Technical Note #633

Ci Technologies' Citect HMI Communicates to RemoteTRAK or Any Other Modbus Serial Device over Ethernet through an EtherTRAK Module or Gateway

Abstract: This document explains the procedure for communicating from Citect to a serial (RS232 or RS485 typical) Modbus device over Ethernet. This is accomplished by using Citect's Modnet (Modbus/TCP) driver and the Ethernet to serial Modbus passthru functionality of SIXNET's EtherTRAK Modules or Gateways.

There are many installed applications using serial Modbus over RS232 or RS485. This was and is a reliable method for interfacing to industrial equipment. However, Ethernet is becoming the standard for industrial networking due to its combination of reliability and speed. Those users who want to gain the advantages of Ethernet are faced with two options: replace all their existing (and paid for) serial devices with new Ethernet-enabled devices OR interface their existing devices to Ethernet. In most cases the latter choice is far less costly due to Ethernet to Modbus converters such as SIXNET's EtherTRAK modules and gateways. These devices can save users substantial time and money by allowing them to maintain their existing devices and wiring.

In this document we outline how to setup communications from the Citect HMI (Human to Machine Interface) to a serial Modbus device that is connected off of an EtherTRAK module or gateway. In this test we used a RemoteTRAK for the serial Modbus device but the steps that follow would be similar for other similar devices.

Software Used:

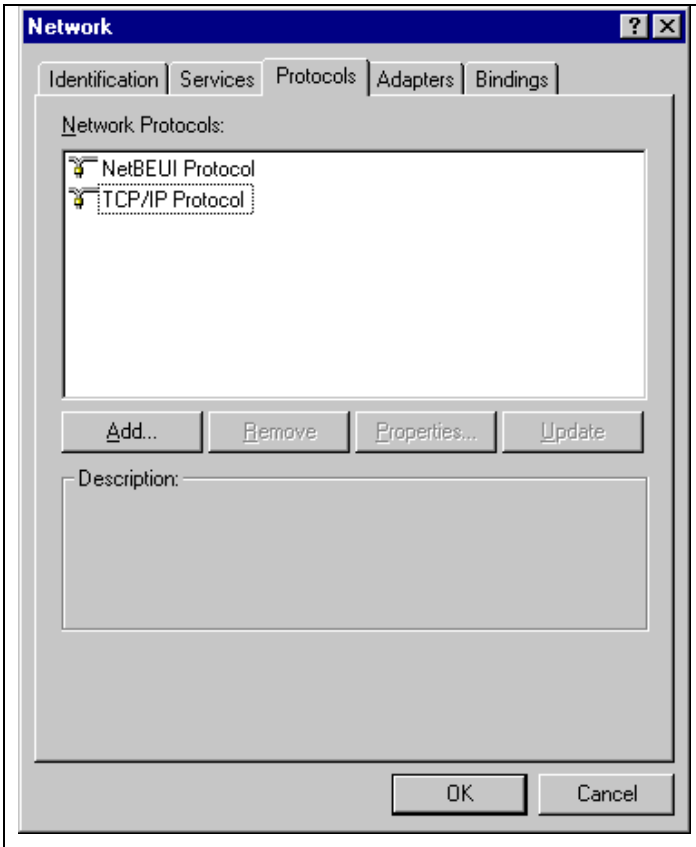
- Ci Technologies' Citect v5.21 with Service Pack F
- Ci Technologies' Modnet driver v2.02.07.005 from Driver Pack B for v5.21.
  (Note: Early versions of the Modnet driver will not work for this type of application. Go to www.citect.com to download the latest driver pack.)
- SIXNET's Remote I/O Tool Kit v3.24
- Windows NT 4.0 OS with Service Pack 5

Hardware Used:

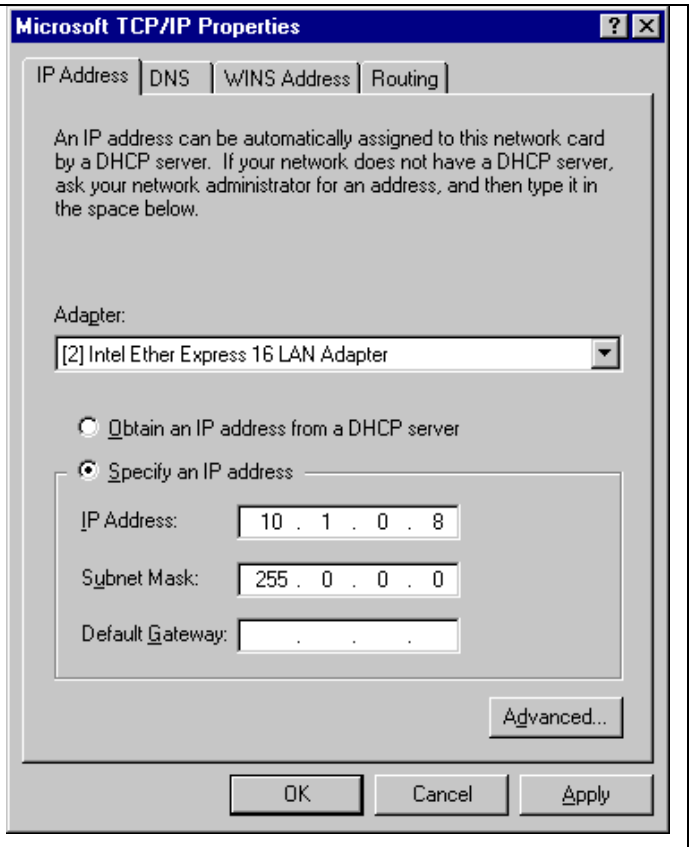
- (1) PC with an Ethernet card and TCP/IP protocol installed
- (1) ST-CABLE-ETH-X (cross-wired 10BaseT Ethernet cable)
- (1) ET-8DI2-8DO2-H
  (Note: An ET-GT-485-1 could have been used. It has the same Modbus passthru functionality of the EtherTRAK I/O module. The only difference is that the ET-GT-485-1 doesn't have any physical I/O points. Also, an ET-GT-232-1 can be used if your serial Modbus device has an RS232 port.)
- (1) RM-4DI2-4DO2-U
  (Note: Substitute any serial Modbus device that supports Modbus ASCII or Modbus RTU.)
- (1) RM-232-SETUP field setup module
- (1) ST-CABLE-PF (included with RM-232-SETUP)

Hardware Setup:
24 VDC power was applied to both the EtherTRAK and RemoteTRAK modules. Refer to the SIXNET user manuals for details on doing this. The EtherTRAK module's Ethernet port was connected directly to the Ethernet card in the PC via the ST-CABLE-ETH-X. Alternatively, you can connect the EtherTRAK to an Ethernet hub or switch. In this case you should use straight-thru Ethernet cables. Make sure the LNK (LINK) LED on the EtherTRAK (and on the Ethernet card or hub) goes ON solid. The RemoteTRAK module's RS485 port was then connected to the RS485 port of the EtherTRAK module (+ to +, - to -, GND to GND). If you are connecting a third party device then refer to its user manual for RS485 wiring details.

Configuring the PC:
To successfully communicate over Ethernet you must first make sure that your PC has the TCP/IP network protocol installed. Go to the Window's Control Panel and double click on the Network icon. Look for the TCP/IP protocol and view its properties. Make a note of what the IP address and Subnet Mask are. These will be important later on when you assign the IP address for your EtherTRAK module/gateway. If you don't have TCP/IP installed then click on the Add button and follow the directions. See screen shots 1 and 2 from Windows NT. Note: These windows may look a little different in other Windows operating systems.

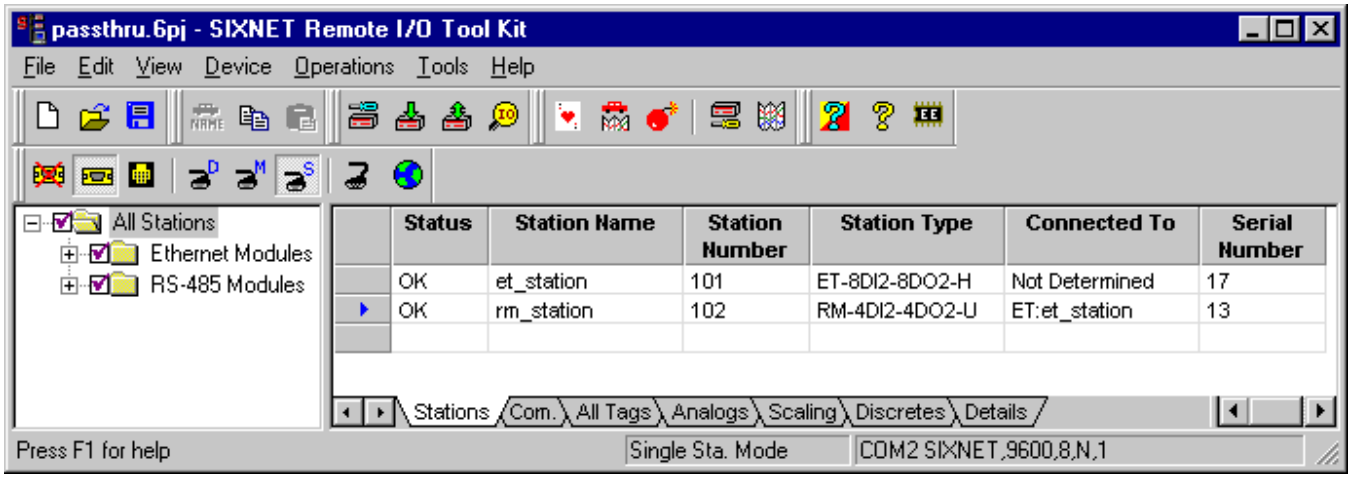


Screen Shot 1

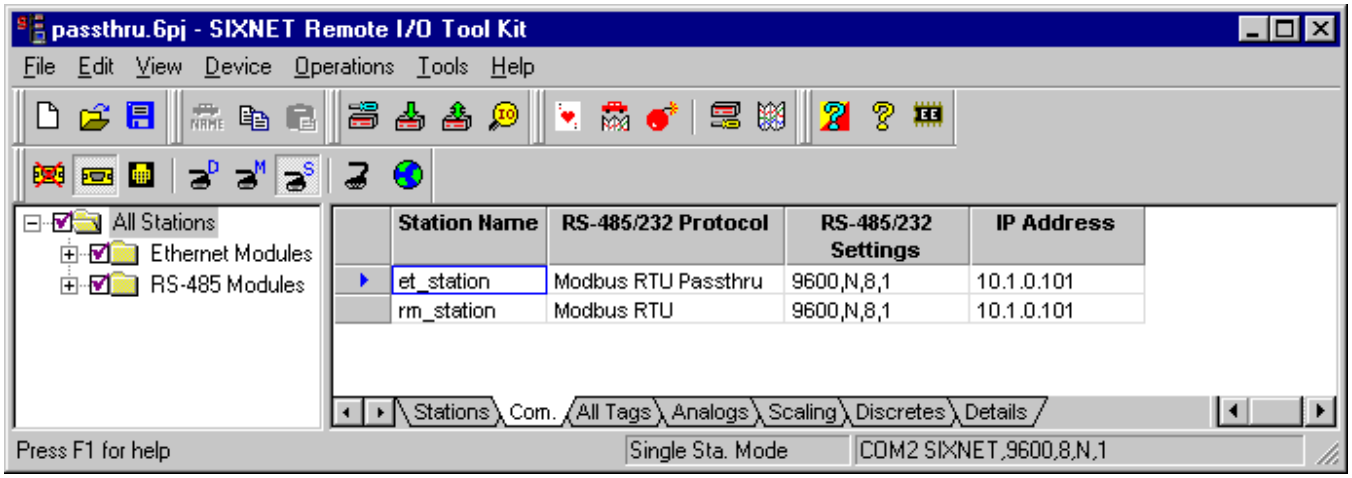


Screen Shot 2

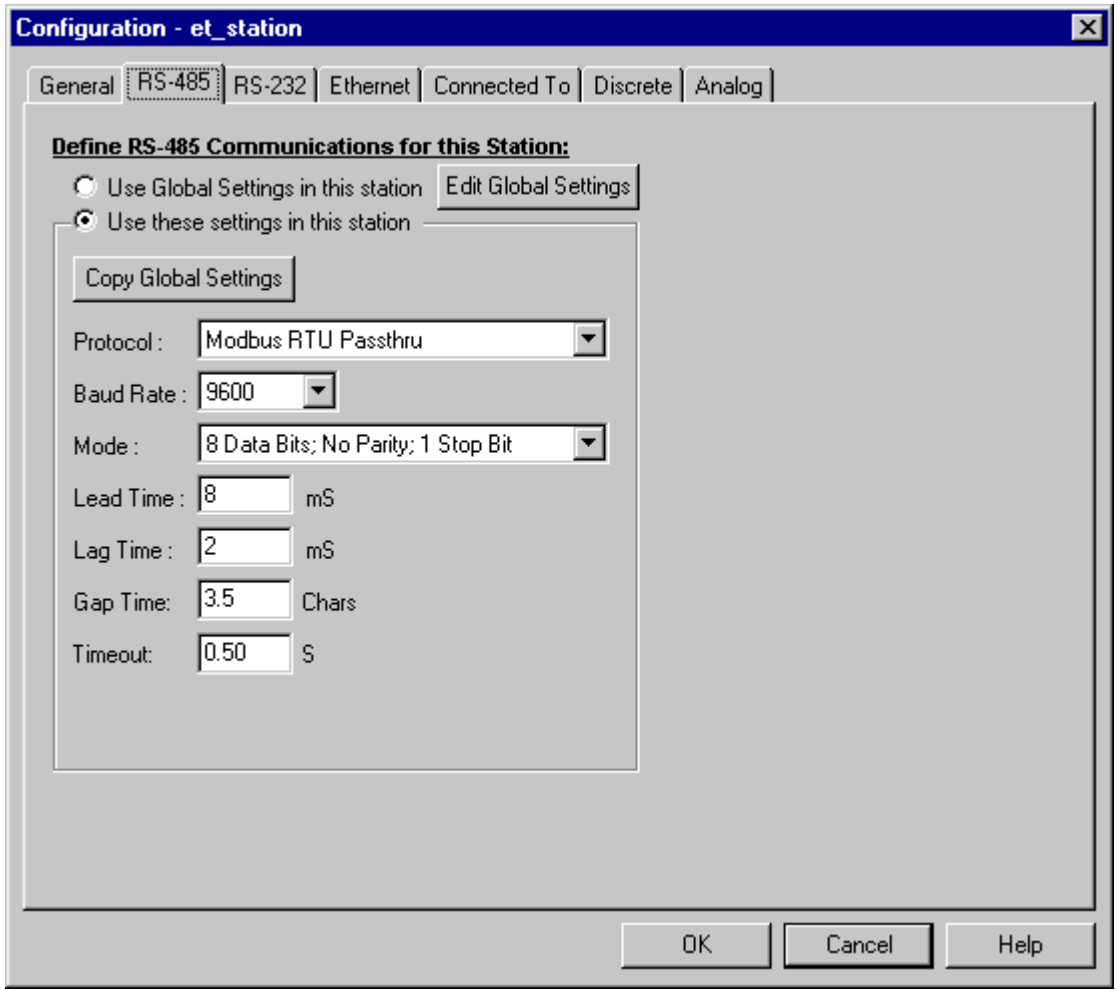
Configuring the EtherTRAK Module or Gateway:
Install the Remote I/O Tool Kit from the SIXNET CD if you haven't done so already. Now run the Tool Kit and select the EtherTRAK module or gateway that you are using. In this case we used an ET-8DI2-8DO2-U. Then step through the configuration windows to configure the module or gateway. Make sure to assign the correct serial number from the sticker on the base of the unit. Assign a unique station number. Make sure this number is different from the device that is connected off of the EtherTRAK. Next, assign an IP address that is appropriate for your network. For example, if the IP address of the Ethernet card in your computer is 192.68.98.4 then you would want to assign to the EtherTRAK a similar (but unique) IP address such as 192.68.98.5. Refer to the Remote I/O Tool Kit help for more details on assigning the IP address or check with your MIS department or network administrator. Finally, configure the RS485 port settings appropriately for the device you will be connecting to. In this case we are using a RemoteTRAK I/O module as our serial Modbus device. See screen shots 3, 4, and 5. Now in the Device menu select Ethernet. Then go to the Operations menu and perform a Load.



Screen Shot 3



Screen Shot 4



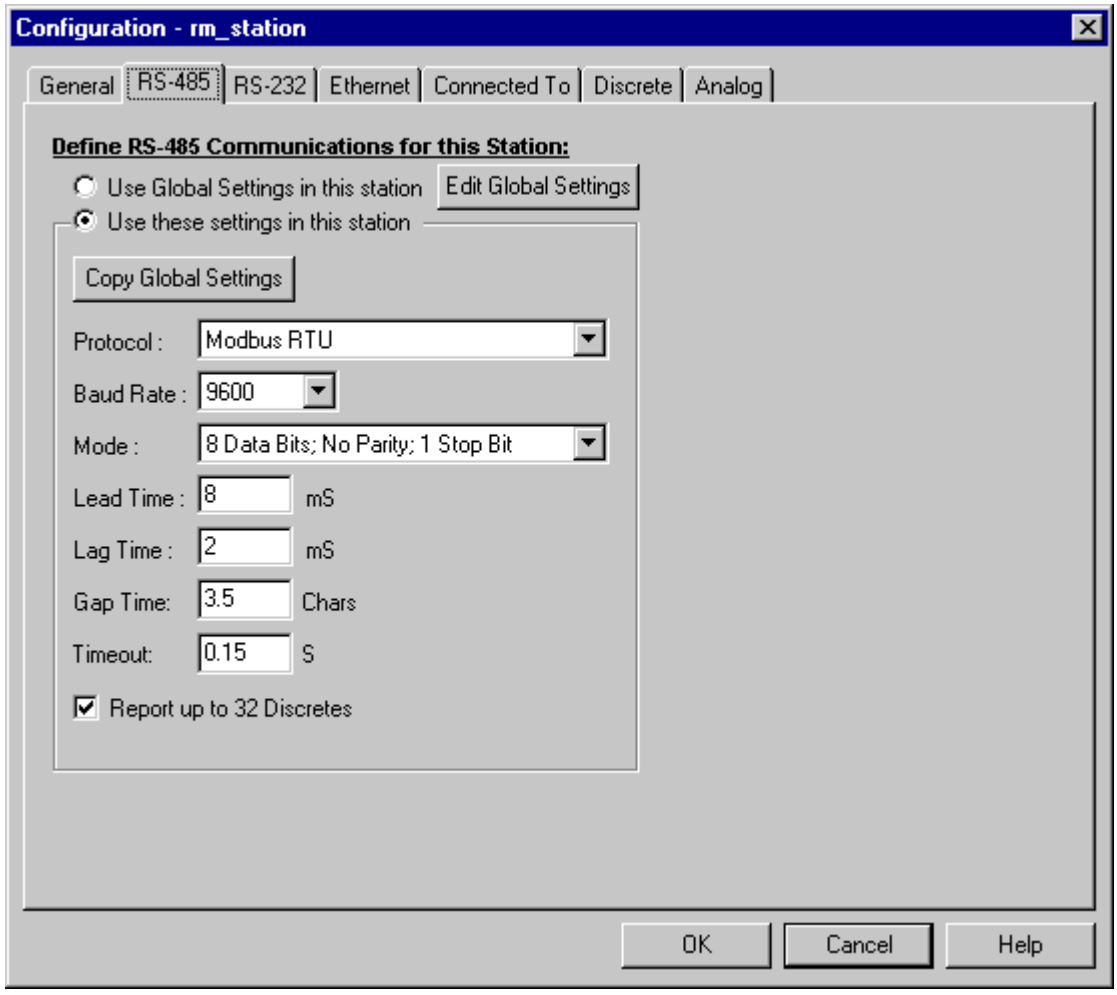
Screen Shot 5

Important Note 1:
Make sure you select Modbus RTU Passthru or Modbus ASCII Passthru. This "Passthru" mode tells the EtherTRAK module to forward (out the RS485 port) any messages that come in the Ethernet port and are not addressed to itself.

Important Note 2:
The default Timeout in the RS485 window (screen shot 5) is 0.15 seconds. This timeout is defaulted for 38,400 bps communications. If you are using a slower baud rate then you should increase this timeout.

Configuring the Serial Modbus Device:
Refer to the user manual for your device for details on configuring its RS485 communications. In our case we used a RemoteTRAK I/O module. The following steps were performed to configure the RemoteTRAK I/O module: (see screen shots 3, 4, and 6)

1. Add the RemoteTRAK module to the Remote I/O Tool Kit configuration.
2. Assigned the serial number from the sticker on the wiring base.
3. Assign a unique station number.
4. Set the RS485 parameters to match those of the EtherTRAK module or gateway. (Note: Because this is a slave station the Timeout parameter is not important and can be left at the default.)
5. Remove the RemoteTRAK I/O module from its base and plug in the field setup module.
6. Connect the field setup module to the PC's serial port with the ST-CABLE-PF cable.
7. In the Device menu select Use Com Port and Use Settings for Field Setup Module.
8. Go to the Operations menu and perform a Load.
9. Remove the field setup module and replace your RemoteTRAK I/O module.

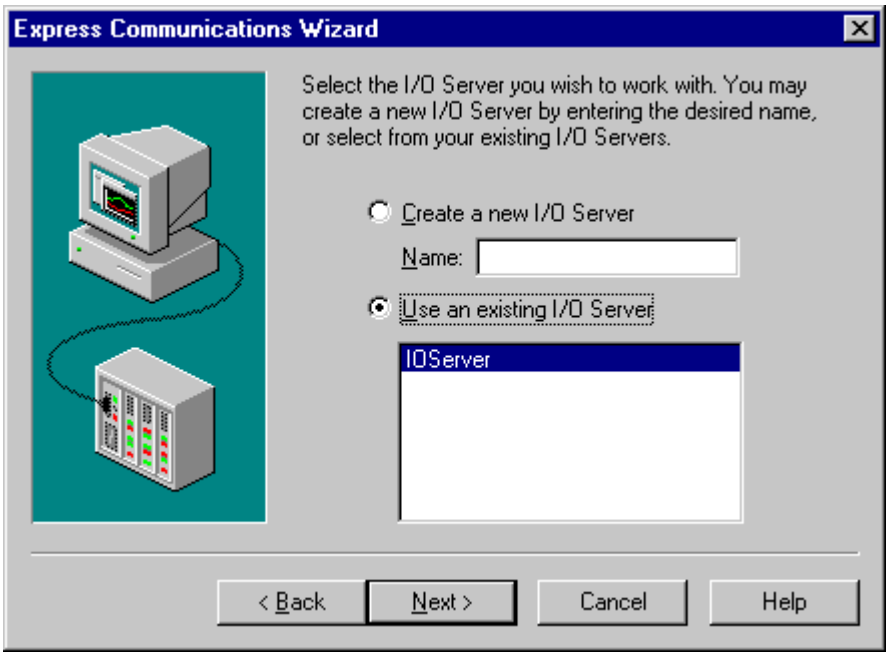


Screen Shot 6

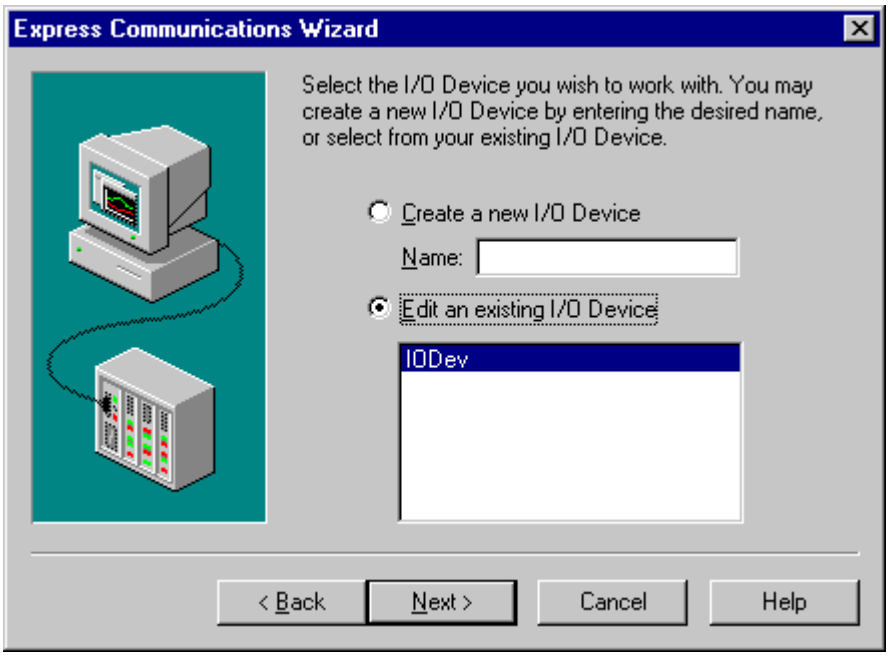
Important Note 3:
Some HMI software (such as Citect) will always request discrete points in word (16 bits) format. By default, a RemoteTRAK or EtherTRAK module that does not have that many discrete points will respond with an "Illegal Data Address" or "Address Out of Range" error. To get these modules to respond without an error you need to select the "Report up to 32 Discretes" feature as seen in screen shot 6.

Configuring Citect:
Make sure you have installed the latest driver pack for Citect. Older versions of the Modnet driver did not work with passthru devices such as an EtherTRAK module or gateway. The following steps were performed to configure Citect: (see screen shots 7 – 20)

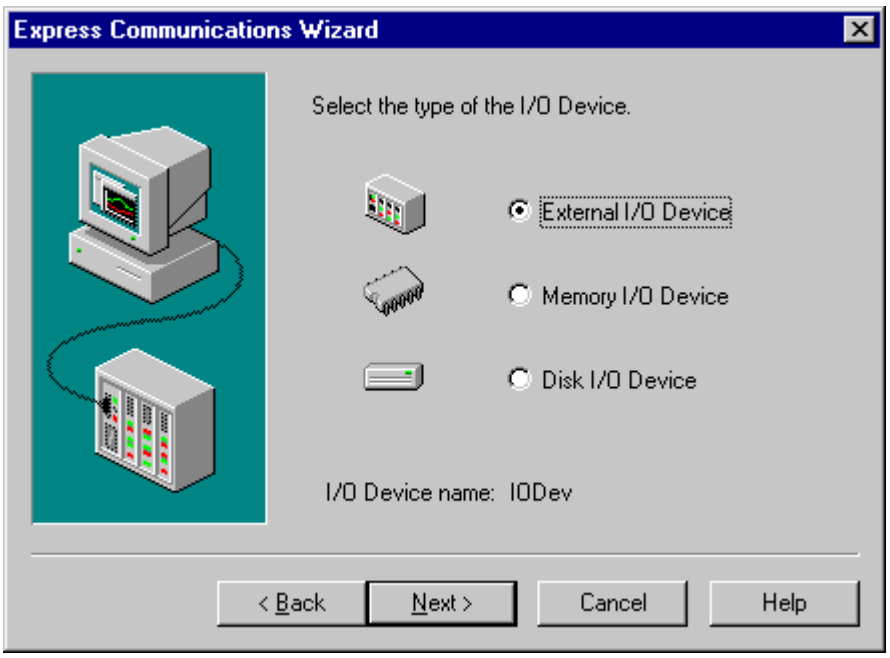
1. Create a new project. In our case we called it "passthru".
2. Run the Communications Setup Wizard (see screen shots 7 – 12) and set the appropriate parameters. Make sure you enter port 502 and the IP address of the EtherTRAK.
3. After you run the setup wizard your communications should be configured as shown in screen shots 13 – 16.
4. Define some variable tags as seen in screen shots 17 –20. Make sure to use appropriate Modbus addresses.
5. Pack your project.
6. Create one or more graphic pages that link to your variable tags.
7. Compile your project and then run it.



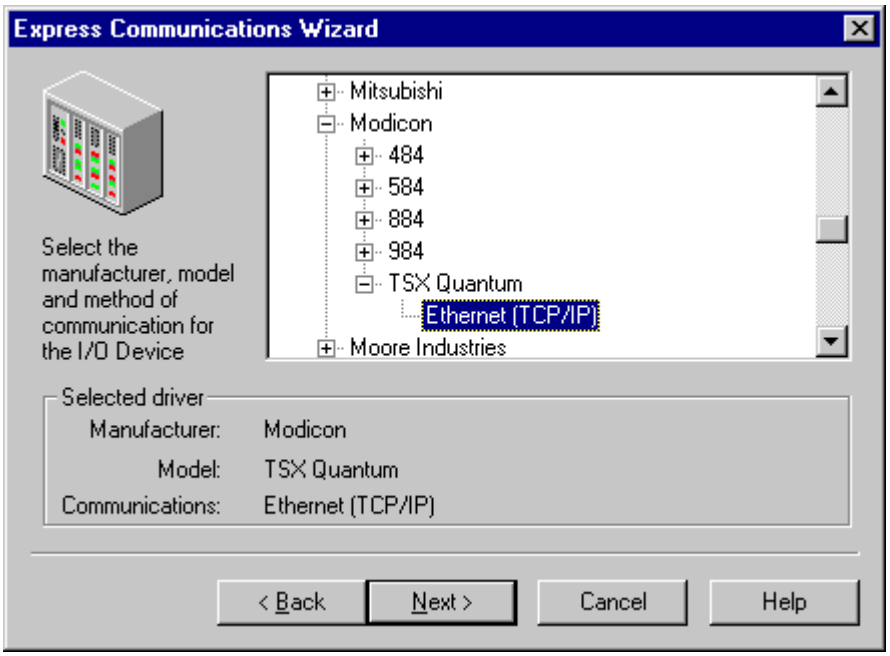
Screen Shot 7



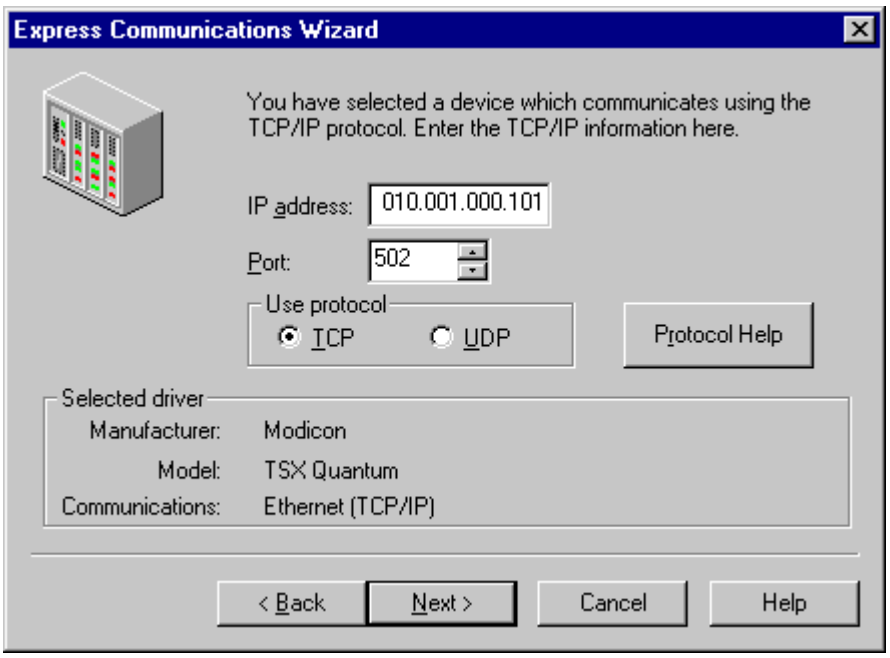
Screen Shot 8



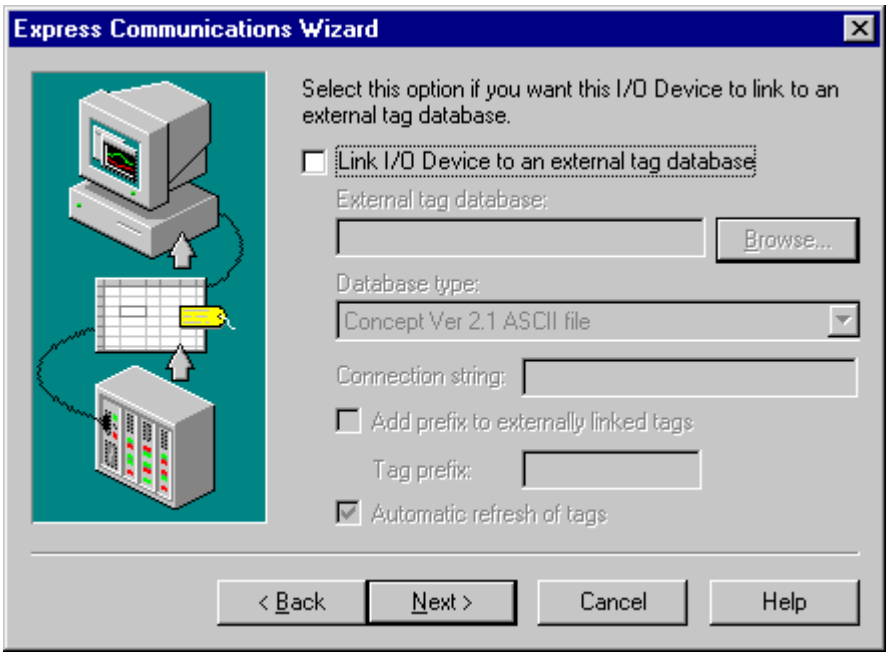
Screen Shot 9



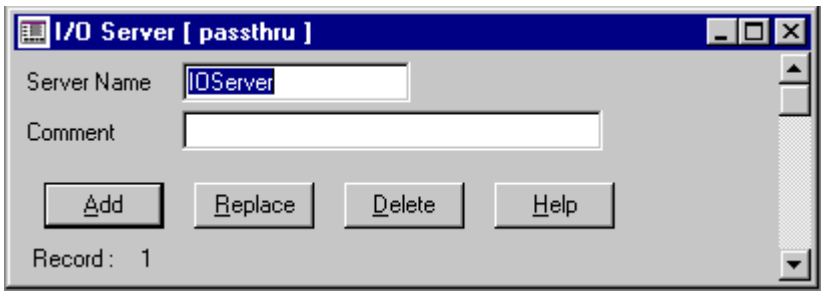
Screen Shot 10



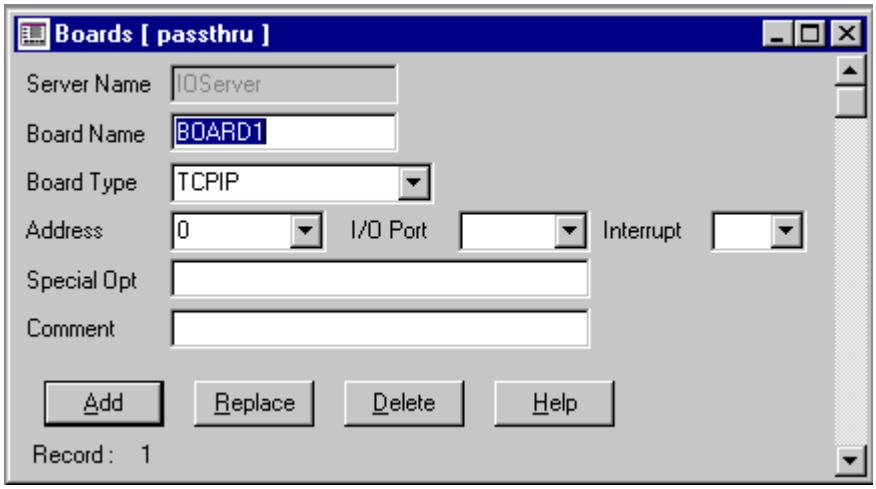
Screen Shot 11



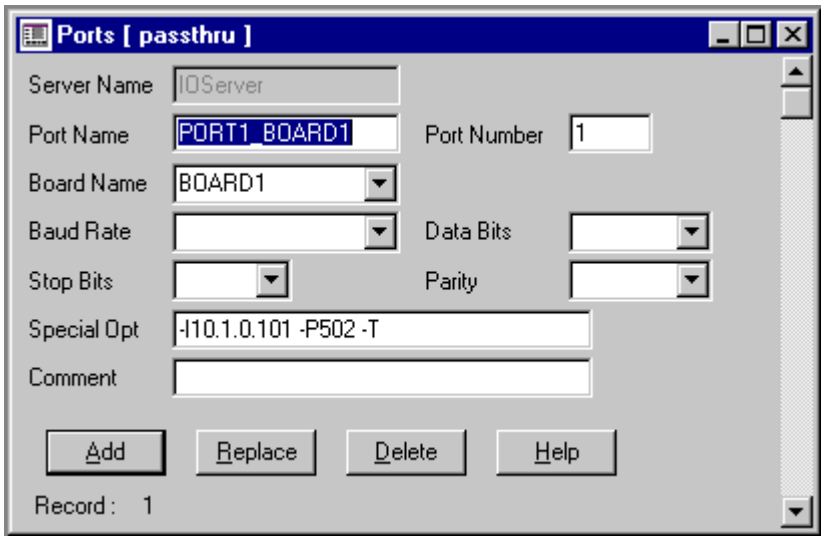
Screen Shot 12



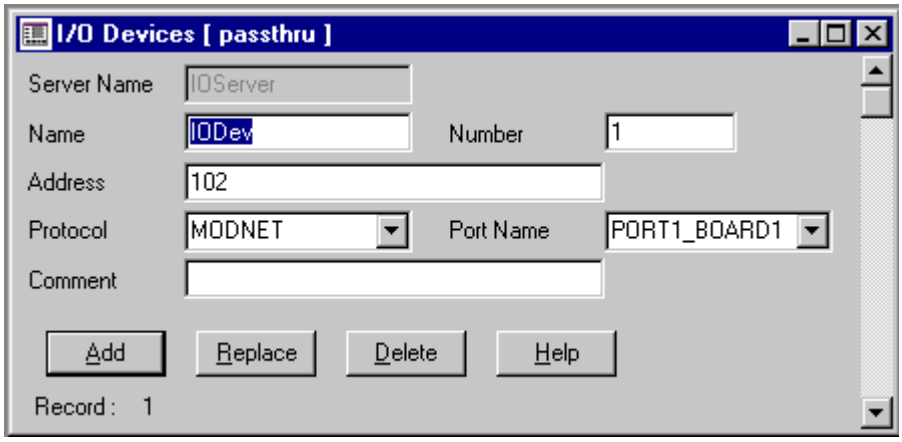
Screen Shot 13



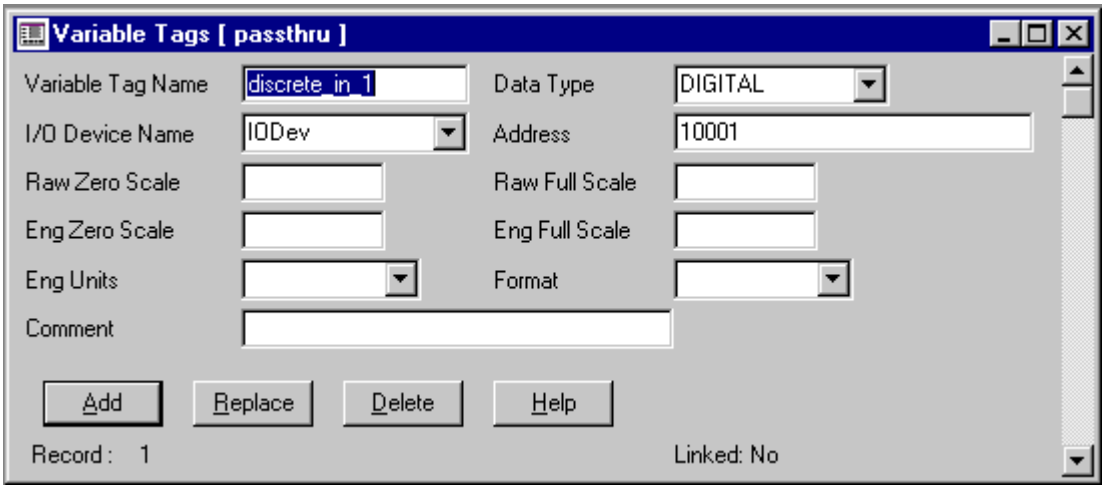
Screen Shot 14



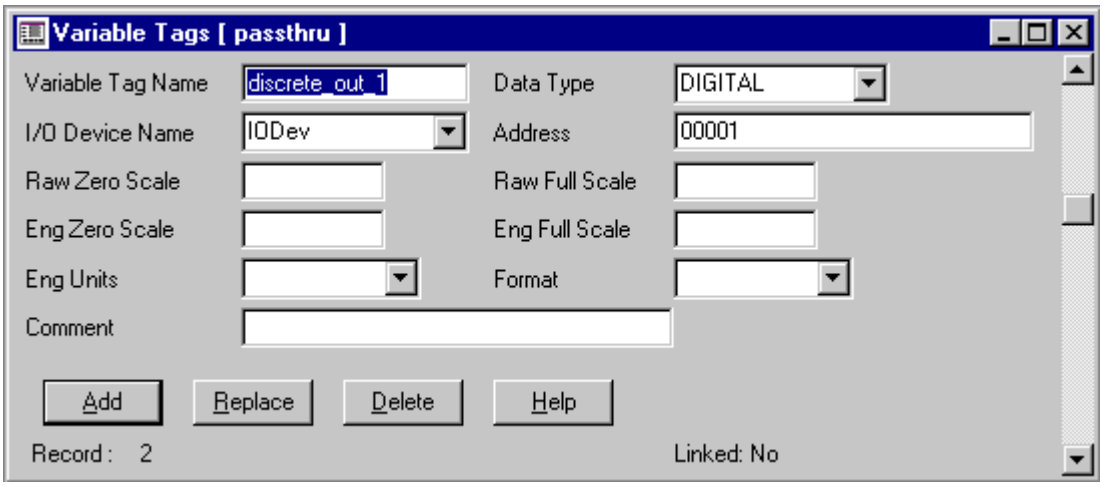
Screen Shot 15



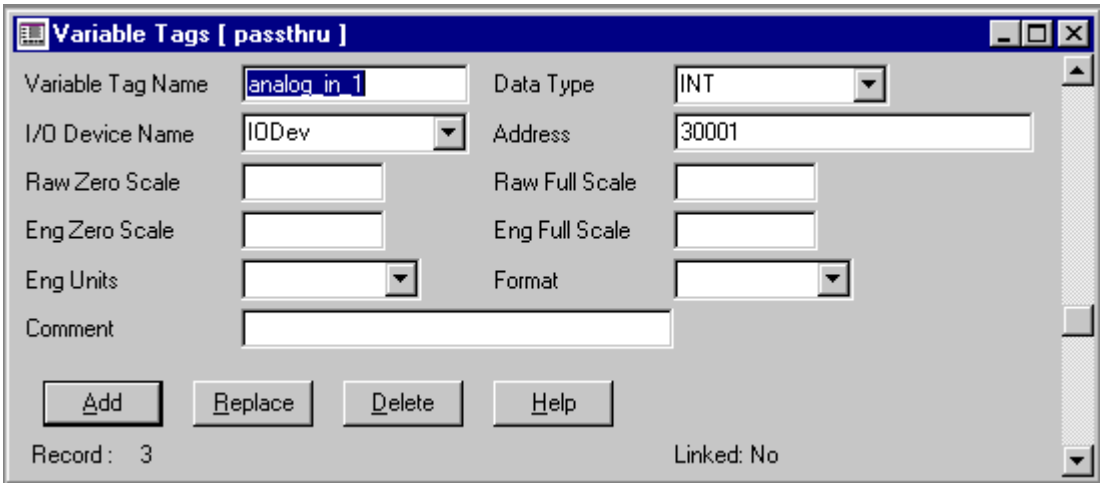
Screen Shot 16



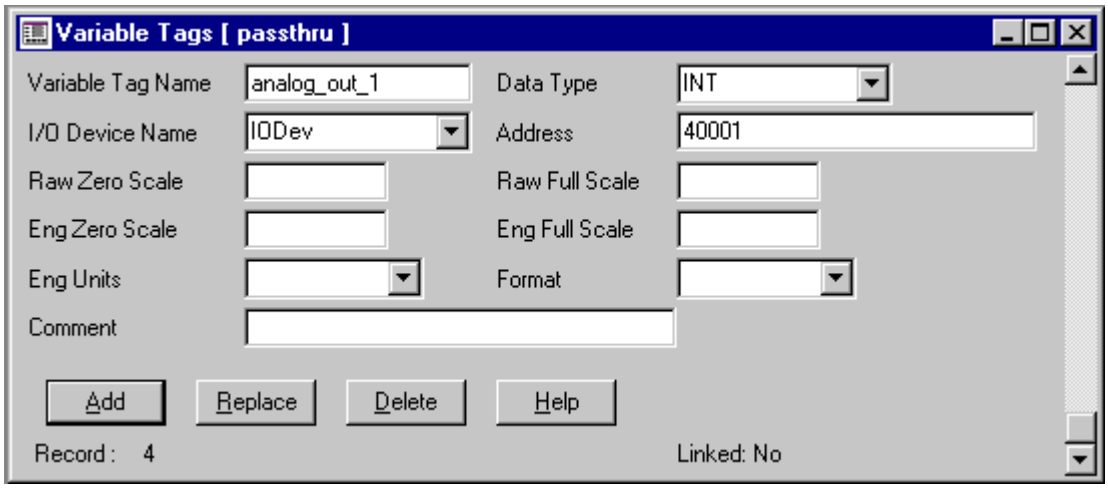
Screen Shot 17



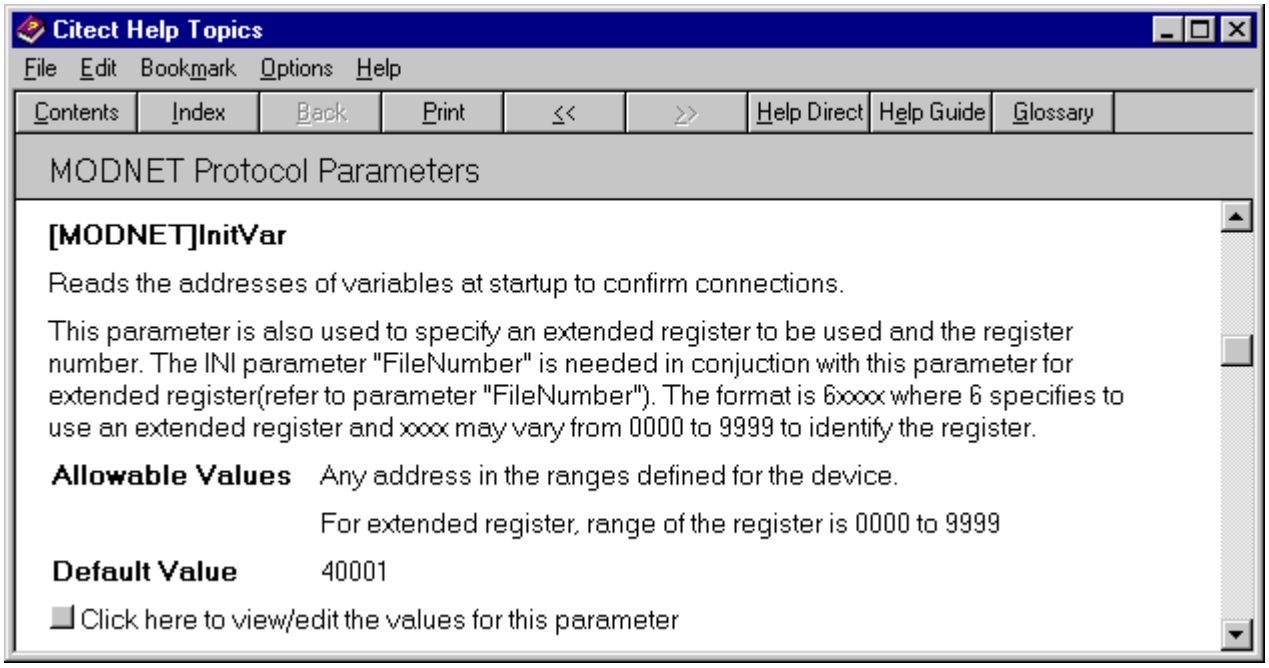
Screen Shot 18



Screen Shot 19



Screen Shot 20



Screen Shot 21

Important Note 4:
It's generally a good idea to set the InitVar value (see screen shot 21) to be of an I/O type that your Modbus station has. With previous versions of the Modnet driver this was absolutely required. With the latest version, Citect should still communicate if the InitVar I/O type is not found in your station.

Conclusion:
This test successfully performed Open Modbus/TCP communications to a serial Modbus device connected off of an EtherTRAK module or gateway.

Troubleshooting Tips:

- Put a "DebugSTR = <portname> ALL" entry in the [Modnet] section of the Citect.ini file. Then when you run your Citect project a syslog.dat file will be created in the Windows directory. This file should show the Modbus messages being sent and the responses received. This can be very helpful in diagnosing a problem.
- After creating your Citect project you may need to run through Citect's Computer Setup wizard and enable Events.
- If you need to make changes to your configuration in Citect's Express Communications wizard then you may need to re-create it from scratch. If your communications doesn't seem to be working then try deleting your IOserver configuration (which deletes all your communication settings), re-pack your project, and then run through the Express wizard again.
- Of course, if all else fails then contact SIXNET or Ci Technologies for technical assistance.

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