Get Channel Direction 2.vi
Returns the direction of the specified channel; true if an input, false if an output.

Input Channel? Boolean

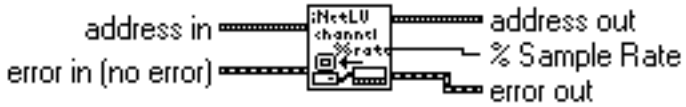
Get Digitizing State 2.vi
Returns true if the controller is digitizing.



Controller Digitizing? Boolean

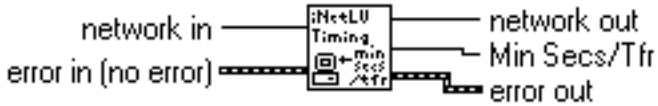
Timing
These VIs return timing values used by the controller.

Get Ch % Sample Rate 2.vi
Returns % of the sample rate that will be used to digitize the specified channel.



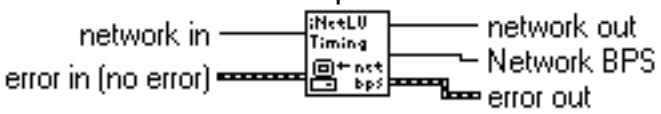
% Sample Rate SGL

Get Min SecsPerTfr 2.vi
Returns the minimum seconds per transfer to and from the specified network.



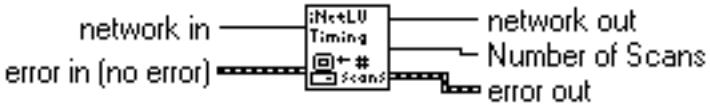
Min Secs/Tfr SGL

Get Network BPS 2.vi
Returns the network data transfer rate in bits per second.



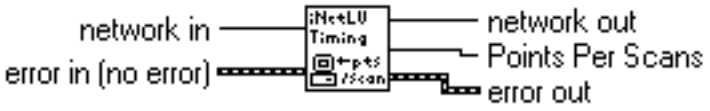
Network BPS I32

Get Number of Scans 2.vi
Returns the number of scans that will be digitized.



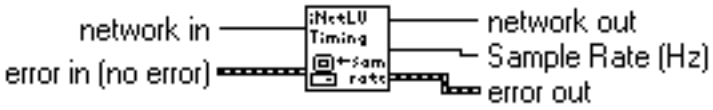
Number of Scans U32

Get Points Per Scan 2.vi
Returns the number of points that will be digitized per scan.



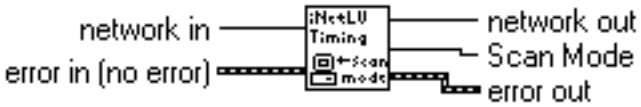
Points Per Scan U32

Get Sample Rate 2.vi
Returns the digitization sample rate in samples per second.



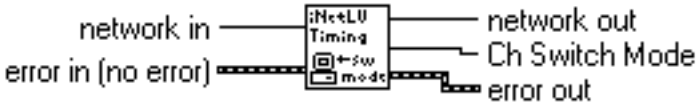
Sample Rate (Hz) SGL

Get Scan Mode 2.vi
Returns the digitization scan mode; Strip Chart, Oscilloscope Queued, or Oscilloscope.



Scan Mode I32
(1) Strip Chart, continuous mode.
(2) Oscilloscope, non-continuous mode with data pulled in a first in, last out manner.
(3) Oscilloscope Queued, non-continuous mode with data pulled in a first in, first out manner.

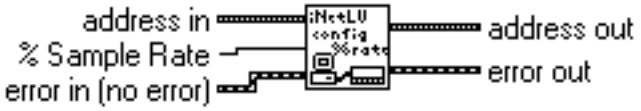
Get Switching Mode 2.vi
Returns the channel switching mode used during digitization; Accurate or Fast.



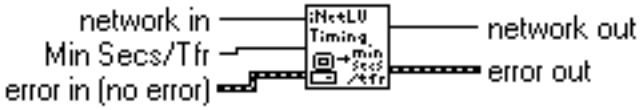
Ch Switch Mode I32
(1) Accurate, yet slower.
(2) Fast, yet less accurate.

These VIs set timing values used by the controller.

Set Ch % Sample Rate 2.vi
Sets the % of the sample rate used to digitize the specified channel.



Set Min SecsPerTfr 2.vi
Sets the minimum seconds per transfer to and from the specified network.

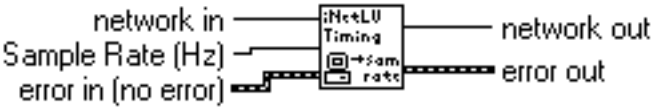


Set Network BPS 2.vi
Sets the network data transfer rate in bits per second.

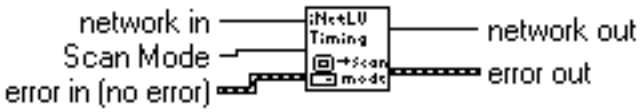
Set Number of Scans 2.vi
Sets the number of scans to digitize.

Set Points Per Scan 2.vi
Sets the number of points to digitize per scan.

Set Sample Rate 2.vi
Sets the digitization sample rate in samples per second.

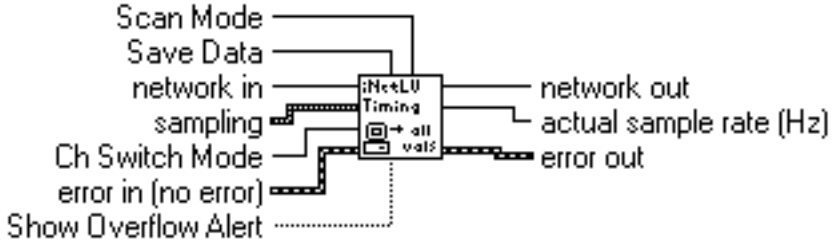


Set Scan Mode 2.vi
Sets the digitization scan mode; Strip Chart, Oscilloscope Queued, or Oscilloscope.



Set Switching Mode 2.vi
Sets the channel switching mode used during digitization; Accurate or Fast.

Set Timing Values 2.vi
Sets the timing values used by the controller during digitization.



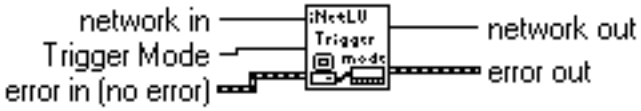
sampling Cluster
Input cluster that bundles controls for *Sample Rate (Hz), Points Per Scans* and *Number of Scans*.

Show Overflow Alert Boolean
Set to true if you want instruNetLV to generate an alert dialog upon an overflow.

actual sample rate (Hz)
Returns the actual sample rate the network will use during digitization. May not be the same as the requested sample rate.

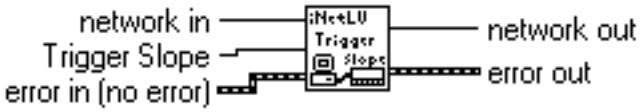
Trigger
These VIs configure the triggering used during digitization.

Set Trigger Mode 2.vi
Sets the trigger mode for digitization; Off, Automatic, or Normal.



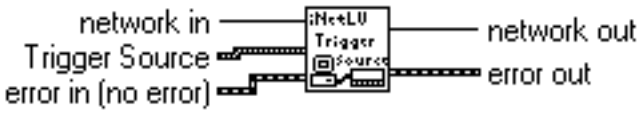
Trigger Mode I32
(1) Off, (2) Auto, (3) Normal.

Set Trigger Slope 2.vi
Sets the trigger slope for digitization; Rising or Falling.



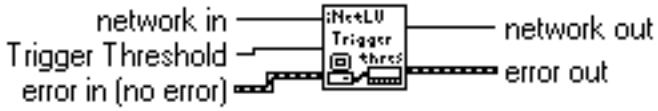
Trigger Slope I32
(1) Rising, (2) Falling.

Set Trigger Source 2.vi
Sets the network address (*network*, *device*, *module* and *channel*) of the trigger source for digitization.



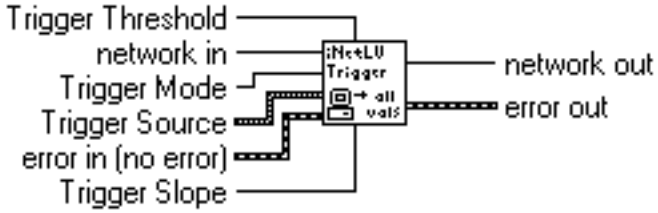
Trigger Source Cluster
Input cluster that bundles controls for specifying the *network, device, module* and *channel* of the trigger source.

Set Trigger Threshold 2.vi
Sets the trigger threshold in engineering units.



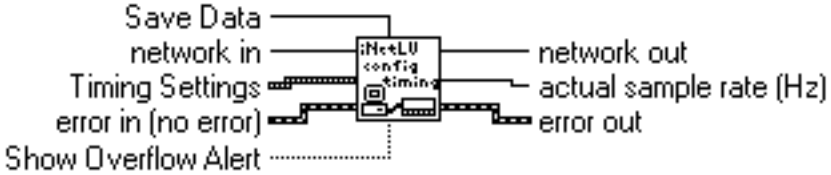
Trigger Threshold SGL

Set Trigger Values 2.vi
Sets the trigger values used during digitization.



Configuration
These VIs configure different portions of the instruNet World.

Config Timing.vi
Configures the Timing Settings used by the network. This VI is an alternative to **Set Timing Values 2.vi** and uses a single cluster for the major timing values.



Timing Settings Cluster
A cluster containing the major timing values (see the Timing VIs)
pts/scan U32
Same as *Points Per Scan*.

# of scans U32
Same as *Number of Scans*.

Scan Mode I32

Sample Rate SGL
Same as *Sample Rate (Hz)*.

Switching I32
Same as *Ch Switch Mode*.

Config Trigger.vi
Configures the Trigger Settings used by the network. This VI is an alternative to the **Set Trigger Values 2.vi** and uses a single cluster for the trigger values.

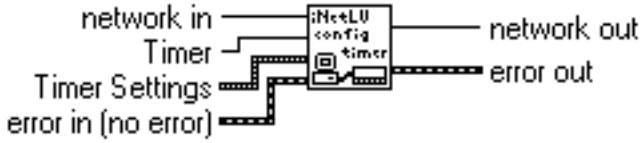
Trigger Settings Cluster
A cluster containing the trigger settings (see the Trigger VIs).
Trigger I32
Same as *Trigger Mode*.

Threshold SGL
Same as *Trigger Threshold*.

Slope I32
Same as *Trigger Slope*.

Source Cluster
Same as *Trigger Source*.

Config Timer.vi
Configures one of the digital timers located on the controller card.



Timer U8
Specifies which timer to configure (from 1 to 10).

Timer Settings Cluster
A cluster containing the timer settings.
Function U32
Species which timer function to use.
(1) Digital In, (2) Digital Out, (3) Clock Output, (4) Period Measurement

Clock Period SGL
Specifies the period (if the timer function is Clock Output).

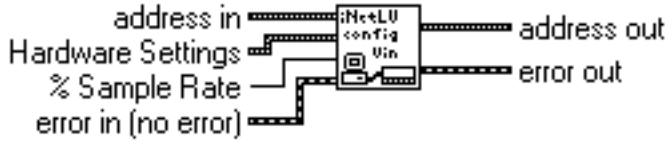
Clock Out Hi SGL
Specifies the duty cycle (if the timer function is Clock Output).

Measure U32
Specifies the measurement mode (if the function is Period Measurement).
(1) Cycle Time, (2) High Time

Measure Resolution U32
Specifies the measurement resolution (if the function is Period Measurement).
(1) 0.25 microseconds, (2) 4 milliseconds

Measure Cycles SGL
Specifies the number of cycles measured (if the function is Period Measurement).

Config Vin Channel.vi
Configures the hardware settings for the specified input channel.



Hardware Settings Cluster
Sensor U16
Specifies the sensor that is connected to the channel (e.g. (1) Voltage). See the front panel, instruNet Manual or Appendix A for values.

Wiring U16
Specifies the wiring used to connect the sensor (e.g. (1) Vin-Gnd). See the front panel, instruNet Manual or Appendix A for values.

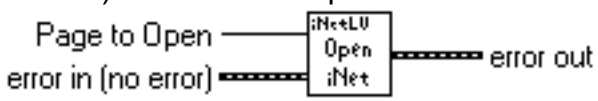
Low Pass U16
Specifies the low pass filter to use during digitization.
(1) Off, (2) 40Hz, (3) 4000Hz

Integrate SGL
Specifies the integration time used during digitization.

Range U16
Specifies the range for the channel.
(1) +-5V, (2) +- 0.6V, (3) 80 mV, (4) 10mV

instruNet World
These VIs operate on the instruNet World window.

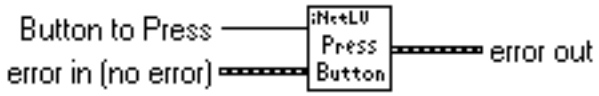
Open instruNet 2.vi
Opens the instruNet World window to the specified page. Program control is owned by the driver (i.e. NOT LabVIEW) until the user quits or closes instruNet World.



Page to Open I32

(1) Record page
(2) Network page
(3) Test page

Press Button 2.vi
Presses the specified button within the instruNet World window. The window does NOT need to be open in order for the action to take place.



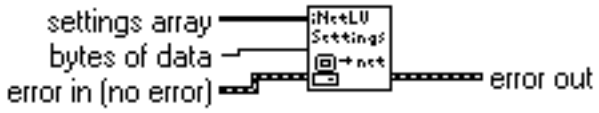
Button to Press I32
Please see the listing of Button Press Commands in Appendix A for the values that correspond to each button.

Get Network Settings(XXX).vi
Returns an array containing the all the settings in the instruNet World. This array can be saved to disk to be recalled and reconfigure the instruNet World.

settings array [I16]
An array containing the settings within the instruNet World.

bytes of data U32
The number of bytes of the *settings array* that contain actual data.

Set Network Settings(XXX).vi
Configures the instruNet World using the settings from the *settings array*. The only way to get a valid *settings array* is from a previous call to **Get Network Settings(XXX).vi**.



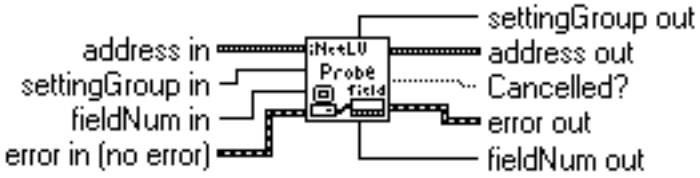
Show Probe

These VIs show the probe dialog. The initial address accessed is specified by *address in*. On return, the *address out* cluster contains the currently accessed network address.

Show Probe(channel) 2.vi
Shows the probe dialog with the channel address only ([net/dev/mod/chan] popups).

Cancelled? Boolean
True if the user pressed Cancel to exit the dialog.

Show Probe(field) 2.vi
Shows the probe dialog with the field address only ([net/dev/mod/chan/set/field] popups).



settingGroup in I16
The initial settingGroup displayed by the dialog.

fieldNum in I16
The initial field displayed by the dialog.

settingGroup out I16
fieldNum out I16
The settingGroup and field displayed when the user exits the dialog.

Show Probe(full) 2.vi
Shows the full probe dialog.

Alerts
These VIs are used to control how the instruNet driver displays alerts.

Get Show Alert 2.vi
Returns whether the instruNet driver is configured to show an alert dialog upon an error.

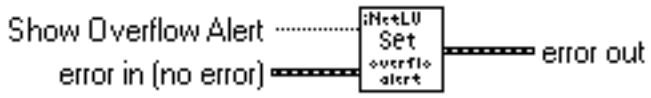
Show Alert Is Boolean
Returns true if instruNetLV will display an alert dialog upon an error.

Set Show Alert 2.vi
Configures the instruNet driver to either show or not show an alert dialog upon an error. Returns the setting that was in place BEFORE the VI was called.

Set Show Alert Boolean
Set to true if you want instruNetLV to show an alert dialog upon an error.

Show Alert Was Boolean
Returns true if the alert dialog was set to be displayed prior to calling the VI

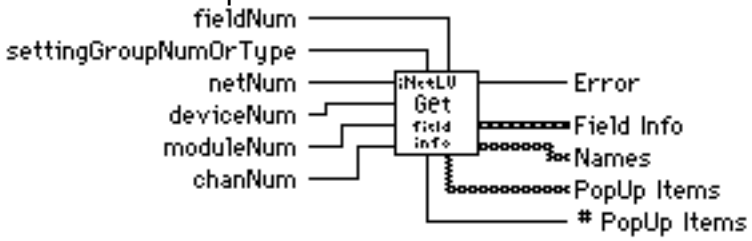
Set Overflow Alert 2.vi
Configures the instruNet driver to either show or not show an alert dialog upon a buffer overflow during digitization.



Show Overflow Alert Boolean
Set to true if you want instruNetLV to generate an alert dialog upon an overflow.

Network Info
A set of VIs that return useful information about the instruNet World.

Get Field Info.vi
Returns information about the specified field within the instruNet World.



fieldNum I16
Field number within the settingGroup. The 1st field is #1, the next #2, etc. See fgNums_... in Appendix A.

settingGroupNumOrType I16
If> 0, this is a settings group Number: {1...numSettingGroups}, which corresponds to the order in which the settingGroup appears in the Setting popup menu (when using the instruNet World application), with the first item in the menu is #1. If < 0, this is a settings group Type. See the listing for settingGroup Types (sgt_VinHardware (-3) etc) in Appendix A for details.

netNum U8
NETWORK number {0...numNetworks}, 0 = Driver, 1 = 1st controller installed in the computer.

deviceNum U8
DEVICE number {0...numDevices}, 0 = Controller, 1 = 1st device on network

moduleNum U8
MODULE number within a hardware DEVICE {1...32}.

chanNum U8
Hardware CHANNEL number {1...32}. Each device contains a number of channels, each of which has it's own channel number.

Error I16
Returns the error code generated by the call to the instruNet driver. See the instruNet manual or the listing in Appendix A for details.

Field Info Cluster
Output cluster containing the following indicators providing information about the specified field.

type I32
The type of user interface appropriate for the field.

category I32
The category of user interface for the field.

representation I32
The native representation of the value in the field. See Data Types in Appendix A for a listing.

read/write Boolean
Returns true if the field is read/write, false if the field is read only.

Names [String]
Contains the names of the network, device, module, channel, settingGroup and field.

PopUp Items [String]
Contains a list of the items in the PopUp menu associated with the field's settingGroup.

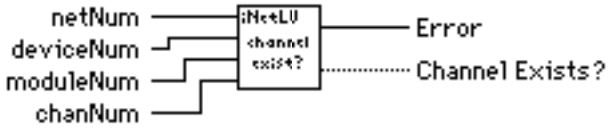
 # PopUp Items I32
The number of items in the associated settingGroup's PopUp menu.

Get Seconds Since Reset.vi
Returns the number of seconds since the network has been reset.

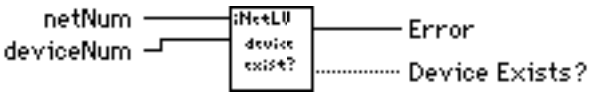
Seconds SGL

These VIs return true if the item exists within the specified portion of the instruNet World. All of the <*X*> *Exists?* terminals are Boolean indicators.

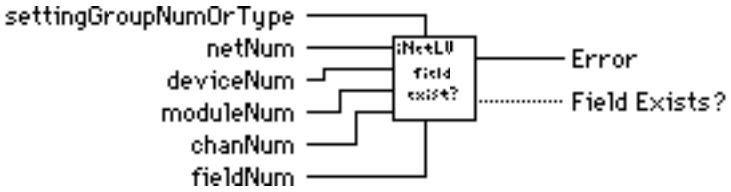
Does Channel Exist.vi



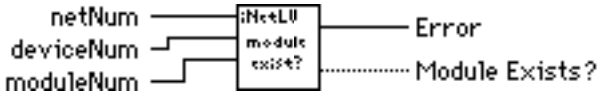
Does Device Exist.vi



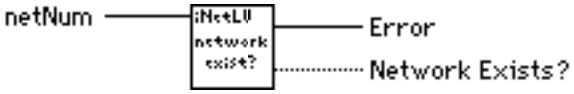
Does Field Exist.vi



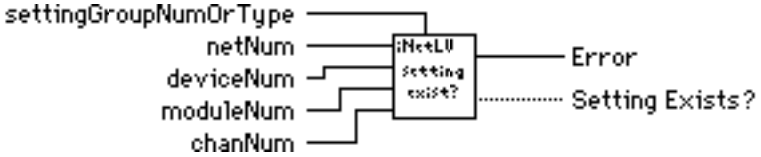
Does Module Exist.vi



Does Network Exist.vi



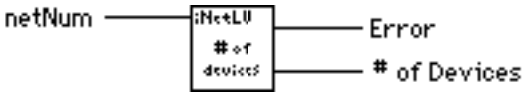
Does Setting Exist.vi



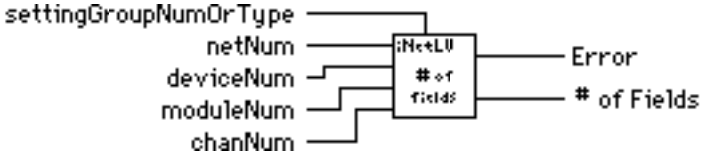
These VIs return how many of the items exist within the specified portion of the instruNet World. All of the *# of <X>* terminals are I32 indicators.

Number of Channels.vi

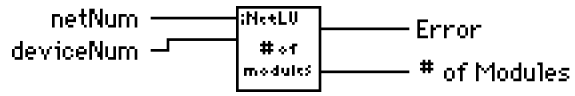
Number of Devices.vi



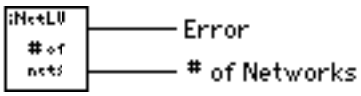
Number of Fields.vi



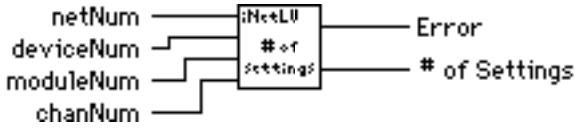
Number of Modules.vi



Number of Networks.vi



Number of Settings.vi

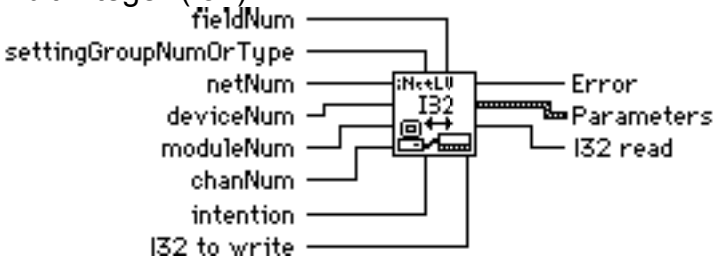


Advanced

These VIs call the instruNet driver to read or write any field in the instruNet World using a value in the indicated representation. The value of *intention* determines the action taken. For almost all purposes the previous VIs will provide easier access to the instruNet hardware.

iNetLV_I32.vi

Uses a signed 32bit integer (I32).



intention I16

Tells the instruNet driver what to do when accessing the field. Please see the listing of Field Access Intentions in Appendix A for details.

Parameters Cluster

A cluster of values used mainly for internal purposes. Some of the elements in the cluster (A, B etc.) are used by certain calls to instruNet to return additional information and will be mentioned in the documentation.

I32 to write I32

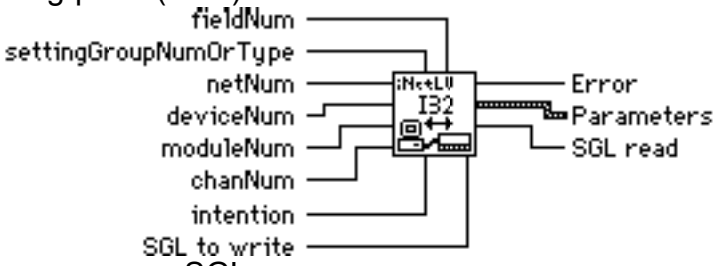
The value to write to the specified field within the instruNet World.

I32 read I32

The value read from the specified field within the instruNet World.

iNetLV_SGL.vi

Uses a 32bit floating point (SGL).

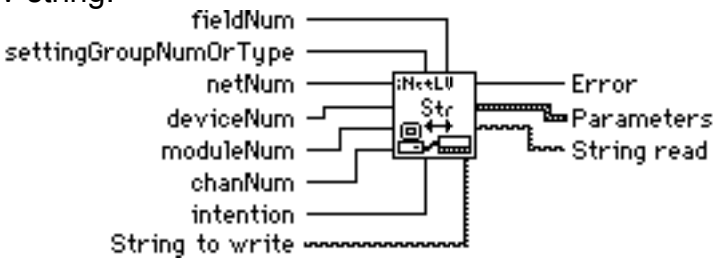


SGL to write SGL

The value to write to the specified field within the instruNet World.

SGL read SGL
The value read from the specified field within the instruNet World.

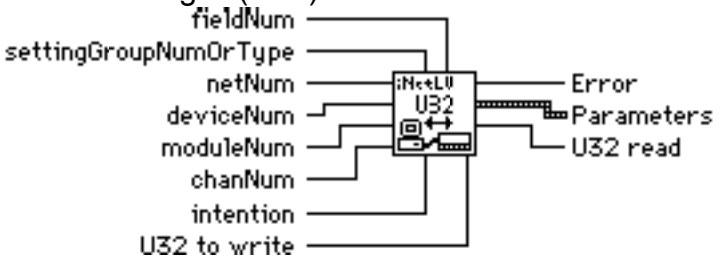
iNetLV_String.vi
Uses a LabVIEW string.



String to write String
The value to write to the specified field within the instruNet World.

String read String
The value read from the specified field within the instruNet World.

iNetLV_U32.vi
Uses an unsigned 32bit integer (U32).



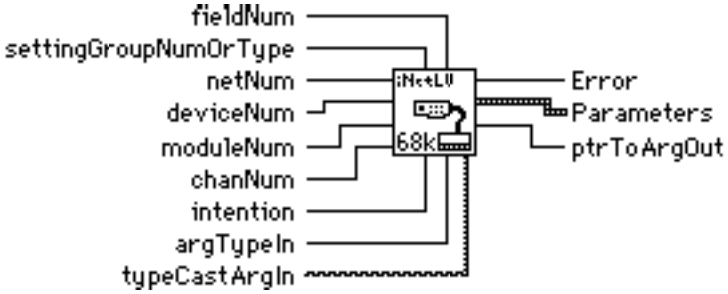
U32 to write U32
The value to write to the specified field within the instruNet World.

U32 read U32
The value read from the specified field within the instruNet World.

Core MacOS only

The CIN based VIs used by the MacOS version of instruNetLV. Each VI is platform specific and allows LV to directly access the fields within the instruNet World.

iNetLV(68K).vi
The CIN based VI for 680x0 based Macs.

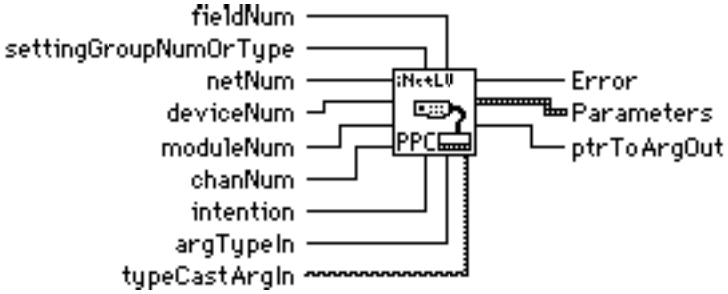


argTypeIn U8
Specifies the representation of the value being read or written. See the listing of Data Types in Appendix A for details.

typeCastArgIn String
Contains the value that is to be written to the instruNet field. MUST be TypeCast to a string using the TypeCast Function since the VI is not polymorphic.

ptrToArgOut U32
Returns the location in memory that contains the value returned by the call to the instruNet driver. How the location needs to be accessed is determined by the value of argTypeIn.

iNetLV(PPC).vi
The CIN based VI for PPC based Macs.



~subVIs
Some utility VIs used by other VIs in the instruNetLV collection. Most of these involve memory access and manipulation and should NOT be used for other purposes.

addresses2networks.vi
Converts an array of address clusters to an array containing all the networks specified by the addresses.

CStr15[] Address To String[].vi
Reads the information at the memory address specified and converts it from a CStr15[] to a LabVIEW String[].

CStr255 Address To String.vi
Reads the information at the memory address specified and converts it from a CStr255 to a LabVIEW String.

iNetLV_Error.vi **Win95 only**
Returns the error reported by the last call to the instruNet Driver.

iNetLV_Params.vi **Win95 only**
Returns the Parameter structure associated with the last call to the instruNet Driver. Most of the values are for internal use only.

iNet_Peek_int16.vi **Win95 only**
Returns the value at the specified memory address as a I16.

iNet_Peek_int32.vi **Win95 only**
Returns the value at the specified memory address as an I32.

iNet_Peek_flt32.vi **Win95 only**
Returns the value at the specified memory address as a SGL.

iNet_Poke_flt32.vi **Win95 only**
Sets the value at the specified memory address using a SGL.

The following VIs are used for memory manipulation by the Mac version of the instruNetLV VIs. They must NOT be used for other purposes. Each VI has a version for 68K and for PPC Macs. They are all CIN based and have corresponding .lsb files that should stay in the same folder as the VI.

Array to Handle(XXX).vi **MacOS only**

Handle to Array(XXX).vi **MacOS only**

Dispose of Handle(XXX).vi **MacOS only**

Appendix A: Useful Numbers

The following lists provide useful values for the various controls and indicators of the instruNetLV VIs. The information is adapted from the header files that come as part of the source code provided by GWI with the instruNet hardware. Several chapters at the back of the instruNet Manual also have listings of many of these numbers.

SettingGroup types (i.e. values for *settingGroupNumOrType*)
settingGroup (i.e. "Settings") types (settingGroupType's must be negative)

	BAD
sgt_noneFound = -1	nothing found
sgt_UnRecognizedType = -2	unrecognized (user probably needs a newer driver that works with this hardware ??)
	MODEL 100 LIKE HARDWARE DEVICE
sgt_VinHardware = -3	Vin "Hardware" settingGroupType {sensorType, a/d range, analog lp, function}
sgt_VinConstants = -4	Vin "Constants" settingGroupType {Ro,Rshunt,Vexcit,GF,alpha,delta}
sgt_Mod100DinDout = -5	8bit Mod 100 Digital I/O settingGroup = {din, dout, direction}
sgt_General = -6	GENERAL settingGroupType struct {valueEU, chanName, unitsLabel, userName...}
sgt_Display = -7	DISPLAY settingGroup = {dispOnOff, dispMaxEU, dispMinEU}
	FILTER
sgt_LowPass = -8	LOW PASS filter settingGroup type
sgt_HighPass = -9	HIGH PASS filter settingGroup type
sgt_BandPass = -10	BAND PASS filter settingGroup type
sgt_BandStop = -11	BAND STOP filter settingGroup type
	DIGITIZER channel in CONTROLLER device.
sgt_Timing = -12	{DigitizeOnOff, PtsPerScan, NoOfScans, ScanMode, SampleRate}
sgt_Trigger = -13	{TriggerMode, ThresholdEu, Slope, PreTrigSec, SrcNet, SrcModule, SrcDevice, SrcChannel}
	CONTROLLER timer channel
sgt_Timer = -14	TIMER settingGroup = {functionPop, clkTotalSecs, clkHiSecs, measHiOrCyclePop, measResolution, measNumPeriods}
	BUFFERS
sgt_DriverRamBuffer = -15	Driver Ram Buffer = {DigitizeOnOff, ScanNumIn, PtNumIn..}
sgt_UserRamBuffer = -16	User Ram Buffer = {DigitizeOnOff, userBufferAddr, ptrSize, ScanNumIn, PtNumIn..}
sgt_File = -17	File = {FileName, Command, ScanNumIn, PtNumIn, ScanNumIn ..}
	DRIVER
sgt_RecordOptions = -18	RECORD OPTIONS settingGroup = {}
sgt_MasterDirectory = -19	MASTER DIRECTORY settingGroup = {pathname, command, save/load settings}

Field Access Intentions (i.e. values for *intention*)

thing that you want to do when you call iNet

intention_getValue = 1	get the value of the field
intention_setValue = 2	set the value of the field
intention_getNameStr = 3	get name of field (i.e. string)
intention_getMaxValue = 4	get maximum value of the field
intention_getMinValue = 5	get minimum value of the field
intention_getUserInterfaceType = 6	get user interface type {e.g. }
intention_getDefaultValue = 7	get the defaultValue of the field
intention_nativeStorageType = 8	get the native storageType of the field {e.g. iNetDT_FLT32, iNetDT_INT16, iNetDT_P_Str15}
intention_getValueAndPullData = 9	get the value of the field (USER RAM BUFFER userBufferAddr field or DRIVER RAM BUFFER bufferPtr field) and also pull data out of the buffer and place 'pointToPullindex' into A, 'numPointsToPull' into B, and 'scanNumIn' into C. gsw 11/25/95
	ADMINISTRATIVE
intention_doNothing = 4000	do nothing (just process iNet_Request struct) (all we do is check the network address and and then calc the Global struct ptrs)
intention_DisableAllChannelDigitizing = 4005	Disable channel digitizing for all channels in this network. This will make sure that the "Display" field in the DISPLAY SettingGroups is OFF, and that the "Digitize" field is OFF in the FILE, USERBUFFER, and DRIVERBUFFER SettingGroups.
	SHOW ALERT UPON ERROR CONTROL
intention_ShowAlertOnError = 8000	tells driver to show an alert upon error (this is the default) returns 1 if driver WAS set up to show an alert upon error; 0 otherwise
intention_NoShowAlertOnError = 8001	tells driver to NOT show an alert upon error returns 1 if driver WAS set up to show an alert upon error; 0 otherwise
intention_GetShowAlertOnErrorStatus = 8002	returns 1 if driver WAS set up to show an alert upon error; 0 otherwise
	DETERMINE IF NETWORK ELEMENT EXISTS
intention_ThisExists_Network = 8003	Returns 1 if NETWORK = {netNum} exists; FALSE (0) otherwise.
intention_ThisExists_Device = 8004	Returns 1 if DEVICE = {netNum, deviceNum} exists; FALSE (0) otherwise.
intention_ThisExists_Module = 8005	Returns 1 if MODULE = {netNum, deviceNum, moduleNum} exists; FALSE (0) otherwise.
intention_ThisExists_Channel = 8006	Returns 1 if CHANNEL = {netNum, deviceNum, moduleNum, channelNum} exists; FALSE (0) otherwise.
intention_ThisExists_Setting = 8007	Returns 1 if SETTING = {netNum, deviceNum, moduleNum, channelNum, settingNum} exists; FALSE (0) otherwise.
intention_ThisExists_Field = 8008	Returns 1 if FIELD = {netNum, deviceNum, moduleNum, channelNum, settingNum, fieldNum} exists; FALSE (0) otherwise.
	INTERROGATE NETWORK
intention_GetNumNetworks = 8009	Returns the # of instruNet Networks.
intention_GetNumDevices = 8010	Returns the # of Devices in the specified Network.
intention_GetNumModules = 8011	Returns the # of Modules in the specified {Network, Device}.

intention_GetNumChannels = 8012	Returns the # of Channels in the specified {Network, Device, Module}.
intention_GetNumSettings = 8013	Returns the # of Settings in the specified {Network, Device, Module, Channel}.
intention_GetNumFields = 8014	Returns the # of Fields in the specified {Network, Device, Module, Channel, SettingGroup}.
	USER INTERFACE
intention_Get_UI_Catagory = 8017	Returns the user interface catagory (i.e. itemType_iNet enum in header file; e.g. ion_StaticText (3), ion_EditText (4), ion_UserItem (popup) (5)).
intention_Get_NumPopupItems = 8018	Returns the number of items in a popup, if the field user interface is a popup. (e.g. returns 2 if the popup shows {"ON", "Off"}).
intention_Get_PopupStringArray = 8019	Returns the pointer to an array of C Str15 strings that contain the items in the popup (i.e. iNetStr15 popupItems[]).
intention_Get_AddrNamesStringArray = 8020	Returns the pointer to an array of C Str15 strings that contain the names of the Network, Device, Module, Channel, Settings, Field (i.e. iNetStr15 array[0] = Network Name, array[1] = Device Name, array[2] = Module Name, array[3] = Channel Name, array[4] = Settings Name, array[5] = Field Name).
intention_GetChannelDirection = 8021	Returns the direction of the channel: 0 is input (e.g. a/d), and 1 is output (e.g. d/a). 5/1/96
	GET/SET NETWORK STATE
intention_getHandleToNetworkState = 8022	Returns a Handle to the Network State (in uint32). The Caller must dispose of it after using it (e.g. DisposHandle() on Macintosh, GlobalFree() on Windows). To get the Handle size, call GetHandleSize() on Macintosh, sssssss on Windows) gsw 11/25/95
intention_setNetworkStateWithHandle = 8023	Sets the network state with the passed Handle. The Caller must dispose after calling this routine. The handle must have originated from a GET_HANDLE_TO_NETWORK_STATE() call that was done previously. gsw 11/25/95
intention_disposeOfNetworkState = 8024	Dispose of all instruNet network state. This will cause the the next call to the instruNet driver to implement the POWER ON boot process. Call CloseDriverAndReleaseDriverRam() to release ram held by the driver itself. gsw 9/8/96
	SERVICE THE DIGITIZATON PROCESS
intention_serviceAllDigitizeBuffers = 8028	Services buffers during the digitization process if they are holding new data (otherwise this does nothing). This must be done continuously while digitizing. Returns TRUE (1) if the next data pulled out out of the buffers is that last pull; FALSE (0) otherwise. A_PARAM() is set to TRUE (1) if we pulled to the end of a Scan; FALSE (0) otherwise. B_PARAM() is set to the last scan # (base 1) that was pulled in full. C_PARAM() is set to the last scan # (base 1) that was pushed in full.
	SHOW PROBE DIALOG
intention_showProbeDialog_Full = 8031	Shows the full probe dialog. On return, netNum_PARAM(gRequestP), deviceNum_PARAM(gRequestP), etc contain the accessed address.
intention_showProbeDialog_ChannelAddrOnly = 8032	

Shows the probe dialog with the channel address only ([net/dev/mod/chan] popups). On return, netNum_PARAM(gRequestP), deviceNum_PARAM(gRequestP), etc contain the accessed address. A_PARAM(gRequestP) is set to 1 if the user pressed CANCEL, 0 if the user pressed OK to exit the dialog.

intention_showProbeDialog_FieldAddrOnly = 8033

Shows the probe dialog with the field address only ([net/dev/mod/chan/set/Field] popups). On return, netNum_PARAM(gRequestP), deviceNum_PARAM(gRequestP), etc contain the accessed address. A_PARAM(gRequestP) is set to 1 if the user pressed CANCEL, 0 if the user pressed OK to exit the dialog.

MANAGEMENT

intention_Set_gClickOnThisWindowToQuitiNet = 8040

Setting a WindowPtr_ such that if this window is clicked on while the instruNet World Window is opened, then the instruNet World Window will QUIT (e.g. the host application window). gsw 3/3/96

Data Types (i.e. values for *argTypeIn*)

types of data stored in the instruNet fields (this must fit into an UINT8 = {0...255})

iNetDT_INT16 = 0	16bit integer, signed
iNetDT_INT16bus = 1	16bit integer, signed; yet data is on a card and
iNetDT_UINT16 = 2	16bit integer, unsigned must be transferred to with 16bit transfers.
iNetDT_INT32 = 3	32bit integer, signed
iNetDT_UINT32 = 4	32bit integer, unsigned
iNetDT_FLT32 = 5	32bit float (ieee Macintosh format)
iNetDT_Double = 6	'double', as determined by the compiler (e.g. flt64, flt80, flt96, flt128)
iNetDT_INT16comp = 7	16bit integer, signed; yet compressed in the standard iNet 'iNetDT_INT16comp" manner.
iNetDT_P_Str15 = 8	PASCAL Str15 string (15 chars, 0th char is length)
iNetDT_P_Str255 = 9	PASCAL Str255 string (255 chars, 0th char is length)
iNetDT_C_Str15 = 10	C Str15 string (15 chars, 0x00 terminate)
iNetDT_C_Str255 = 11	C Str255 string (255 chars, 0x00 terminate)
iNetDT_READ_ONLY_BIT = 128	this is ADDED to the iNetDataType value if the field is read only.

iNetError error codes (i.e. values for *Error*)

iNet error codes

iNetErr_None = 0	no error
iNetErr_General = 1	general error
iNetErr_ControllerNotInitialized=2	InitializeDriverAndControllers_iNet() has not been called
iNetErr_InitializationFailed = 3	InitializeDriverAndControllers_iNet was called, yet failed
iNetErr_DeviceNumOutOfRange = 4	Device number is out of range (is it connected & powered on?)
iNetErr_ChannelNumOutOfRange = 5	Channel number is out of range
iNetErr_FieldNumOutOfRange = 6	Field number is out of range
iNetErr_ControllerNotFound = 7	iNet Controller not found

iNetErr_FieldDoesNotExist = 8	(deviceNum, chanNum, fieldNum) refer to field that does not exist
iNetErr_BadfieldNativeDataType = 9	bad iNetFieldDataType value
iNetErr_BadFieldReadType = 10	bad iNetFieldReadType value
iNetErr_TimeoutAtReadBegin = 11	time out at read begin
iNetErr_TimeoutAtWaitForReadDone = 12	timeout at wait for read done
iNetErr_ControllerIsInWeeds = 13	controller is in the weeds
iNetErr_illegalDataType = 14	illegal data type
iNetErr_FailedCopyDataTest = 15	failed the CopyWaveData() test
iNetErr_CompressorHitError = 16	compressor hit error
iNetErr_FailedRamTest = 17	failed board ram test
iNetErr_RanOutOfMemory = 18	ran out of memory
iNetErr_AlertFailed = 19	the routine that shows an alert failed
iNetErr_CtrlrRomNotBooting = 20	iNet Controller's ROM does not seem to boot up (poss problem: controller, bus, rom)
iNetErr_CtrlrRamNotBooting = 21	iNet Controller's driver in RAM does not seem to boot up (poss problem: controller, bus, ram, rom, download from ucontroller, bad driver downloaded from host)
iNetErr_DriverDownloadFailed = 22	the download of the uController driver into controller ram failed (driver may be bad, or hardware is bad) (the keys and copyright did not match up).
iNetErr_CtrlrRWTestFailed = 23	failed during controller r/w test in Test_DualPort_Ram()
iNetErr_InterfaceBlockTestFailed = 24	Interface block between uController and host computer is invalid
iNetErr_IncCounterTestFailed = 25	Controller failed CounterInc test
iNetErr_EchoCmdToStatusTestFailed = 26	Controller failed EchoCmdToStatus test
iNetErr_ControllerBootTestFailed = 27	Controller failed Test_A_Booted_Controller test
iNetErr_ControlleFailedToBoot = 28	Controller failed to Boot.
iNetErr_ControllerCmdFailed = 29	Controller failed to execute command
	GUI Errors.
iNetErr_GUI = 30	error related to graphical user interface
	iNet Bus error codes
iNetErr_QSPI_Busy = 31	iNet Bus is busy running
iNetErr_QSPI_Halted = 32	iNet Bus hit HALT error
iNetErr_QSPI_ArgOutOfRange = 33	iNet Bus argument out of range
iNetErr_QSPI_TimeOutErr = 34	iNet Bus hit time out error
iNetErr_FlakyNetwork = 35	iNet Bus is acting flaky (need terminator?)
	Driver Errors
iNetErr_CouldNotLocateDriverFile = 36	could not find the DRIVER code resource file.
iNetErr_netNumOutOfRange = 37	netNum is out of range
iNetErr_SettingGroupNumOutOfRange = 38	settingGroupNum is out of range
iNetErr_UnitTypeOutOfRange = 39	deviceType is out of range
iNetErr_DriverDidNotSetErrCode =40	Driver did not get a chance to set the error code; therefore Driver is in trouble.
iNetErr_SettingGroupTypeOutOfRange = 41	settingGroupType is out of range
	Etc Codes
iNetErr_ModuleNumOutOfRange = 42	Module number is out of range gsw 5/2/95
iNetErr_IntentionNumOutOfRange =43	Intention number is out of range gsw 5/2/95
iNetErr_ReadOnlyField = 44	Cannot write to this field, read only gsw 5/2/95
iNetErr_WriteOnlyField = 45	Cannot read from this field, write only gsw 5/2/95
iNetErr_FieldValueOutOfRange = 46	Tried to set a field with a value that is too high or low gsw 5/2/95

iNetErr_ArgTypeOutOfRange = 47	ArgType parameter is out of range gsw 5/2/95
iNetErr_BadKeyInFieldHierarchy =48	A BAD key was found in the field hierarchy data
iNetErr_Max_LT_MinInFieldHierarchy = 49	A maximum value is less than a minium value in the field hierarchy
iNetErr_HierarchyFieldDataInTrouble = 50	Hierarchial field data is in trouble
iNetErr_ChannelNameInvalid = 51	The channel name is in trouble
iNetErr_tempUnits_outOfRange = 52	temperature scale {C,K,F} out of range gsw 8/8/95
iNetErr_sensorType_outOfRange = 53	sensor type out of range gsw 8/8/95
	Digitize Errors.
iNetErr_CircBufErr = 54	circular data buffer error
iNetErr_CtlrDataBufferOverflow = 55	controller circular data buffer overwrote data before it was read
iNetErr_PulledTooMuchOnLastPull=56	controller circular data buffer error where pulled too much on last pull, gsw 10/4/95
	Filter Error Codes
ERequired_fbx_DCIIR = 57	"At least one cutoff frequency (passband or stopband) is needed for each transition band of bandpass and bandstop filters"
EFreqTooLarge_fx_DCIIR = 58	"Cutoff frequency must be less than half the sampling rate"
EFreqsNotAscending_DCIIR = 59	"Cutoff frequency negative or frequencies not in ascending order"
ERequired_fx_DCIIR = 60	"Missing one or more cutoff frequencies"
ERequired_adelx_DCIIR = 61	"Missing passband ripple and/or stopband attenuation"
EInvalidArg_DCIIR = 62	"Invalid argument"
EOrderTooHigh_DCIIR = 63	"Necessary or specified filter order is too high -- maximum order is %d"
EEven_ndeg_DCIIR = 64	"Filter order must be even for bandpass and bandstop filters -- order being increased by 1"
EOrderTooLow_DCIIR = 65	"Specified filter order is too low -- order being automatically increased"
EActualOrder_DCIIR = 66	"Required filter order = %d (%s biquadratic section%s)"
	New Error Codes
iNetErr_InterfaceCompiledBadly =67	a variable type in interface file (e.g. "ionC_INT.c") is bad
iNetErr_BadInterfaceKey = 68	the 'key' field passed to driver is bad
iNetErr_BadAddrPassedToDriver = 69	bad address passed to driver
iNetErr_BadStaticVarInDriver = 70	bad static variable in driver
iNetErr_BadIntegerMathInDriver =71	bad integer math in driver
iNetErr_BadChannelType = 72	bad channel Type
iNetErr_CppCompilerDidBad = 73	Cpp compiler failed
iNetErr_MemMngr_Failed = 74	Memory Manager failed
iNetErr_Toolbox_Failed = 75	Toolbox failed
iNetErr_CrtRect_Failed = 76	CrtRect failed
iNetErr_DlogCode_Failed = 77	Dialog Code failed
iNetErr_DrvrNeedsFpu_Failed = 78	Driver file needs FPU
iNetErr_iirCode_Failed = 79	iir code failed
iNetErr_sprintf_Failed = 80	sprintf failed
iNetErr_DigitizeInit = 81	initialization of digitizer failed 1/22/96 gsw
iNetErr_SPE_off = 82	SPE off while digitize error 1/31/96 gsw
iNetErr_Halt_on = 83	HALT while digitize error 1/31/96 gsw
iNetErr_CPTQP_failed_to_clr = 84	CPTQP_failed_to_clr error 1/31/96 gsw
iNetErr_qspiBusyBeforeDigitize=85	qsp busy before digitize error 1/31/96 gsw
iNetErr_weAbortedEarly=86	controller was told to abort digitize 2/11/96 gsw
iNetErr_CtlrIsBusyDoingSomething=87	controller is busy doing something and cannot be interrupted now. 2/11/96 gsw
iNetErr_CtlrDidNotFinishCmd=88	controller did not finish the command 2/11/96 gsw

iNetErr_CodeGenSegmentErr=89	code generation segment error 2/22/96 gsw
iNetErr_CPTQP_is_Bad=90	CPTQP is bad 6/01/96 gsw
iNetErr_CompilerErr=91	Compiler error 6/18/96 gsw
iNetErr_DrvrOrUserBufferOverflow = 92	User or Driver data buffer overwrote data before it was read 8/18/96 gsw
iNetErr_NonCompatible_OS = 93	Operating System (version) is not compatible with driver 8/28/96 gsw
	STATUS register error codes.
iNetErr_StatusRegBase = 10000	this is an error code from the iNet stats register that is (10000+status)
iNetErr_StatusRegEnd = 10255	last status register location

Open Window Commands (i.e. values for *Page to Open*)

These are field values for the OpenWindow Channel within the DRIVER.

iNetCM_OpenWindow_Record = 1	open the RECORD page
iNetCM_OpenWindow_Network = 2	open the NETWORK page
iNetCM_OpenWindow_Test = 3	open the TEST page

Button Press Commands (i.e. values for *Button to Press*)

These are field values for commands that press buttons in the instruNet World window.

	RECORD page
iNetCM_BtnPress_Record_Start = 1	press 'Start' button in RECORD page
iNetCM_BtnPress_Record_Stop = 2	press 'Stop' button in RECORD page
iNetCM_BtnPress_Record_Open = 3	press 'Open' button in RECORD page
iNetCM_BtnPress_Record_Save = 4	press 'Save' button in RECORD page
iNetCM_BtnPress_Record_Options = 5	press 'Options' button in RECORD page
iNetCM_BtnPress_Record_Timing = 6	press 'Timing' button in RECORD page
iNetCM_BtnPress_Record_Trigger = 7	press 'Trigger' button in RECORD page
iNetCM_BtnPress_Record_Probe = 8	press 'Probe' button in RECORD page
	PROBE page
	NETWORK page
iNetCM_BtnPress_Network_Restore=9	press 'Restore' button in NETWORK page
iNetCM_BtnPress_Network_Store = 10	press 'Store' button in NETWORK page
iNetCM_BtnPress_Network_Open = 11	press 'Open' button in NETWORK page
iNetCM_BtnPress_Network_Save = 12	press 'Start' button in NETWORK page
iNetCM_BtnPress_Network_Clear = 13	press 'Clear' button in NETWORK page
iNetCM_BtnPress_Network_Reset = 14	press 'Reset' button in NETWORK page
	TEST page
iNetCM_BtnPress_Test_Search = 15	press 'Search' button in TEST page
iNetCM_BtnPress_Test_Test =16	press 'Test' button in TEST page
iNetCM_BtnPress_Test_BigTest = 17	press 'Big Test' button in TEST page
iNetCM_BtnPress_Test_Open = 18	press 'Open' button in TEST page
iNetCM_BtnPress_Test_SaveAs = 19	press 'Save As' button in TEST page
iNetCM_BtnPress_Test_Clear = 20	press 'Clear' button in TEST page

DRIVER Channel Numbers (i.e. values for *chanNum*)

Channel numbers for the DRIVER

driver_ChanNum_OpenWindow = 1	Open Window Command (DRIVER channel type)
driver_ChanNum_PushButton = 2	Push Button Command (DRIVER channel type)
driver_ChanNum_RecordOptions = 3	RECORD OPTIONS = {hScale, hPosition, maxPtsPerPix, gridOnOff, plotLinesDots}

HARDWARE Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for HARDWARE settingGroup

fldNum_Vin_sensorType = 1	sensorType
fldNum_Vin_wiring = 2	wiring options
fldNum_Vin_AnaLpFltr_Hz = 3	analog lp filter hz value (e.g. 0, 40, 16000 for Model 100)
fldNum_Vin_ad_IntegrateSecs = 4	# of seconds that a/d integrates via multiple readings. 1/19/96
fldNum_Vin_ad_VmaxRange = 5	voltage range (max voltage) (i.e. a/d gain) {e.g. 5, .626, 0.078, 0.01}

SENSOR TYPES (i.e. values to write to the field)

	Sensor Screws Used	Units Wiring	Constants Used
ion_SensorType_Voltage = 1	Voltage	Volts	
	(V+ - V-)	Differential	(none)
	(V - GND)	Single-Ended	(none)
ion_SensorType_Current = 2	Current	Amps	
	(V+ - V-)	Shunt Resistor	Rshunt
ion_SensorType_Resistance = 3	Resistance	Ohms	
	(V+,V-,Vout,Gnd)	Voltage Divider	Rshunt, Vexcit
	(V+,V-,Vout,Gnd)	Bridge	Ro, Vexcit, Vinit
ion_SensorType_StrainGauge = 4	StrainGauge	Strain(E)	
	(V+,V-,Vout,Gnd)	Voltage Divider	Ro,Shunt,Vexcit,Vinit,GF
	(V+,V-,Vout,Gnd)	Q Bridge Bend	Ro,Vexcit,Vinit,GF,Rlead
	(V+,V-,Vout,Gnd)	H Bridge Bend	Ro,Vexcit,Vinit,GF,Rlead
	(V+,V-,Vout,Gnd)	H Bridge Axial	Ro,Vexcit,Vinit,GF,Rlead,v_Poi
	(V+,V-,Vout,Gnd)	F Bridge Bend I	Vexcit,Vinit,GF
	(V+,V-,Vout,Gnd)	F Bridge Axial I	Vexcit,Vinit,GF,v_Poi
	(V+,V-,Vout,Gnd)	F Bridge Axial II	Vexcit,Vinit,GF,v_Poi
ion_SensorType_RTD = 5	RTD	Celsius	
	(V+,V-,Vout,Gnd)	Voltage Divider	alpha,delta,Ro,Shunt,Vexcit
ion_SensorType_TC_J = 6	Thermocouple J	Celsius	
	(V+ - V-)	Differential	Calc with polynomial
ion_SensorType_TC_K = 7	Thermocouple K	Celsius	
	(V+ - V-)	Differential	Calc with polynomial
ion_SensorType_TC_T = 8	Thermocouple T	Celsius	
	(V+ - V-)	Differential	Calc with polynomial
ion_SensorType_TC_E = 9	Thermocouple E	Celsius	
	(V+ - V-)	Differential	Calc with polynomial
ion_SensorType_TC_R = 10	Thermocouple R	Celsius	
	(V+ - V-)	Differential	Calc with polynomial
ion_SensorType_TC_S = 11	Thermocouple S	Celsius	
	(V+ - V-)	Differential	Calc with polynomial
ion_SensorType_Thermister = 12	Thermister	Celsius	
	(V+,V-,Vout,Gnd)	Voltage Divider	(not yet supported)
	Not yet supported (gsw 8/11/95)		
ion_SensorType_Digital = 13	Digital	INT16 Digital word	

WIRING OPTIONS (i.e. values to write to the field)

ion_Wiring_Differential = 1	DIFFERENTIAL
ion_Wiring_SingleEnded = 2	SINGLE-ENDED POS
ion_Wiring_Shunt_Resistor = 3	SHUNT RESISTOR
ion_Wiring_Voltage_Divider = 4	VOLTAGE DIVIDER
ion_Wiring_Bridge = 5	BRIDGE
ion_Wiring_Q_Bridge_Bend = 6	Q Bridge Bend
ion_Wiring_H_Bridge_Bend = 7	H Bridge Bend
ion_Wiring_H_Bridge_Axial = 8	H Bridge Axial
ion_Wiring_F_Bridge_Bend_I = 9	F Bridge Bend I
ion_Wiring_F_Bridge_Axial_I = 10	F Bridge Axial I
ion_Wiring_F_Bridge_Axial_II = 11	F Bridge Axial II

Analog Low Pass Filter Options (e.g. Model 100) (i.e. values to write to the field)

ion_AD_AnaLpFltr_Pop_Off = 1	off
ion_AD_AnaLpFltr_Pop_40Hz = 2	40Hz
ion_AD_AnaLpFltr_Pop_4KHz = 3	4KHz

A/D Range Options (e.g. Popup) (i.e. values to write to the field)

ion_AD_RangePop_5V = 1	+/- 5.0V
ion_AD_RangePop_0_625V = 2	+/- .625V
ion_AD_RangePop_0_078V = 3	+/- 0.078V
ion_AD_RangePop_0_010V = 4	+/- 0.010V

Vin CONSTANTS Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for Vin CONSTANTS settingGroup

fldNum_VinCon_Ro = 1	Ro constant
fldNum_VinCon_Rshunt = 2	Rshunt constant
fldNum_VinCon_Vexcitation = 3	Vexcitation constant
fldNum_VinCon_Vinit= 4	Vinit constant
fldNum_VinCon_alpha = 5	alpha constant
fldNum_VinCon_delta = 6	delta constant
fldNum_VinCon_GF = 7	GF constant
fldNum_VinCon_v_Poisson = 8	v_Poisson constant

CONTROLLER CHANNEL NUMBERS (i.e. values for *chanNum*)

Channel numbers for the NETWORK's Controller.

controller_ChanNum_Ch1_Dio = 1	Ch1 Dio (counter/timer/digital in/digitial out)
controller_ChanNum_Ch2_Dio = 2	Ch2 Dio (counter/timer/digital in/digitial out)
controller_ChanNum_Ch3_Dio = 3	Ch3 Dio (counter/timer/digital in/digitial out)
controller_ChanNum_Ch4_Dio = 4	Ch4 Dio (counter/timer/digital in/digitial out)
controller_ChanNum_Ch5_Dio = 5	Ch5 Dio (counter/timer/digital in/digitial out)
controller_ChanNum_Ch6_Dio = 6	Ch6 Dio (counter/timer/digital in/digitial out)
controller_ChanNum_Ch7_Dio = 7	Ch7 Dio (counter/timer/digital in/digitial out)
controller_ChanNum_Ch8_Dio = 8	Ch8 Dio (counter/timer/digital in/digitial out)
controller_ChanNum_Ch9_Dio = 9	Ch9 Dio (counter/timer/digital in/digitial out)
controller_ChanNum_C10_Dio = 10	Ch10 Dio (counter/timer/digital in/digitial out)
controller_ChanNum_C11_Time = 11	Ch11 Time (get time in seconds since reset, accurate to .25us)

controller_ChanNum_C12_Digitizer = 12	Ch12 Digitizer {control timebase and trigger while digitizing on network}

GENERAL Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for GENERAL settingGroup

fldNum_General_valueEu = 1	inputValue (engineering units)
fldNum_General_unitsLabel = 2	units label (editable); e.g. "Volts", "C", "F", "mmHg".
fldNum_General_userName = 3	user name (editable)
fldNum_General_ad_sampleRateMult=4	sampleRateMult (0.001% to 100% of master sample rate)
fldNum_General_chanName = 5	channel name (non-editable)

DISPLAY Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for DISPLAY settingGroup (1 for each channel)

fldNum_Display_dispOnOff = 1	1 = display is turned on (in RECORD window); or off (2)
fldNum_Display_dispMaxEU = 2	EU value of top line of display (RECORD window, and PROBE dialog)
fldNum_Display_dispMinEU = 3	EU value of bottom line of display (RECORD window, and PROBE dialog)

DIGITAL FILTER Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for DIGITAL FILTER settingGroup (1 for each filter in each channel)

fldNum_DigitalFilter_filterMethod = 1	ATYPE_DCIIR = {FILTEROFF_DCIIR, BUTTERWORTH_DCIIR, CHEBYSHEV_P_DCIIR, CHEBYSHEV_S_DCIIR, ELLIPTIC_DCIIR}
fldNum_DigitalFilter_passBand_Ripple_dB = 2	passband ripple (dB)
fldNum_DigitalFilter_stopBand_Attn_dB = 3	stopband attenuation (dB)
fldNum_DigitalFilter_filterOrder = 4	
fldNum_DigitalFilter_passband1_Hz = 5	(lower) passband cutoff frequency
fldNum_DigitalFilter_stopband1_Hz = 6	(lower) stopband cutoff frequency
fldNum_DigitalFilter_passband2_Hz = 7	upper passband cutoff (BANDPASS_DCIIR/BANDSTOP_DCIIR only)
fldNum_DigitalFilter_stopband2_Hz = 8	upper stopband cutoff (BANDPASS_DCIIR/BANDSTOP_DCIIR only)

Filter Method (this is a popup menu) (i.e. values to write to the field)

Value for ATYPE_DCIIR that specifies the filter method

FILTEROFF_DCIIR = 1	filter is turned off (i.e. not running)
ELLIPTIC_DCIIR = 2	ELLIPTIC -- The magnitude response of an elliptic filter is equiripple in both passband and stopband. For given filter specifications, the elliptic filter requires the lowest order of the four available types.
CHEBYSHEV_P_DCIIR = 3	CHEBYSHEV_P -- The magnitude response of a Chebyshev filter with an equiripple passband exhibits monotonically increasing stopband attenuation.
CHEBYSHEV_S_DCIIR = 4	CHEBYSHEV_S -- The magnitude response of a Chebyshev filter with an equiripple stopband exhibits a monotonically decreasing passband.
BUTTERWORTH_DCIIR = 5	BUTTERWORTH -- The magnitude response of a Butterworth filter exhibits maximal passband flatness and monotonic stopband attenuation. For given filter specifications, the

Butterworth filter requires the highest order of the four approx. types.

RECORD OPTIONS Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for RECORD OPTIONS settingGroup (1 for each driver)

fldNum_RecordOptions_hScale = 1	horiz scale (e.g. 0.1 Seconds per horiz division) if = 0, we do an auto-scale and set ~5 digitized points per pixel
fldNum_RecordOptions_hPosition = 2	horiz position (i.e time of left edge, e.g. 0 Seconds)
fldNum_RecordOptions_plotLinesDots = 3	plot dots or connect dots with lines
fldNum_RecordOptions_gridOnOff = 4	grid is on or off
fldNum_RecordOptions_maxPtsPerPix = 5	maximum points per vertical pixel column when plotting
fldNum_RecordOptions_saveData = 6	save data {off / To Ram Buffer / To Disk / User Control}
fldNum_RecordOptions_overflowAlert = 7	show alert on buffer overflow ON/OFF, gsw 11/25/95

Save Data Options (i.e. values for *Save Data*)

Off/To Ram Buffer/To Disk Popup

ion_gSaveDataPopup_Off = 1	off (the DIGITIZE fields in the FILE and DRIVER RAM BUFFER settings groups are turned OFF)
ion_gSaveDataPopup_ToRamBuffer = 2	to ram buffer (the DIGITIZE field in the DRIVER RAM BUFFER field group will automatically follow the DIGITIZE field in the DISPLAY fielgroup).
ion_gSaveDataPopup_ToDisk = 3	to disk (the DIGITIZE field in the FILE field group will automatically follow the DIGITIZE field in the DISPLAY settinggroup).
ion_gSaveDataPopup_UserControl = 4	user control (the FILE and DRIVER RAM BUFFER settinggroups are left alone)

FILE Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for FILE settingGroup (1 for each filter in each channel)

	CONTROL
fldNum_File_FileOnOff = 1	on/off for FILE turned ON & Linked to a Display (scroll bar will load from file)
fldNum_File_DigitizeOnOff = 2	on/off for Moving Digitized Data to FILE at Digitize Time
	FILE
fldNum_File_FileName = 3	Name of File (pathname is stored in MasterDirectory SettingGroup)
	PROGRAMMING
fldNum_File_fileCmd = 4	command = {fileCmd_FileToRamBuffer (ScanNum), fileCmd_RamBufferToFile (ScanNum), fileCmd_FileToUserBuffer (ScanNum), fileCmd_UserBufferToFile (ScanNum), fileCmd_Get_File_Info (ScanNum, NumPts per Scan)}. If programmer needs more control, they should go directly to the file.
fldNum_File_ScanNum = 5	
fldNum_File_FirstPointNum = 6	
fldNum_File_NumPts = 7	

File Command Options (e.g. Popup) (i.e. valuesto read/write to the field)

fileCmd_FileToRamBuffer = 1	Transfer data from FILE @ 'ScanNum' to DRIVER RAM BUFFER
fileCmd_RamBufferToFile = 3	Transfer data from DRIVER RAM BUFFER to FILE @ 'ScanNum'
fileCmd_FileToUserBuffer = 4	Transfer data from FILE @ 'ScanNum' to USER RAM BUFFER
fileCmd_UserBufferToFile = 5	Transfer data from USER RAM BUFFER to File @ 'ScanNum'
fileCmd_Get_File_Info = 6	Get info on FILE (ScanNum = # of scans; NumPts = pts per scan)

MASTER DIRECTORY Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for MASTER DIRECTORY settingGroup (1 for each filter in each channel)

	CONTROL
fldNum_Directory_PathName = 1	Path Name (for directory that contains a file)
fldNum_Directory_NewDirectoryName=2	New Directory Name = { ndn_PromptUser, ndn_AutoGenerate }
fldNum_Directory_SaveSettingsOnOff=3	When we create a new directory we can save network settings into the new directory with file name "iNet.prf" if ON = {On/Off}
fldNum_Directory_LoadSettingsOnOff=4	When we are asked to redirect our directory, then if LOAD SETTINGS is ON, and a "iNet.prf" exists in the new Directory, then we will load those settings.
fldNum_Directory_FileType = 5	FileType = {ft_Text, ft_iNet_Binary}
	PROGRAMMING
fldNum_Directory_dirCmd = 6	dirCmd = {dirCmd_CreateNewDirectory, dirCmd_ShowDirectoryDlog}

New Directory Name Options (e.g. Popup) (i.e. values to write to the field)

ndn_PromptUser = 1	Prompt User
ndn_AutoGenerate = 2	Auto Generate

FileType Options (i.e. values to write to the field)

ft_iNet_Binary = 1	iNet Binary
ft_Text = 2	Text

Directory Command Options (dirCmd popup) (i.e. values to write to the field)

dirCmd_CreateNewDirectory = 1	Create a new directory
dirCmd_ShowDirectoryDlog = 2	Show the Directory dlog & let user redirect directory

USER RAM BUFFER Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for USER RAM BUFFER settingGroup (1 for each filter in each channel)

	CONTROL
fldNum_UserBuffer_DigitizeOnOff =1	on/off for Moving Digitized Data to buffer at Digitize Time
	USER BUFFER
fldNum_UserBuffer_UserBufferAddr = 2	user's addr to a buffer in RAM; 0 if not used (off) The Buffer MUST be able to hold one scan; therefore, it must be >= ptsPerScan.
fldNum_UserBuffer_UserPtrSizeInBytes=3	This is the size of the user's buffer in Bytes. It must be >= ptsPerScan. Each point consumes 4 bytes.

	BUFFER COUNTERS
	User sees base 1, gsw 11/25/95
fldNum_UserBuffer_ScanNumIn = 4	Scan # of last point pushed into buffer = {1...numScans}
fldNum_UserBuffer_PtNumIn = 5	Point # of last point pushed into buffer = {1...PtsPerScan}
fldNum_UserBuffer_ScanNumOut = 6	Scan # of last point pulled out of buffer = {1...umScans}
fldNum_UserBuffer_PtNumOut = 7	Point # of last point pulled out of buffer = {1...PtsPerScan}

DRIVER RAM BUFFER Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for DRIVER RAM BUFFER settingGroup (1 for each filter in each channel)

	CONTROL
fldNum_DvrBuffer_DigitizeOnOff = 1	on/off for Moving Digitized Data to buffer at Digitize Time
	USER BUFFER
fldNum_DvrBuffer_BufferAddr = 2	driver's addr to a buffer in RAM; 0 if not used (off) The Buffer MUST be able to hold one scan; therefore, it must be >= ptsPerScan.
fldNum_DvrBuffer_BufferAddrSizeInBytes = 3	This is the size of the drivers's addr in Bytes. It must be >= ptsPerScan. Each point consumes 4 bytes.
	BUFFER COUNTERS
	User sees base 1, gsw 11/25/95
fldNum_DvrBuffer_ScanNumIn = 4	Scan # of last point pushed into buffer = {1...numScans}
fldNum_DvrBuffer_PtNumIn = 5	Point # of last point pushed into buffer = {1...PtsPerScan}
fldNum_DvrBuffer_ScanNumOut = 6	Scan # of last point pulled out of buffer = {1...numScans}
fldNum_DvrBuffer_PtNumOut = 7	Point # of last point pulled out of buffer = {1...PtsPerScan}

TIMING Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for TIMING settingGroup

fldNum_Timing_digitizeOnOff = 1	1 = digitizer turned on; 2 = off
fldNum_Timing_ptsPerScan = 2	points per scan (i.e. pts/trace)
fldNum_Timing_noOfScans = 3	# of scans
fldNum_Timing_scanMode = 4	space between scans = {ion_gScanModePopup_StripChart, ion_gScanModePopup_OscilloQueued, ion_gScanModePopup_Oscilloscope}
fldNum_Timing_sampleRate = 5	master sample rate (pts/second)
fldNum_Timing_minSecsBetweenTsfrs=6	minimum secs between 16bit tsfrs. (It gives the analog electronics time to adjust from 1 channel to the other. gsw 2/22/96)
fldNum_Timing_network_bps = 7	network data clock rate (bits per second), gsw 11/25/95
fldNum_Timing_switching = 8	switch channels quickly or with more accuracy and slower = {ion_gSwitchingPopup_Fast}

ON/OFF Options (e.g. popup) (i.e. values to write to the field)

ion_gOnOffPopup_On = 1	on
ion_gOnOffPopup_Off = 2	off

Lines/Dots Options (e.g. popup) (i.e. values to write to the field)

ion_gLinesDots_Lines = 1	Lines
ion_gLinesDots_Dots = 2	Dots

ON/OFF/OFF_WITH_SKIP Options (e.g. popup) (i.e. values for *Scan Mode*)

Determines the mode of digitization

ion_gScanModePopup_StripChart = 1	STRIP CHART continuous scans
ion_gScanModePopup_Oscilloscope=2	OSCILLOSCOPE non-continuous scans pulled out of controller's buffer in a filo manner (first in, last out).
ion_gScanModePopup_OscilloQueued =3	OSCILLO QUEUED non-continuous scans pulled out of controller's buffer in a fifo manner (first in first out)

Switching Mode (i.e. values for *Ch Switch Mode*)

ion_gSwitchingPopup_Accurate = 1	switch slower, yet more accurate
ion_gSwitchingPopup_Fast = 2	switch faster, yet less accurate

TRIGGER Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for TRIGGER settingGroup

fldNum_Trigger_triggerModePop = 1	trigger mode popup {1=off, 2=auto, 3=normal}
fldNum_Trigger_thresholdEu = 2	trigger threshold engineering units
fldNum_Trigger_slopeRisFalPop = 3	slope {1=rising edge, 2=falling edge}
fldNum_Trigger_preTrigSec = 4	pretrigger (seconds)
fldNum_Trigger_srcNet = 5	trigger source netNum
fldNum_Trigger_srcDevice = 6	trigger source deviceNum
fldNum_Trigger_srcModule = 7	trigger source moduleNum
fldNum_Trigger_srcChannel = 8	trigger source channeNum

MODE options in TRIGGER Settings Group (i.e. values for *Trigger Mode*)

ion_TriggerMode_Off = 1	trigger off (i.e. start when START button is pressed)
ion_TriggerMode_Auto = 2	auto trigger (wait for threshold, and if it does not arrive within several secs, trigger anyway)
ion_TriggerMode_Norm = 3	Normal trigger (ONLY trigger when src crosses threshold)

SLOPE options in TRIGGER Settings Group (i.e. values for *Trigger Slope*)

ion_Rising = 1	trigger on rising edge
ion_Falling = 2	trigger on falling edge

TIMER Settings (i.e. values for *fieldNum*)

FIELD NUMBERS for TIMER settingGroup

fldNum_Timer_functionPop = 1	function mode popup {1=digitalIn, 2=digitalOut, 3=clkOut, 4=periodMeas}
fldNum_Timer_clkTotalSecs = 2	clockOut total time (seconds)
fldNum_Timer_clkHiSecs = 3	clockOut high time (seconds)
fldNum_Timer_measHiOrCyclePop = 4	periodMeasureCyclePop {1=measureCycleTime, 2=measureHighTime}
fldNum_Timer_measResolutionPop = 5	periodMeasureResolutionPop {1 = 0.25us, 2 = 4ms}
fldNum_Timer_measNumPeriods = 6	periodMeasureNumPeriods {1...255}

Timer function mode popup (i.e. values to write to the field)

uController TPU Channel Timer/Din/Dout Function Options

ion_TimerFuncPopup_Din = 1	digital input
ion_TimerFuncPopup_Dout = 2	digital output
ion_TimerFuncPopup_ClkOut = 3	clock output
ion_TimerFuncPopup_PerMeas = 4	period measurement

Timer measurement option (i.e. values to write to the field)

uController TPU Channel measure CYCLE time or HIGH time.

ion_measHiOrCyclePop_CycleTime = 1	measure cycle time (falling edge to falling edge)
ion_measHiOrCyclePop_HighTime = 2	measure high time (rising edge to falling edge)

Timer resolution option (i.e. values to write to the field)

25us/8ms Resolution popup

ion_timeResolutionPop_quarterMicroSec = 1	.25us resolution
ion_timeResolutionPop_eightMilliSec = 2	8ms resolution

DIGITAL I/O Settings Field Numbers (i.e. values for *fieldNum*)

FIELD NUMBERS for 8bit Mod 100 Digital I/O settingGroup

fldNum_Mod100DinDout_dout = 1	digital output, {0..255}
fldNum_Mod100DinDout_direction = 2	direction, {0..255}

Appendix B: BINARY file format

Waves stored in iNet BINARY file format are stored with 1 wave per file, where wave data and header are both stored in the data section of the file, where the header (shown below) is at the beginning of the file's data, and the actual points are a 1 dimensional array at the end of the header. The 0th byte of the file corresponds to 'headerSizeInBytes', and the 1st waveform point begins at 'data[0]'
Macintosh:
file type:'GWID'
creator type:'ioNe'

This header info is at the beginning of GWI iNet BINARY files that contain waves.

	HEADER INFORMATION
iNetINT32 headerSizeInBytes	contains length, in bytes, of this header (this does not include 1 byte of data)
	FILE INFORMATION
iNetINT32 int32key	32bit key that should contain 0x12345678 (this will help you make sure your byte lanes are ok)
iNetINT32 file_endian	endian mode of stored data on disk = 0 bigEndian_ion, 1 littleEndian_ion
iNetINT16 int16key	16bit key that should contain 0x1234; (this field should consume 2 bytes in the struct -- no padding)
iNetINT16 zero	set to 0; (this field should consume 2 bytes in the struct -- no padding)
iNetUINT32 acquisition_secsSince1904	# of seconds since 1904 that the acquisition started (this is used to compute the date of acquisition)
	# OF POINTS STORED This file contains a set of scans. Each scan is 1 to 2^64 points long. For example, we might have 100 scans, each 1000 points long. In this case: pointsPerScan_LSB = 1000, pointsPerScan_MSB = 0, numScansStoredBeforeLastScan = 100, numPointsInLastPartialScan_LSW = 0, numPointsInLastPartialScan_MSW = 0
iNetUINT32 pointsPerScan_LSB	# points per scan =
iNetUINT32 pointsPerScan_MSB	(pointsPerScan_MSB * 2^32) + pointsPerScan_LSB
iNetUINT32 numScansStoredBeforeLastScan	# of complete scans stored in file
iNetUINT32 numPointsInLastPartialScan_LSW	# points stored in last scan if it is partially complete
iNetUINT32 numPointsInLastPartialScan_MSW	=(numPointsInLastPartialScan_MSW * 2^32) + numPointsInLastPartialScan_LSW
	TIME INFORMATION
iNetFLT32 firstPoint_Time_Secs	time of 1st point, units are seconds
iNetFLT32 samplePeriod_Secs	time between points, units are seconds
	TYPE OF DATA STORED
iNetINT32 arrayDataType	Type of src array data. iNetDataType: 0 iNetDT_INT16: 16bit integer, signed 2 iNetDT_UINT16: 16bit integer, unsigned 3 iNetDT_INT32: 32bit integer, signed 4 iNetDT_UINT32: 32bit integer, unsigned

	5 iNetDT_FLT32: 32bit float (ieee Macintosh format) 6 iNetDT_Double: 'double', as determined by the compiler (e.g. flt64, flt80, flt96, flt128) see 'bytesPerDataPoint' field to see how many bytes
iNetINT32 bytesPerDataPoint	# of bytes for each datapoint (e.g. 4 for 32bit signed integer)
iNetStr31 verticalUnitsLabel	pascal string of vertical units label (e.g. "Volts")
iNetStr31 horizontalUnitsLabel	pascal string of horizontal units label (e.g. "Secs")
iNetStr31 userName	pascal string of channel named by user (e.g. "Pressure 1")
iNetStr31 chanName	pascal string of channel name (e.g. "Ch1 Vin+")
	DATA MAPPING
iNetINT32 minCode	if data is stored in integer format,
iNetINT32 maxCode	this contains the mapping from integer
iNetFLT32 minEU	to engineering units (e.g. +/-2048 A/D
iNetFLT32 maxEU	data is mapped to +/- 10V, minCode = -2048, maxCode = +2047, minEU = -10.000, maxEU = +9.995
	iNet NETWORK ADDRESS (this does not need to be filled in, 0L's are ok)
iNetINT32 netNum	channel network # (this pertains to iNet only; use 0 otherwise)
iNetINT32 deviceNum	channel device # (this pertains to iNet only; use 0 otherwise)
iNetINT32 moduleNum	channel module # (this pertains to iNet only; use 0 otherwise)
iNetINT32 chanNum	channel channel # (this pertains to iNet only; use 0 otherwise)
	END USER NOTES
iNetStr255 notes	pascal string that contains notes about the data stored.
	EXPANSION FIELDS
iNetINT32 expansion1	expansion fields that are preset to 0 and
iNetINT32 expansion2	then ignored
iNetINT32 expansion3	
iNetINT32 expansion4	
iNetINT32 expansion5	
iNetINT32 expansion6	
iNetINT32 expansion7	
iNetINT32 expansion8	
iNetINT32 expansion9	
iNetINT32 expansion10	
	KEY TO TEST STRUCT PACKING
iNetINT32 int32key_StructTest	32bit key that should contain 0x12345678;
	ACTUAL DATA
iNetFLT32 *data[1]	contains array of data of type