

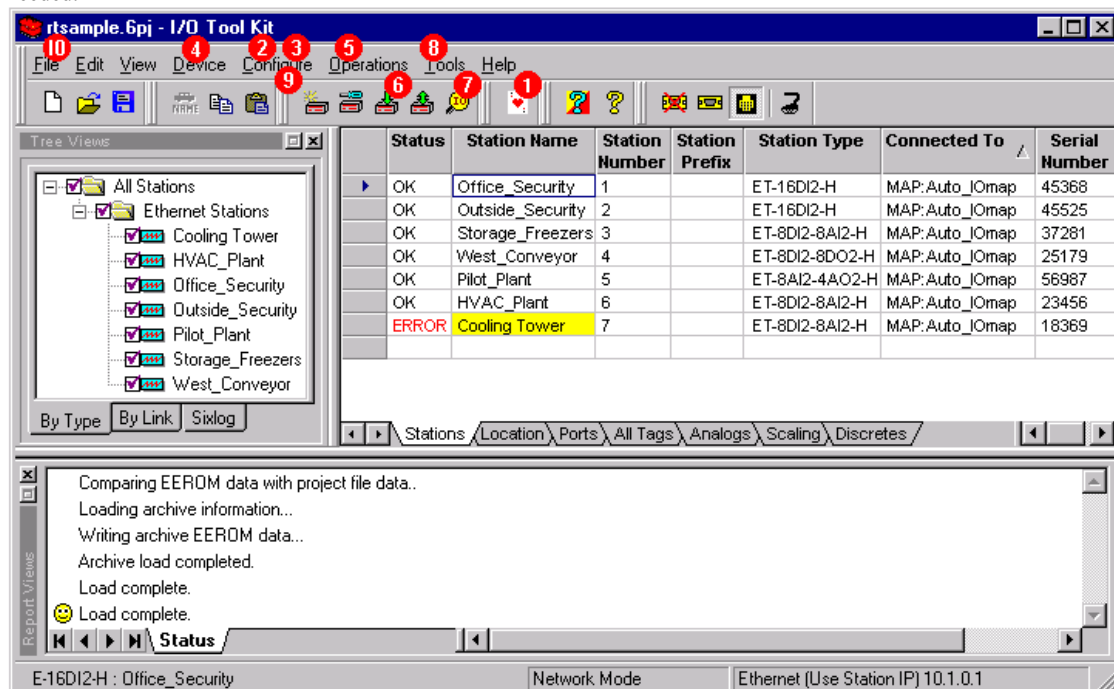
Getting Started with the I/O Tool Kit

This information will help guide you through system configuration. You may wish to review the SIXNET I/O Tool Kit Overview topics if you haven't already done so. These topics also contain information that may be useful for users of the earlier SIXNET programs.

Prior to following this outline, you should:

- [Install and wire your SIXNET I/O](#)
- [make serial port connections](#)
- [Configure your computer for Ethernet networking](#)

Then proceed with this outline. Note that some steps may not apply to all systems. These steps can be bypassed as needed.



Follow the step numbers to configure and test your I/O.

- 1) [Create Station and Module Configurations](#)
- 2) [Configure I/O Transfers Between Stations](#)
- 3) [Configure Datalogging](#)
- 4) [Select a Communication Port for Downloading](#)
- 5) [Link SixTRAK Modules to Their Controller](#)
- 6) [Load the Configuration into each Station or Module](#)
- 7) [Test the I/O of each Station or Module](#)
- 8) [Add Virtual Modules to your Station](#)
- 9) Access Your SIXNET I/O From Other Applications
- 10) Export Tag Names to Other Applications

Installing and Wiring SIXNET I/O

Refer to the User Manuals on the SIXNET CD for mounting, wiring and installation guidelines. To access these documents, insert your SIXNET CD. From the Home page select the Documentation link. Then select the User Manuals link. Finally, select the User Manual for the product you are installing. These manuals are PDF files and will be displayed if you have Adobe Acrobat or some other pdf file viewer installed on your computer. If you don't have a viewer installed, you can install the Adobe Acrobat reader from the SIXNET CD. A link to the Acrobat Reader installation is provided just above the User Manuals list.

I/O channel wiring diagrams are provided in the PDF files and are also provided in the SIXNET Product Catalog, which is part of this help system.

Module Jumpers:

Some SIXNET I/O modules have movable jumpers inside their base assemblies. Some modules that have jumpers are:

- All instrumentation analog input modules
- SixTRAK and RemoteTRAK 8 channel 4-20 mA analog input modules
- EtherTRAK discrete inputs
- SixTRAK and EtherTRAK RTD input modules
- EtherTRAK, RemoteTRAK and SixTRAK combination I/O modules with analog inputs

Refer to the appropriate User Manual to determine the proper setting of each jumper. The jumpers are accessible by removing the plug-in logic module and opening the access door in the base.

Configure your Computer for Ethernet Networking

If you will be using Ethernet to communicate with your I/O, then the TCP/IP protocol will need to be installed and configured properly on your computer for communication to be successful. Refer to Getting Started with Ethernet Networking for details on Ethernet configuration.

SIXNET I/O supports most standard Ethernet network media. You can use Ethernet switches and hubs as needed to add Ethernet I/O to your network.

Serial Port Wiring

Make serial port connections as needed. Several types of serial cables may be needed for your system. Here is a summary of the most common cables and their usage:

RJ45 to DB9

Most newer SIXNET controllers have RJ45-style connectors for their serial port(s). These include all IPm-based controllers (VT-IPM, VT-MIPM, ST-IPM, ST-GT-1210 and ET-GT-ST-3), SiteTRAK RTUs and the Ethernet I/O Expander (ET-GT-ST-2). Plug the supplied RJ45 to DB9 female adapter onto the DB9-style RS232 port on a computer or SIXNET station. Then connect a straight-through Ethernet cable between the RJ45 to DB9 female adapter and one of the RJ45 serial ports on the SIXNET controller.

ST-CABLE-PF

Most legacy SIXNET controllers and the RM-232-SETUP module (used for configuring RemoteTRAK and EtherTRAK I/O) have DB9-style connectors for their serial port(s). Connect the ST-CABLE-PF between your computer and the DB9-style serial port on the SIXNET controller or setup module.

VT-CABLE-MDM

This cable is used to connect a SIXNET Industrial Modem (VT-MODEM-###) to a DB9-style RS232 port on a computer or legacy SIXNET station. For newer SIXNET controllers with RJ45-style connectors, a RJ45 to DB9M adapter is usually provided. Use the adapter and a straight-thru Ethernet cable in place of the VT-CABLE-MDM. Refer to the "RS232 Port Wiring" link below for more information.

Step 1: Creating Station and Module Configurations

Use the I/O Tool Kit to create a configuration for each SIXNET station and I/O module in your system. The easiest way to do this is to use the Plug and Play Wizard. Start the Plug and Play Wizard and select “Add a new station to the project”. Select the appropriate product line from the Select New Station Type window. Next, you’ll be prompted for a name for the project file. After you assign a project name, fill in each configuration window set that appears for the station or module. You can edit these windows at a later time, so it is not necessary at this time to fill in all fields.

The station and I/O module configurations should be created in the following order:

IPm stations (VT-IPM, ST-IPM) and SixTRAK I/O modules – [Click here for suggestions.](#)
Mini-VersaTRAK mIPm RTU – [Click here for suggestions.](#)
SixTRAK I/O controller (ST-GT-1210) and SixTRAK I/O modules – [Click here for suggestions.](#)
I/O concentrators (ET-GT-ST-2, -1) – [Click here for suggestions.](#)
Dual Ethernet I/O gateway (ET-GT-ST-3) and SixTRAK I/O modules – [Click here for suggestions.](#)
VersaTRAK or Mini-VersaTRAK RTUs and SixTRAK I/O modules – [Click here for suggestions.](#)
Legacy SixTRAK gateways and SixTRAK I/O modules – [Click here for suggestions.](#)
EtherTRAK and RemoteTRAK I/O modules – [Click here for suggestions.](#)
Ethernet gateways (ET-GT-232, -485) – [Click here for suggestions.](#)

Configuring IPm Stations and I/O Modules

Configure each IPm-based controller (ST-IPM, VT-IPM, VT-MIPM, ST-GT-1210 or ET-GT-ST-3) and its attached SixTRAK I/O modules, if any. The IPm configuration should include a unique station name and number, the serial number (see the note below) as it is written on the station, the correct memory and communication port options, communication port settings and a definition of each SixTRAK I/O module. The IPm configuration can also include virtual I/O modules and I/O Transfers, though it is often easier to go back and add them after the remaining station and module configurations have been created.

If you have a license for the SCS feature set of the I/O Tool Kit, you can access the Files to Load tab of the IPm Configuration window and reference all of the applicable files for the particular IPm station (all except ET-GT-ST-3). Then you can use the Load all Now (Predefined Files) command to load all of those files in one operation.

A Note about entering serial numbers:

Whenever possible, it is recommended that you enter the IPm controller’s serial number into the I/O Tool Kit. However, it is possible to load and maintain an IPm controller if the serial number field is left blank or contains a serial number does not match the serial number written on the controller. While this capability is very flexible, there are potential risks if more than one IPm controller exists on an Ethernet network or party line serial communication media such as radio modems. Without a serial number, the I/O Tool Kit may need to send special broadcast messages that any IPm station would respond to. It would be possible to load a different IPm station than the one intended. If it is not possible or practical to enter the IPm controller’s serial number, then it is recommended that the Ethernet or serial communication be isolated such that only the intended IPm controller would receive commands from the I/O Tool Kit.

If the IPm controller’s serial number is entered into the project file, there will be no risk of errant loading because the IPm controller’s serial number will be embedded in all outgoing commands. Broadcast messages will not be used and only the correct IPm controller will accept the commands.

Configuring the SixTRAK I/O Controller and I/O Modules

Configure each SixTRAK I/O Controller (ST-GT-1210) and its attached SixTRAK I/O modules, if any. The I/O Controller configuration should include a unique station name and number, the serial number as it is written on the station, the correct memory and communication port options, communication port settings and a definition of each SixTRAK I/O module. The I/O Controller configuration can also include virtual I/O modules and I/O Transfers, though it is often easier to go back and add them after the remaining station and module configurations have been created.

A Note about entering serial numbers:

Whenever possible, it is recommended that you enter the I/O Controller’s serial number into the I/O Tool Kit. However, it is possible to load and maintain an I/O Controller if the serial number field is left blank or contains a serial number

does not match the serial number written on the I/O Controller. While this capability is very flexible, there are potential risks if more than one I/O Controller exists on an Ethernet network or party line serial communication media such as radio modems. Without a serial number, the I/O Tool Kit may need to send special broadcast messages that any I/O Controller would respond to. It would be possible to load a different I/O Controller than the one intended. If it is not possible or practical to enter the I/O Controller's serial number, then it is recommended that the Ethernet or serial communication be isolated such that only the intended I/O Controller would receive commands from the I/O Tool Kit.

If the I/O Controller's serial number is entered into the project file, there will be no risk of errant loading because the serial number will be embedded in all outgoing commands. Broadcast messages will not be used and only the correct I/O Controller will accept the commands.

Configuring Legacy SixTRAK gateways and I/O Modules

Configure each SixTRAK gateway (ST-GT-xxx-xxx) and its attached SixTRAK I/O modules, if any. The gateway configuration should include a unique station name and number, the correct memory and communication port options, communication port settings and a definition of each SixTRAK I/O module. The gateway configuration can also include virtual I/O modules and I/O Transfers, though it is often easier to go back and add them after the remaining station and module configurations have been created.

Configuring VersaTRAK RTUs and I/O Modules

Configure each VersaTRAK or Mini-VersaTRAK RTU and its attached SixTRAK I/O modules, if any. The RTU configuration should include a unique station name and number, the correct memory and communication port options, communication port settings and a definition of each SixTRAK I/O module. The RTU configuration can include virtual I/O modules and I/O Transfers, though it is often easier to go back and add them after the remaining station and module configurations have been created.

Configuring the ET-GT-ST-# and I/O Modules

Configure each I/O concentrator (ET-GT-ST-2) or Ethernet I/O Expander (ET-GT-ST-1) and its attached SixTRAK I/O modules, if any. The configuration should include a unique station name and number, the correct communication port settings and a definition of each SixTRAK I/O module. The configuration can include virtual I/O modules and I/O Transfers, though it is often easier to go back and add them after the remaining station and module configurations have been created.

Configuring Ethernet Gateways

Configure each Ethernet gateway (ET-GT-232 or ET-GT-485) in your system. For each gateway, assign a unique station name and station number. Enter the serial number that is written on the gateway's base. Assign a unique IP address and configure the RS232 or RS485 port settings as required for your system. Select the appropriate protocol for the serial port.

A Note about entering serial numbers:

Whenever possible, it is recommended that you enter each Ethernet gateway's serial number into the I/O Tool Kit. However, it is possible to load and maintain an Ethernet gateway if the serial number field is left blank or contains a serial number does not match the serial number written on the Ethernet gateway. While this capability is very flexible, there are potential risks if more than one Ethernet gateway exists on an Ethernet network or party line serial communication media such as RS485 or radio modems. Without a serial number, the I/O Tool Kit may need to send special broadcast messages that any Ethernet gateway would respond to. It would be possible to load a different Ethernet gateway than the one intended. If it is not possible or practical to enter the Ethernet gateway's serial number, then it is recommended that you isolate the Ethernet or serial communication such that only the intended Ethernet gateway would receive commands from the I/O Tool Kit.

If the Ethernet gateway's serial number is entered into the project file, there will be no risk of errant loading because the serial number will be embedded in all outgoing commands. Broadcast messages will not be used and only the correct Ethernet gateway will accept the commands.

Configuring EtherTRAK and RemoteTRAK I/O Modules

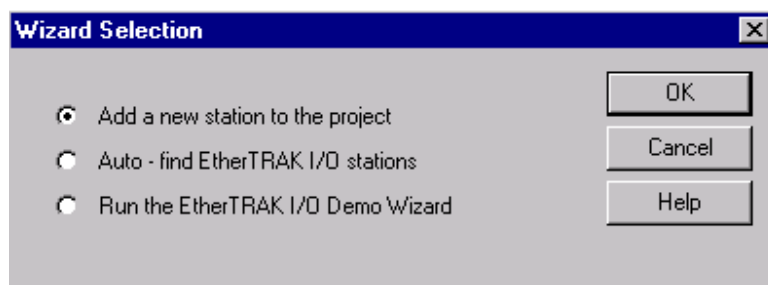
Configure each EtherTRAK and RemoteTRAK I/O module in your system. For each module, assign a unique station name and station number. Enter the serial number that is written on the module's base. Assign a unique IP address to each EtherTRAK module. Configure the RS485 port settings as required for your system.

A Note about entering serial numbers:

Whenever possible, it is recommended that you enter each I/O module's serial number into the I/O Tool Kit. However, it is possible to load and maintain an I/O module if the serial number field is left blank or contains a serial number does not match the serial number written on the I/O module. While this capability is very flexible, there are potential risks if more than one I/O module exists on an Ethernet network or party line serial communication media such as RS485 or radio modems. Without a serial number, the I/O Tool Kit may need to send special broadcast messages that any I/O module would respond to. It would be possible to load a different I/O module than the one intended. If it is not possible or practical to enter the I/O module's serial number, then it is recommended that you use an RS232 setup module or isolate the Ethernet or serial communication such that only the intended I/O module would receive commands from the I/O Tool Kit.

If the I/O module's serial number is entered into the project file, there will be no risk of errant loading because the serial number will be embedded in all outgoing commands. Broadcast messages will not be used and only the correct I/O module will accept the commands.

Using the Plug and Play Wizard



The Plug and Play Wizard makes it easy to add station and I/O module configurations to a new project file.

Follow the instructions in the Plug and Play Wizard windows as they appear. When installing a new system, use the Wizard to add stations and I/O modules to a new or existing configuration. The configurations you create can be edited at a later time from within the I/O Tool Kit.

To make changes:

- Click anywhere in the line containing data or settings for the station or module. Then right-click and select "Configure" from the popup menu. A configuration window will be presented with the necessary tabs so you can select different views and make changes as needed.

Saving Your Project File

After configuring your I/O, the next step is to assign a project name to store the configuration data into. Select the File -> Save As command or toolbar button.

The project file name is assigned or selected from within the File Save As window.

Step 2: Configuring I/O Transfers Between Stations

An ET-GT-ST-1, -2 or -3 or any SIXNET programmable station has the ability to act as a master station that exchanges I/O registers with other SIXNET stations, EtherTRAK and RemoteTRAK I/O modules, and Modbus-compatible devices. This is accomplished by configuring I/O Transfers in the master station. This can be done in the Plug and Play Wizard or through the I/O Transfers view of the configuration window for the station. I/O transfers can be added and edited at any time. The transfers will begin within a few seconds of loading the configuration into the master station.

See Also: I/O Transfers Overview

SIXTRAK/VersaTRAK Configuration

General | Ports | I/O Modules | Advanced | I/O Transfers

Define I/O Transfers:

Action Name	Defined Action	Local Type	Local Start	Remote Type	Remote Start	Number of Registers
Panel_Lamps->DO	Write SIXNET I/O	From Discrete Out	12	To Discrete Out	0	16
Panel_Switches->D	Read SIXNET I/O	To Discrete In	12	From Discrete In	0	16
Small_Machine->AI	Read SIXNET I/O	To Analog In	16	From Analog In	0	4
Small_Machine->AC	Write SIXNET I/O	From Analog Out	8	To Analog Out	0	4
Small_Machine->DI	Read SIXNET I/O	To Discrete In	8	From Discrete In	0	4
Small_Machine->DO	Write SIXNET I/O	From Discrete Out	8	To Discrete Out	0	4

Use the "Add New Remote I/O Link" button to exchange I/O with a RemoteTRAK or EtherTRAK module.

Use the the "Add New Flexible I/O Link" button to exchange I/O with a SIXTRAK gateway, VersaTRAK RTU or Modbus-compatible device.

I/O Transfer Options | Scan Options

Add New Remote I/O Link | Edit Selected Transfer

Add New Flexible I/O Link | Delete Selected Transfer

Default time: 1.000 Seconds

OK | Cancel | Help

Step 3: Configuring Datalogging in a Station

Any programmable SIXNET station or a SiteTRAK RTU can be configured to perform datalogging. Select Configure -> Datalogging (Sixlog) to create a new datalog configuration. After you create the datalog configuration, select Operations -> Datalogging (Sixlog) -> Load Configuration to Station. Datalogging will begin a few seconds after the load.

See Also: [Datalogging Overview](#)

Load the Configuration into the Station or Module

Step 4: Set the Host's Communication Parameters

Click on the "Select ..." command from the Device menu. Then configure the appropriate communication port from the Select Communications Device window. These are the settings your computer will use to communicate with the I/O.

Select "Use Com Port" if you will be using a serial port of your computer to talk to the I/O. In the Com Port field, select the appropriate serial port of your computer. Then choose one of the following:

- Choose settings in the Com Port area of the window that match the settings of the station. The default settings for most SIXNET serial ports are 9600 baud, 8 data bits, no parity and one stop bit.
- Click the "Restore Defaults" button if you will be using the RM-232-SETUP module to load a configuration into the base of an EtherTRAK or RemoteTRAK module.

Select "Use Ethernet Port" if you will be using the Ethernet card in your computer to load Ethernet I/O or a station with an Ethernet port.

Step 5: Linking SIXTRAK I/O Modules

Each SixTRAK I/O module needs to be "linked" to its controller. The linking process associates each SixTRAK module with its corresponding configuration settings in the controller. (These settings were originally defined in the project file.) Once a SixTRAK I/O module is linked and the configuration is loaded into the controller, the SixTRAK module's Status LED will be ON solid instead of blinking.

New Automatic Linking Feature for all IPm, ST-GT-1210 and ET-GT-ST-3 Controllers

If your IPm-based controller has SixTRAK I/O modules connected to its ST-Bus, all or some of the modules may be linked automatically when you load your configuration into the controller. Here are some highlights of this new feature:

- Once a module is linked, its Status LED will be ON solid. The Status LED will be blinking on modules that are not linked.
- Each unique module (only one of its type exists on the ST-Bus) will be linked automatically when the configuration is loaded into the controller.
- If multiple modules of a given module type exist, they will need to be linked manually the first time. However, once they are linked, they will link automatically from that point forward, even if the controller is replaced for any reason.

During the load of your configuration, the I/O Tool Kit will present the Link window if any SixTRAK I/O modules have not been automatically linked. If you see this window, proceed with Manual Linking of SixTRAK I/O Modules.

Step 6: Load the Configuration into the Station or Module

Loading RemoteTRAK and EtherTRAK I/O Modules

EtherTRAK and RemoteTRAK I/O modules are most easily loaded the first time using a field setup module (RM-232-SETUP). Subsequent loads can be performed through the Ethernet port or RS485 port. Simply connect your module(s) to the appropriate port of your computer. Select the appropriate communication device and then select the Operations -> Load Now command or toolbar button.

See Also:

[Using the RM-232-SETUP Module with EtherTRAK and RemoteTRAK I/O](#)

[Loading EtherTRAK I/O Without Using a Setup Module](#)

[Loading RemoteTRAK I/O Without Using a Setup Module](#)

[Loading RemoteTRAK I/O Modules Connected to an EtherTRAK I/O Module](#)

[Loading RemoteTRAK I/O Modules Connected to an Ethernet Gateway](#)

Loading IPm-based Stations

Each SixTRAK IPm, VersaTRAK IPm, Mini-VersaTRAK mIPm, ST-GT-1210 I/O controller or ET-GT-ST-3 can be loaded through its primary Ethernet port or serial port. The default IP address is 10.1.0.1 and the default serial port settings are typically 9600, 8, N, 1.

Loading SixTRAK, VersaTRAK and Ethernet Gateways

Each SixTRAK gateway, VersaTRAK RTU or Ethernet I/O concentrator should initially be loaded through its Plant Floor port. Subsequent loads can be performed through the Ethernet port (if populated) or through any serial port configured to recognize SIXNET protocol.

Connect a Plant Floor RS232 cable between your computer and the Plant Floor port of the station. Select the appropriate communication device. In the main window, click in any one of the configuration fields for the station to be loaded and then select the Operations -> Load Now command or toolbar button. This will write the configuration data into the station.

Using the RM-232-SETUP Module with EtherTRAK and RemoteTRAK I/O

Insert the RM-232-SETUP into the base of the module being configured. Removal of the existing module and insertion of the field setup module can be performed even when power is applied. In the Device Selection window (select Device -> Select ..) choose "Use COM Port" and click the "Use Setup Mod. Settings" button. Also choose the appropriate COM port (COM 1, COM 2 etc..) from the dropdown list. In the main window, click in any one of the configuration fields for the module to be loaded and select the Operations -> Load Now command or toolbar button. This will write the configuration data into the base of the module.

Loading EtherTRAK I/O Without Using a Setup Module

This information applies to an EtherTRAK module connected directly to the computer using a crosswired cable, or through a hub or switch using a straight-through cable.

In the Device Selection window (click Device -> Select...) choose "Use Ethernet" and choose "Single Station" for the Connection. In the main window, click in any one of the configuration fields for the module to be loaded and select the Operations -> Load Now command or toolbar button. This will write the configuration data into the base of the module.

Notes:

- The computer's IP address and the IP address you are attempting to load into the EtherTRAK module must be on a compatible subnet in order for the module loading to work. For example, if you are attempting to load an IP address of 10.1.0.1 into the EtherTRAK module, your computer's Ethernet card must be configured with a fixed IP address such as 10.1.0.9 and a subnet mask such as 255.255.255.0.
- The initial loading of an EtherTRAK module over Ethernet may utilize a broadcast IP address in the message. Though highly unlikely, this type of message could interfere with other traffic on your Ethernet network during the loading of the module. The use of a setup module (RM-232-SETUP) is recommended if any brief interruption of Ethernet traffic is undesirable. If the EtherTRAK module has been previously configured with a proper IP address, then

broadcast messaging will not be used.

- The “Network / Passthru” setting will not use broadcast messaging as long as the EtherTRAK module’s serial number has been entered into the configuration. This mode can be selected after all EtherTRAK modules have been loaded with acceptable IP addresses. All outgoing messages for a given module will be sent using the appropriate IP address and destination station number for that module.

Loading RemoteTRAK I/O Without Using a Setup Module

This information applies to RemoteTRAK modules connected to the computer using an RS232 to RS485 converter, such as the RM-232-485-4U.

Loading new (not previously configured) RemoteTRAK modules:

Important: If any of your RemoteTRAK modules have not yet been configured, unplug or power down all RemoteTRAK modules except the one you will be configuring.

In the Device Selection window (select Device -> Select ..) choose “Use COM Port” and choose “Single Station” for the Connection. Choose the appropriate COM port (COM 1, COM 2 etc..) from the dropdown list. In the main window, click in any one of the configuration fields for the module to be loaded and select the Operations -> Load Now command or toolbar button. This will write the configuration data into the base of the module.

Loading previously configured RemoteTRAK modules:

Note: It is not necessary to unplug or power down RemoteTRAK modules if they have all been previously configured with unique station numbers.

In the Device Selection window (select Device -> Select ..) choose “Use COM Port” and choose “Network / Passthru” for the Connection. Choose the appropriate COM port (COM 1, COM 2 etc..) from the dropdown list. In the main window, click in any one of the configuration fields for the module to be loaded and select the Operations -> Load Now command or toolbar button. This will write the configuration data into the base of the module.

Loading RemoteTRAK I/O Connected to an Ethernet Module or Gateway

This information applies to loading RemoteTRAK module(s) connected to the RS485 port of an EtherTRAK I/O module or ET-GT-485 Ethernet gateway. Here are the requirements and limitations of this capability:

- This setup will only work with SIXNET protocol. If you are using Modbus protocol, you’ll need to use the RM-232-SETUP module to configure the RemoteTRAK module(s).
- The Ethernet gateway / EtherTRAK I/O module must be configured and loaded for SIXNET passthru at 9600 baud for the RS485 port setting.
- The Ethernet gateway / EtherTRAK I/O module must be configured and loaded for a station number other than “1”.
- The RemoteTRAK module(s) must be at their factory default setting (SIXNET protocol and 9600 baud).

Here are the steps to follow:

1. In your I/O Tool Kit configuration, each RemoteTRAK module and EtherTRAK module or ET-GT-485 gateway must be given a unique station number. The RemoteTRAK module(s) must be “Connected To:” the EtherTRAK I/O module or ET-GT-485 gateway. In the Device menu, select Network / Passthru as the Connection type.
2. Configure the RS485 port of the EtherTRAK I/O module or ET-GT-485 gateway for SIXNET passthru at 9600 baud, as opposed to the default 38,400 baud. Load the configuration into the EtherTRAK module or Ethernet gateway. Refer to Loading EtherTRAK I/O Without Using a Setup Module for more details.
3. You should now be able to load each of your RemoteTRAK I/O modules by clicking anywhere in it’s

configuration line in the I/O Tool Kit main window and selecting Operations ->Load ->Load Now or clicking the Load button.

Increasing the Passthru Baud Rate

You can generally run the RS485 passthru communications as fast as 38,400 baud. To do this, change the RS485 port configuration of each RemoteTRAK module to 38,400 baud, and reload each RemoteTRAK module. Then, reconfigure the EtherTRAK module or ET-GT-485 gateway's RS485 port for 38,400 baud and reload the EtherTRAK module or ET-GT-485 gateway.

Step 7: Test I/O

The Test I/O window can be used to verify the functionality of I/O in gateways, RTUs, I/O modules and the Control Room IOMap. I/O that can be read or written includes:

- Physical discrete and analog I/O
- Virtual discrete, analog, floating point and long I/O.
- Counter inputs

The Test I/O window can display and/or control all I/O at the station or module and at the station or module's equivalent IOMap registers. It can also be used to write values to virtual inputs and physical / virtual outputs for the purpose of debugging standalone control programs. Tabs in the Test I/O window let you select the specific type of I/O to read and/or write. Multiple Test I/O windows can be opened as needed.

I/O values can be displayed in Scaled, Decimal, Signal, or Percentage format as applicable. A Large window display is available for easy viewing of any single I/O channel from a distance. This view is particularly useful when making adjustments to field devices.

How to Open Test I/O windows

- To test the I/O of a gateway or RTU, simply click your right mouse button when you have the desired gateway / RTU highlighted and select "Test I/O" from the popup menu that appears. If you select "Direct to Selected Station/Module", the Test I/O window will communicate directly to the station or module. If you select "Selected Station/Module in Active IOMap", the Test I/O window will communicate with the active IOMap in your computer's memory. Note that an IOMap must be running for this command to be available. The Status Bar at the bottom of the Test I/O window will indicate "Active IOMap", or "Online" (with blinking LEDs) when communicating directly to the station.

- To test the I/O of a specific I/O module, click your right mouse button when you have the desired I/O module highlighted in the Tree View, and select "Test I/O" from the popup menu that appears. If you select "Selected Station/Module in Active IOMap", the Test I/O window will communicate with the active IOMap in your computer's memory. Note that an IOMap must be running for this command to be available. The Status Bar at the bottom of the Test I/O window will indicate "Active IOMap", or "Online" (with blinking LEDs) when communicating directly to the station.

You can open multiple Test I/O windows simultaneously, as needed.

A Test I/O window can also be opened by highlighting the desired gateway / RTU / module and then clicking on the Test I/O icon in the toolbar, or by selecting one of the two Test I/O choices from the Operations menu. The toolbar button will open a Test I/O window that communicates directly to the station or module.

How to Use a Test I/O window

When you open a Test I/O window, one I/O type will be displayed. Tabs are provided in the window so you can switch to a different I/O type. As an alternative you can open multiple Test I/O windows, each displaying the desired I/O type.

I/O values can be displayed in Scaled, Decimal, Signal, or Percentage format as applicable. A Large window display is available for easy viewing of any single I/O channel from a distance. This view is particularly useful when making adjustments to field devices.

The current status of physical and virtual inputs will be displayed. Virtual inputs can be written to by selecting the channel and then using the toolbar buttons to enter a new value. Note that the toolbar buttons will not be displayed if a physical input is highlighted. Only virtual inputs can be written to.

The status of physical and virtual outputs will be displayed. An output can be written to by selecting the channel and then using the toolbar buttons to enter a new value. Discrete outputs can also be written to by double clicking in the I/O Value field. Other types of outputs can also be written to by clicking in the I/O Value field and typing in a new value.

I/O Status messages for discrete I/O will be displayed automatically if they exist in the project file.

Step 8: Adding Virtual Modules to a Station

You can add Virtual I/O modules to a programmable SIXNET station at any time. These modules are used to hold I/O values from an ISaGRAF program or from I/O Transfers.

Note: If you add virtual I/O modules to a station configuration, be sure to reload the configuration into the station.

Virtual I/O Modules

Virtual I/O modules are menu item modules that can be included in your I/O Tool Kit configuration. The virtual module types are:

- Discrete Inputs
- Discrete Outputs
- Analog Inputs
- Analog Outputs
- Floating Inputs
- Floating Outputs
- Long Inputs
- Long Outputs
- I/O Module Status
- Station Status

These non-physical modules allow you to define and use I/O registers that are not associated with your physical (actual) SixTRAK I/O modules. Applications for these modules' virtual I/O registers include:

- to hold I/O data transferred from another station through an I/O Transfer, Control Room register update or Modbus data transfer
- to hold output data written from an ISaGRAF program running in the gateway / RTU
- these registers can be used as transfer locations in advanced I/O mapping schemes
- To monitor I/O module and/or remote station status from within Windows applications

Here are some tips on using virtual registers:

- Virtual I/O modules can be inserted (or deleted) and assigned module tag names using the I/O Tool Kit program. (Note that virtual modules are not included in the Bill of Materials since there is no cost involved.)
- I/O tag names can be assigned to virtual I/O in the I/O Tool Kit program.
- Virtual I/O registers can be viewed or altered using the Test I/O window in the I/O Tool Kit.

Step 9: How to Access SIXNET I/O From Windows Applications

Any of the following methods may be used to access SIXNET I/O from other applications:

Standard I/O Drivers

Citect HMI software includes an I/O driver (SxDirect) that communicates directly to SIXNET stations and I/O modules. The optional SCS feature set of the SIXNET I/O Tool Kit includes an exporting function that automatically configures the Citect SxDirect driver and also creates Variable tag records for the SIXNET I/O.

Standard Modbus Drivers

Modbus Ethernet and serial drivers have been incorporated into a number of SCADA, control and MMI packages. SIXNET IPm stations, SixTRAK gateways, VersaTRAK RTUs, RemoteTRAK and EtherTRAK I/O modules can be configured to respond to Modbus commands.

OPC Servers

The following OPC servers will respond to OPC messages from any Windows application that has an OPC client, then send the appropriate Modbus or SIXNET commands to the SIXNET stations and/or I/O modules:

- The KepServerEx sends SIXNET protocol over Ethernet and serial ports. A limited version (32 I/O points total) of this server is provided free of charge on the SIXNET CD, and works with SIXNET hardware only. A fully featured version of this OPC server may be purchased from Kepware Products.
- The KEPServer sends Modbus protocol over Ethernet and serial ports. This server is provided free of charge on the SIXNET CD, and works with SIXNET hardware only.

DDE Servers

The following DDE servers will respond to DDE messages from Windows database and spreadsheet programs such as Excel or Lotus, or from many SCADA and MMI packages such as Wonderware. The DDE server will then send the appropriate commands (Modbus or SIXNET) to the SIXNET stations, I/O modules or I/O database to read / write the desired I/O.

- The KepServerEx sends SIXNET protocol over Ethernet and serial ports. A limited version (32 I/O points total) of this server is provided free of charge on the SIXNET CD, and works with SIXNET hardware only. A fully featured version of this server may be purchased from Kepware Products.
- The KEPServer sends Modbus protocol over Ethernet and serial ports. This server is provided free of charge on the SIXNET CD, and works with SIXNET hardware only.

Write Your Own I/O Driver to Send SIXNET Protocol

Many applications can be written to send SIXNET commands directly over Ethernet and serial ports. A SIXNET Universal Driver Development Kit has been provided on the SIXNET CD for this purpose. This kit contains detailed information on the SIXNET Universal protocol. To install the SIXNET Universal Driver Development kit, access the "Install Software" link on the SIXNET CD.

Creating an IOMap Configuration

There are a number of Windows applications that can use the Control Room IOMap as I/O driver. These include:

- Citect
- Intellution Fix
- Programs that communicate using DDE messaging
- Programs that communicate using OPC messaging

The Control Room IOMap is a shared resource database that allows Windows applications to share data with SIXNET I/O. This utility establishes an I/O database in your computer's memory. Any combination of DDE, OPC and direct DLL messages can then be used to read and write your I/O.

If you will be running a Windows application that requires the Control Room IOMap, you will need to create or update an IOMap Interface. An Auto IOMap feature will automatically create an IOMap for you. To start the Autoload feature, select Tools -> Run Auto IOMap.

Auto IOMap (I/O Tool Kit)

The I/O Tool Kit program has an Autoload feature. When launched, the Autoload wizard will guide you through the creation of an IOMap configuration called Auto_IOMap. You will be able to select the stations and I/O modules to be included in this Auto_IOMap configuration. To start the Autoload feature, select Tools -> Run Auto IOMap.

The "Auto_Iomap" configuration is saved in the project file and can be easily modified or updated at a later time.

Usage

Use the Auto IOMap feature if the Control Room IOMap will communicate with SIXNET I/O directly over Ethernet, serial ports, or through a SIXNET station running passthru mode.

Step 10: Exporting Tag Names to Other Applications

The I/O and module tag names you create in the I/O Tool Kit are stored in your project (.6pj) file. Using the exporting capability in the optional SCS feature set of the I/O Tool Kit, your tag names can become readily available to many Windows applications. These include:

ISaGRAF IEC 1131 programming

This export is highly recommended for applications where an ISaGRAF program will be running in a SIXNET station. See Exporting Tag Names to ISaGRAF for more information.

Follow these steps to export tag names to ISaGRAF:

1. If you don't already have an ISaGRAF project, run ISaGRAF and create a new one. The new project does not have to contain any programming.
2. In the I/O Tool Kit, select File -> Export -> ISaGRAF.
3. Choose your ISaGRAF project.
4. Choose the "Only One Station" or "Selected Tags" option when you will be running an ISaGRAF program in a SIXNET station.
5. Choose the "All I/O in IOMap" option if you will be running an ISaGRAF program as a Windows application (ISaRun). Make sure the appropriate IOMap configuration is loaded and running in your computer's memory.

Notes:

1. This export feature requires that you have a license for the "SCS" feature set of the I/O Tool Kit.
2. The ISaGRAF export option creates Input variables and Output variables in the ISaGRAF Dictionary, and makes the necessary "I/O Connections". One variable will be created for each physical input / output or virtual input / output.
3. If you have ISaGRAF program variables that need to be accessible outside of the ISaGRAF program, copy those variables into SIXNET virtual I/O registers. Refer to Controlling PID Operational Parameters From a Windows Application for an example of how to externally control the tuning parameters of a PID block.
4. Station prefixes (if defined) will be included with the "All I/O in IOMap" and "All Tags" choices only.
5. Any Internal variables you create within ISaGRAF will be untouched by this export feature.
6. The "Selected Tags" option will remove all Input and Output variables from your ISaGRAF project and replace them with the tags you select in the Tag Selection window. If you are re-exporting to ISaGRAF for the purpose of adding some new variables to your ISaGRAF project, make sure you select the original tags plus your new tags in the Tag Selection window.

Citect

There are two export functions: "SxDirect Driver" and "IOMap Interface". Use the SxDirect Driver export for Citect projects that use the built-in SIXNET driver. (This is the preferable driver for most Citect / SIXNET systems.) Use the IOMap Interface export for Citect projects that use the SIXNET Control Room IOMap as the I/O driver. Both of these exports will create Variable Tag records (including analog scaling), and will also configure the appropriate Boards, Ports and I/O Device forms for the station(s) you export. See Exporting Tag Names to Citect for more information.

NOTE: Do not run Citect's Express Wizard Setup if you use either of the SIXNET exports to Citect.

The optional SCS feature set of the I/O Tool Kit has an enhanced export function that automatically creates Variable Tag records containing the tag names you previously assigned. It also configures the appropriate I/O devices in your Citect project.

Follow these steps for automatic tag record creation and I/O device configuration in your Citect project:

1. If you don't already have an existing Citect project, run the Citect Explorer and create a new project. Exit (or minimize) the Citect Explorer.

Note: It is not necessary to run the Express Wizard for SIXNET I/O. I/O device configuration will be performed automatically in an upcoming step.

2. Use the SIXNET I/O Tool Kit to configure your SIXNET I/O. It is recommended that you assign a tag name to each I/O register in your system. These tag names will easily be exported to your Citect project, saving valuable project development time.

3. Choose the Ethernet or serial port that Citect will use to communicate with the I/O. Run the Test I/O utility and verify that you can read/write your I/O.

4. From the File menu, select File à Export I/O Definitions to -> Citect (SxDirect Driver). This export feature will automatically configure Citect for your SIXNET I/O and create Variable Tag records in Citect. Exit the SIXNET I/O Tool Kit.

5. In Citect, open your project. Select File -> Pack.

Citect - SIXNET configuration is now complete. If you assigned tag names in the SIXNET I/O Tool Kit, they will now be available in the Citect Graphics Builder. If you didn't assign tag names, select Tags -> Variable tags and create the necessary Variable Tag records. Alternatively, you can run the SIXNET I/O Tool Kit and assign tag names, then repeat steps 4 and 5.

Intellution Fix.

The tag records in the .GDB file will contain I/O tag names and analog I/O scaling values from the I/O configuration file. See Exporting Tag Names to Intellution for more information.

CSV file

Use this export for spreadsheet applications that can import comma separated variable (.csv) files. The tag records in the .csv file will contain I/O tag names and analog I/O scaling values from the I/O configuration file. Refer to CSV Export File Format for an example of a CSV file.

Modbus OPC (Kep Server)

Use this export for OPC-based applications where Modbus RTU is the desired protocol to send to the SIXNET hardware. The Kepware server sends Modbus RTU protocol over Ethernet and/or serial ports to communicate with I/O. Note that in RS232 and RS485 applications the SIXNET serial port must be configured for the "Modbus RTU Slave" mode in order for the Kep Server to communicate properly. This is not an issue with Ethernet communications because SIXNET Ethernet ports respond to SIXNET protocol and/or Modbus protocol automatically.

KepServerEx

Use this export for OPC-based applications where SIXNET is the desired protocol to send to the SIXNET hardware. The KepServerEx sends SIXNET protocol over Ethernet and/or serial ports to communicate with I/O. In RS232 and RS485 applications the KepServerEx is preferable over the Kep Server. Because the KepServerEx sends SIXNET protocol, the SIXNET serial port does not have to be reconfigured before SIXNET operations can be performed. Note that this is not an issue with Ethernet communications because SIXNET Ethernet ports respond to SIXNET protocol and/or Modbus protocol automatically.

By exporting tags to your Windows applications, you can reduce or eliminate the need to create and maintain tag names within your different programs.

The "Connected To:" field for each station ultimately determines which applications a station's tag names can be exported to. This information is listed in the help topics for each export window.

Select File -> Export -> (appropriate application) to export a station's tag names.