

CorsairHMI Experts

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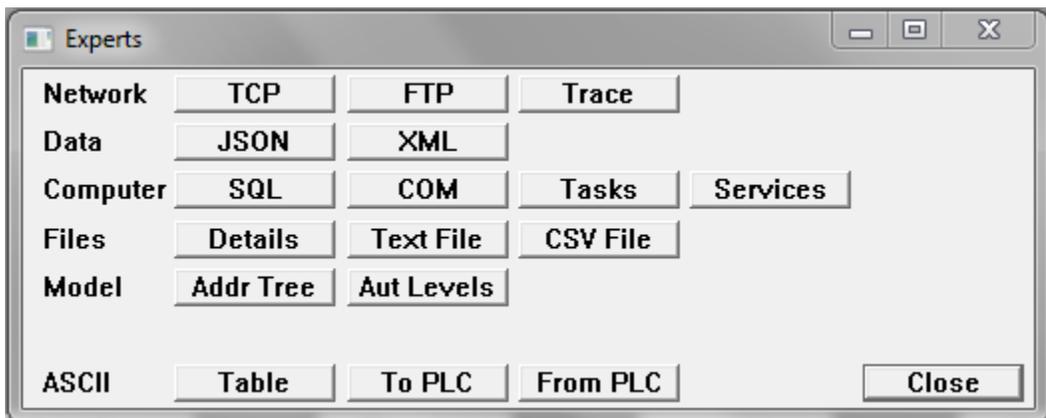
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Corsair Experts

Corsair experts are sections of the program with several purposes. Some Experts are view-only windows that monitor the operation of the Corsair program. Some are used to investigate, monitor, and configure external data paths. Some can be used to configure other equipment. Some are used to automatically generate portions of a Corsair application database. The purpose of many of the experts is to aid in telephone support of an installation. The operators can see the status of many things in a safe way that does not enable them to disrupt the system.

Many of the functions that are performed by the experts are available with other programs. The Corsair advantage is that they are all available within the Corsair development environment. They are integrated with the Model file. They are optimized for what the Corsair developer needs and frequently easier to use than separate programs. The developer does not need to pay for, download, or install separate utility programs. Most of the experts are available with either a Windows or a Linux Corsair program.

Many of the experts are opened from the Corsair main menu 'Tools''Experts' option.



The experts that appear on this window depend upon the build and license options that are present on the system.

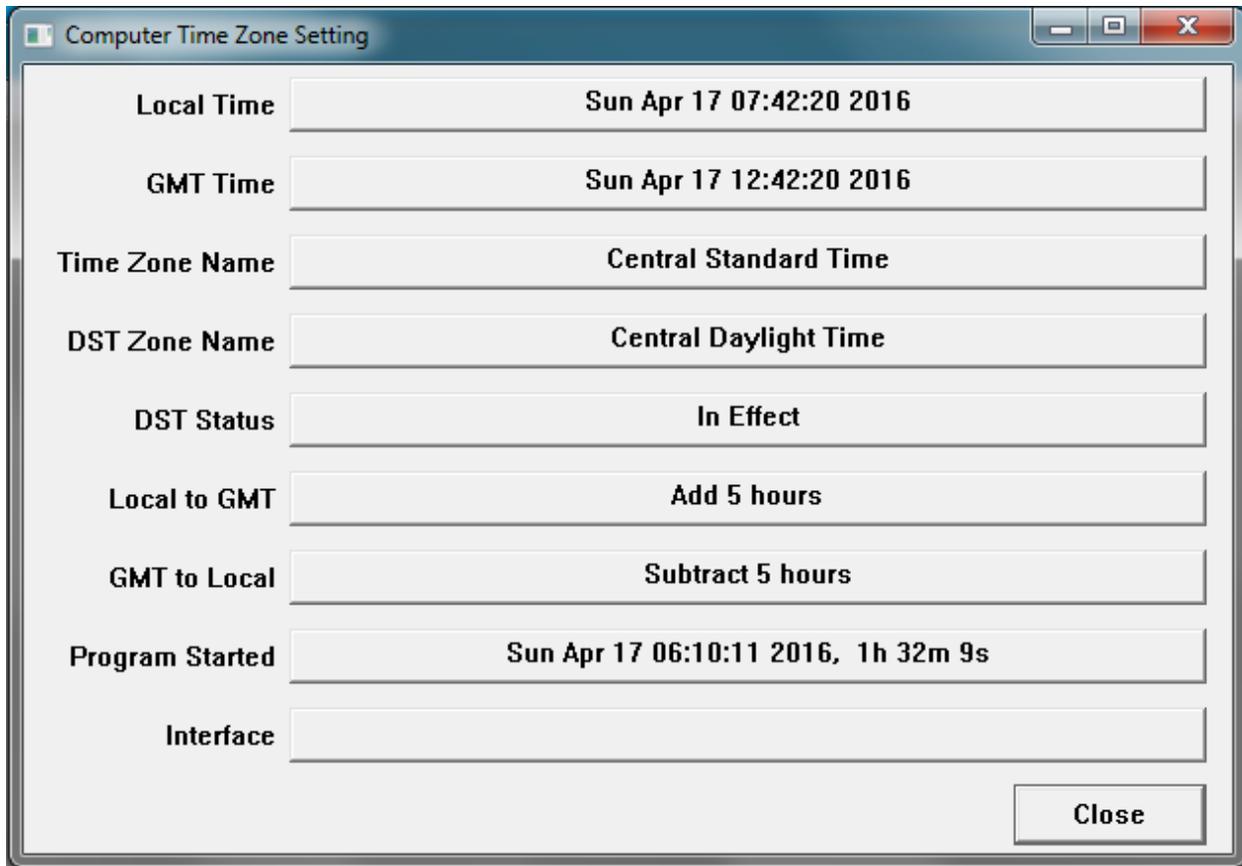
The Data Source Address Tree

The Corsair program generates a listing of data source addresses in a tree structure. This data can be viewed by the developer as a tree control in a window. It can also be printed out. The resulting document can be the basis for coordination of addresses between the Corsair developer and the PLC programmer.

Time Zone Monitor

The Time Zone monitor window is a view-only window. It gives the operator and developer information about the computer's clock and calendar. It can be used to verify that the computer is set up for the correct time zone. The Corsair program cannot be used to directly change the computer clock or time zone.

CSV data log files frequently contain date and time values for each record in the log. Responsible developers will use GMT time for logged data. This means if someone is viewing the log through the CSV file viewer or through a spreadsheet program the times in the log records will not be the local time at the computer. This window can help the operator to determine how many hours to add or subtract from the records time to get the corresponding local time. Remember that this value changes with daylight saving time.



The Program Started time shows when the Corsair program started running. The Interface time shows when Interface operation began or ended.

Database Generation

To be determined

The Application Database Error Summary

The Corsair program runs a background task called the 'thinker' that constantly analyzes the database. One of the tasks that the thinker performs is checking the database for errors. Each possible error condition has an error code number.

All possible error code numbers are shown with some description by picking Help/Program Information/Error Codes from the main menu. Using the up and down arrow and page up and down keys it is possible to scroll through the list of codes. The list may be printed out when the Corsair program is used to print a manual.

Error code numbers are divided into ranges of values. Each range has a name. Each range serves a different purpose. The thinker uses 4 ranges of error codes:

1000-2999 Advice
3000-4999 Alert
5000-6999 Warning
7000-8999 System

A summary of the current results from the thinker's error checking is shown from the main menu with View/Error Summary. System errors are shown on this window. They are errors that apply to the setup of the computer or to deficiencies in the database.

Advice, Alert, and Warning errors are applied to individual fields in the development databases. If a field has an error it will be shown in color. The color corresponds to the range of the error. When the developer clicks on the field the description of the error appears in the status bar on the bottom of the window. Clicking on the status bar causes a more complete description of the error to appear.

Warning errors are the most severe. Advice errors are the least severe. The recommended Corsair project procedure is to have all warnings fixed before startup. All Alerts should be cleared before leaving the database with a customer. All advice items should be evaluated before the project is closed out.

The computer can move through the databases from error to error using Control-N to go to the next error and Control-L to go backwards to the previous error. This error search can be reset to the beginning from the main menu by View/Reset Error Search.

There are other ranges of error codes.

9000-9999 Disk
10000-11999 Winsock
12000-12999 Memory
13000-14999 Comms
15000-16999 Notice
59000-60999 Entry
61000-62999 Application
63000-64999 Corrupt Memory

Disk errors are concerned with disk file operations. Winsock errors apply to the operation of the computer's TCP/IP communications software. Memory errors deal with computer memory allocation. Comms errors apply to various problems with communications. Notices are codes to guide the developer in his work. Entry errors spot when data entered into a field is not acceptable. Application errors indicate faults in the Corsair program. Corrupt memory errors indicate problems with the Corsair application database.

The MBHR Host Monitoring Window

When the Corsair program acts as a host for the MBHR remote access system up to 100 computers can act as remotes. The Host Monitoring window shows what remotes are hooked into the host, their IP addresses, their network names, and how long they have been connected. The information can be printed.

The Communications Architecture Printout

The Architecture printout is a chapter of the Corsair application manual that can be printed from the Corsair computer. This printout shows configuration information about the communication networks that are shown in the Corsair database. One of its uses is in the submittal process when seeking an engineer's approval of a design before ordering equipment.

The Email Status Window

The email status window shows diagnostic information about the email system and provides a way to test it.

The Data Source Diagnostics Window

This window monitors the status of the communications to all connected data sources. It shows the connection status and time. It shows the total of good and bad reads and writes and the last time of each. It shows the last read and write error code.

The HTTP (Web) Host Window

This Window displays the status of the HTTP server system.

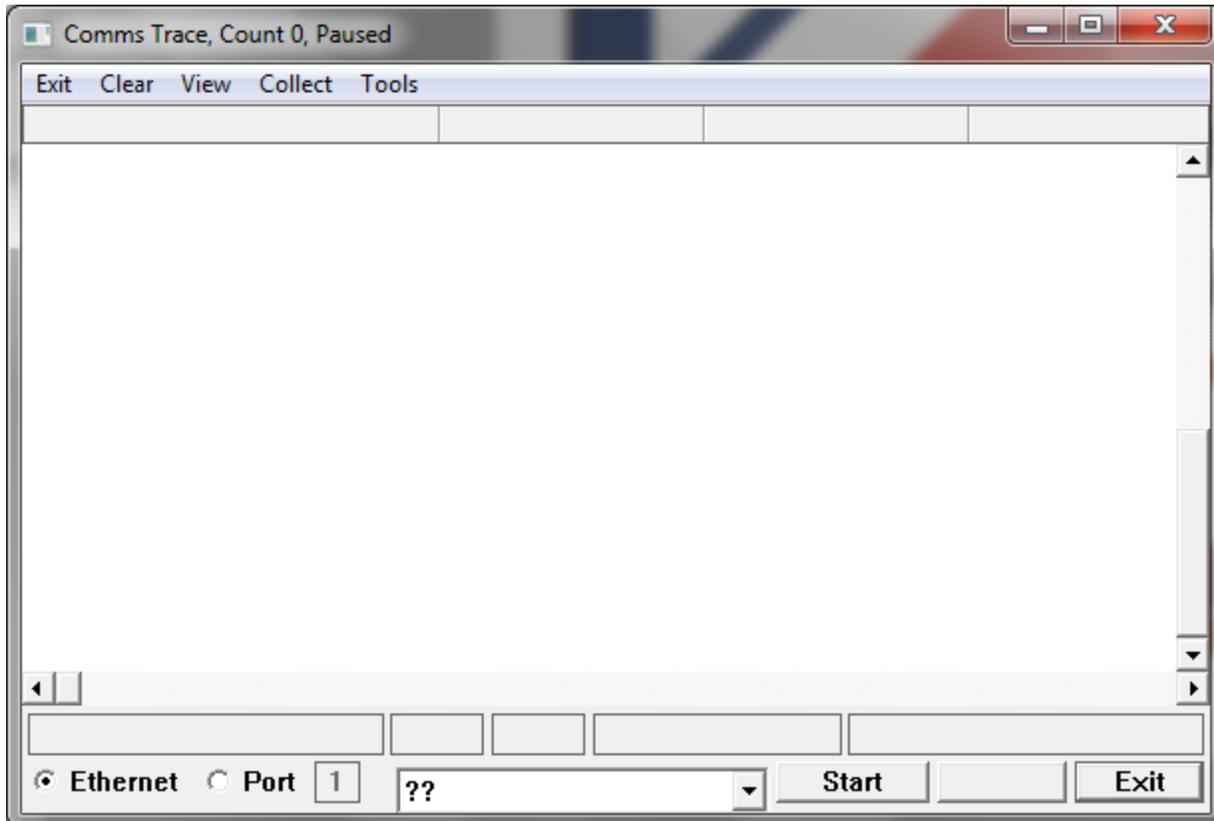
The Sound Monitor Window

The Corsair system can produce sounds from Wave files in response to alarms. This window displays the contents of the queue of sounds and enables testing of the sound system.

Communications Trace

Corsair communicates with several types of devices over serial port and Ethernet connections. It uses different protocols that send different types of data packets. The communications trace expert is used by advanced developers to see what the Corsair program is transmitting and receiving. The trace is available for most driver types but not for Ethernet MBHR communications. It allows the developer to analyze the communications traffic for Modbus function codes and exceptions, data length and byte-

ordering problems, and many other things. This expert features packet analysis for some communications protocols. Packet analysis means that labels appear on the trace window to explain the meaning of different parts of the data packet.



The trace is started using the Comms Trace window. It is accessed from the main menu from Tools/Comms Trace. After the trace is enabled the window can be closed and the trace will continue. Opening the window again will show the trace result as a collection of items.

Trace items are of two types – headers and data. A header may mark an event like the establishment of a TCP/IP connection. More commonly a header marks the start of a data packet. A data packet is a group of 1-byte characters. Transmit data packets show data that is transmitted from the Corsair computer to another device. Receive data packets show data that was transmitted from another device to the Corsair computer. Most types of headers show the count of characters that is in the packet. The characters in a packet are labeled with T or R followed by a number. The number is the position of the character in the packet. T[0] is the first character of a transmit packet. R[2] is the third character of a receive packet.

The value of each character is shown as a hexadecimal number with a 0x prefix. The View menu selections contain an option to change the display to decimal. An ASCII interpretation of the value is shown. If the value is hex 0x41 it is also decimal 65 and the ASCII for an upper case letter 'A'.

The header will often tell what communications protocol is being used for the packet. For some protocols Corsair can display comments about what some of the packets characters mean.

To start the communications trace the operator must first select if the source is Ethernet or a serial port. Ethernet traces show all Ethernet activities from all drivers. It may be necessary to set some data sources to be Not Real to reduce the data on an Ethernet communications trace.

A serial port trace can be on any serial port from 1 through 10.

After the operator selects the source of the trace clicking on the 'Start' button will start trace operation. The 'Pause' button can be used to stop the data collection without stopping communications. The 'Clear' menu option is used to clear out the trace data.

The trace memory buffer is large enough to hold several thousand headers and characters. Usually it fills up and the older items are lost as newer items are added.

The 'Collect' menu selections are used to control options for how the trace collects data. It includes a 'Quit if Full' option. When 'Quit if Full' is checked the trace will operate until it is full and then pause automatically. The operator must then clear the trace buffer before it can be started again.

The communications trace can accumulate a large amount of data in a short time, especially with Ethernet communication. By default it collects Transmit Headers, Transmit Data, Receive Headers, and Receive Data. Collect menu options allow these items to be selectively shut off. Data must have headers so it is not possible to have Transmit Data on and Transmit Headers off.

Another collection control option is the Header Filter. It can reject all headers that do not match a particular header type. As an example, assume that a developer is setting up communications between a GPS receiver and a Corsair computer. He goes to the Data Source Register Monitoring window to see a summary of the GPS sentence types that he is receiving. It shows him that he is receiving some unrecognized GPS sentences. These are sentences whose type is not recognized by the Corsair program. He can go to the comms trace window, set the filter on the bottom of the screen to 'Unrecognized GPS Sentence', and turn on the 'Use Header Filter' option on the Collect menu. He can then clear the buffer. It will fill with just the unrecognized sentences.

When the trace is paused trace data can be output to a printer.

Comms trace settings are not retained when the Corsair program is stopped.

The comms trace window can be a powerful tool to use when starting up Corsair interface systems, especially with serial-port drivers.

TCP Expert

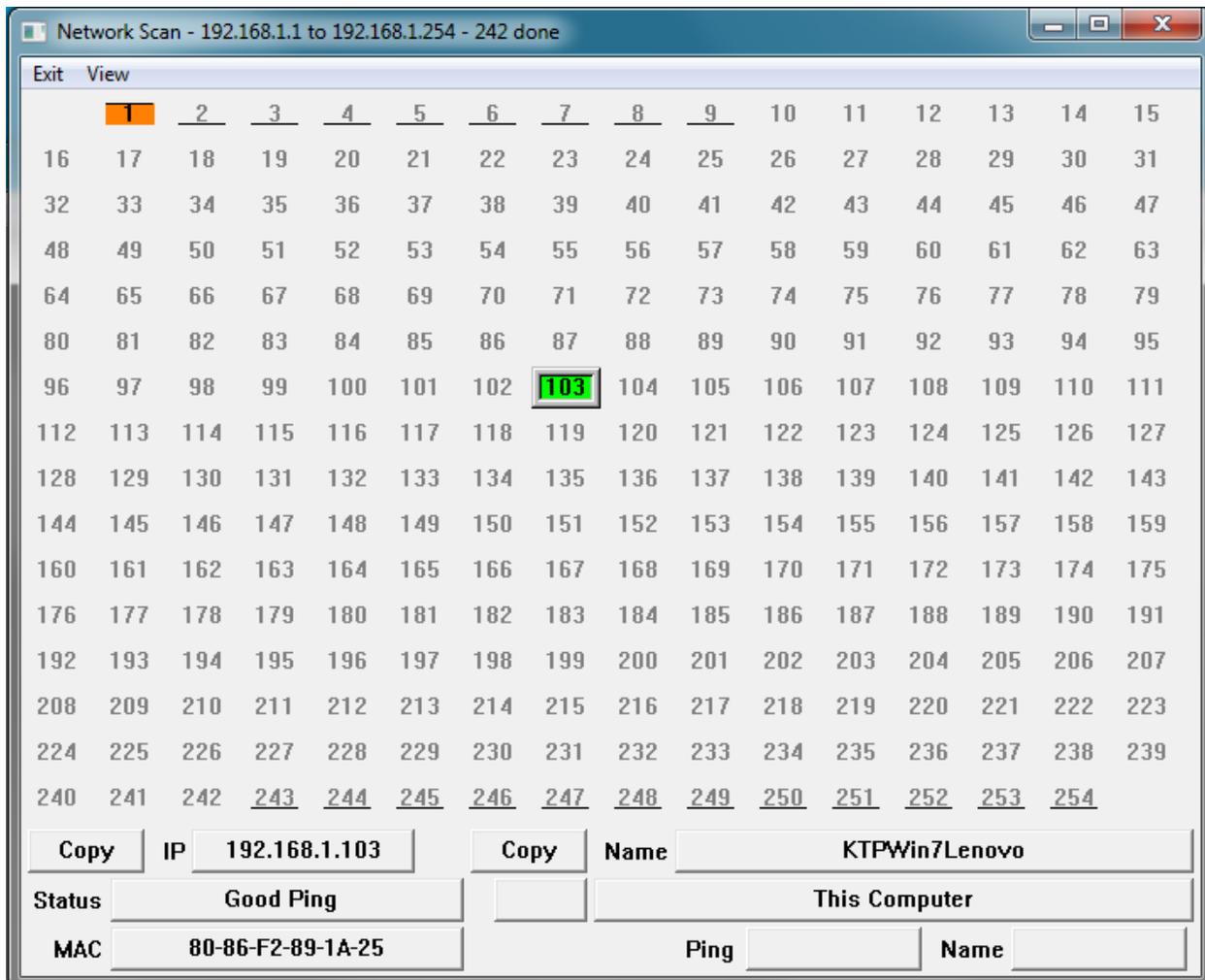
The TCP expert is used with Ethernet networked systems. It can learn about what devices are on a network and make some configuration changes in those devices.



The window has several buttons to select different options. There is an edit box near the bottom that can be used to enter a 4-part IP address. This address is used as a starting point for the functions on the other buttons. Two buttons can be used to assist in entering IP values for this edit box. The left-side one is labeled 'IP List'. It opens a pick list of IP addresses based upon records in the currently selected Corsair model. The right-side button is labeled 'Computer IP'. It opens a pick list of IP addresses from the computer that the Corsair program is running on.

Ping Scan

When a nonzero IP address has been entered the 'Ping Scan' button appears. It opens a window that examines the network to see what addresses exist. It scans the 254 addresses from the entered address with a 1 at the end through the entered address with a 254 at the end.



The scan window does a Ping to locate devices. Computers will not appear on it if they are firewalled to not respond to pings. Successful pings will show up with a number in orange. Corsair tries several pings at one time. Active pings are shown with a line underneath the number. After Corsair gets a successful ping to an address it tries to fetch a network name. It only ties one network name at a time as shown by a line above the number. If it gets a network name the number is shown in green. Typically computers show in green and PLCs show in orange.

The scan window can be printed so that the printout can be compared to scan results at a later date. This serves as a check for devices that are missing from the network.

Bootp

The Corsair program contains a TCP expert utility. One of the functions that it can perform is a BootP server. BootP is a way to load an IP address into a piece of equipment so that it can communicate on a TCP/IP Ethernet network.

For the BootP server to work with a Corsair program on a Windows machine it may be necessary to turn a network firewall off. The program will have to be started in a Windows Administrator mode. This is typically a property of the shortcut that starts the Corsair program.

The development level of the Corsair program must also be set to 'Admin' for the BootP server to work. It should say "Dev: Admin" on the status bar of the Corsair desktop. The 'Users – Change Levels' menu option is for setting this level.

Corsair supports two methods to serve out BootP addresses. The first is 'Requested' BootP. The device requests an address and Corsair replies with one. Most devices use this method. The second method is 'Transmit' BootP. Corsair repeatedly sends out a BootP reply to the device even though it has not explicitly requested one. With either method the Corsair program needs to know the 6-part Ethernet MAC address of the device. Most of the time that address consists of 6 two-digit hexadecimal numbers separated by colons. Frequently it is on a label somewhere on the device. In some cases Corsair may be able to discover what this address is if the label is not available.

Procedures

Situations differ in how the Corsair BootP server has to be used. The following list contains standardized procedures that have been developed for using it to load addresses into equipment. A separate manual named 'CorsairHMI Application Notes' recommends which of these procedures to use for some different situations.

The Corsair BootP server may be unusable in some situations where the final subnet mask of the device needs to be something other than 255.255.255.0. The procedures written here assume that the initial and final IP addresses of the device are on the same subnet as the Corsair computer. That usually means that the first 3 numbers of the IP address agree. The procedures may have to be modified if the initial and final IP addresses are on different subnets. For instance, if changing an IP from 192.168.141.12 to 192.168.1.7 the network adapter address of the Corsair computer may need to be changed at least once between the 192.168.141.# to 192.168.1.# subnets.

Procedure 'A'

Step 1: Your Corsair license must have the 'CIP Expert' option. This is verified from the 'Help – View License' menu selection. Go to the 'Options' tab and verify that 'CIP Expert' is checked.

Step 2: Pick the 'Tools – TCP Expert' menu selection. Hit the 'Protocol' button. Select the 'EtherIP' radio button option.

Step 3: Hit the 'Computer IP' button. The IP selector will show the addresses of adapters that are on your computer. Select one that is compatible with the initial address that is presently on the equipment.

Step 4: Hit the 'Ping Scan' button. Wait for the scan to complete and show '254 done'. It may take two cycles for all the addresses to appear. Addresses that are in use will show with an orange or green color.

Step 5: Verify that the current 'initial' IP address of the device before the change is shown on the scan with a MAC address. If it is not shown the situation will have to be investigated. Perhaps Procedure 'B' will need to be used. Verify that the MAC address that is shown matches the one labeled on the device.

Step 6: Verify that the target 'final' IP address that is desired for the device is not shown on the Ping Scan. If it is there is a device that needs to be removed from the network or you need to use a different Final IP.

Step 7: Pick the 'View – Requested BootP' menu selection. Two lists will appear. The Requests list is on the top and the Relations list is on the bottom. Your device should be showing with its MAC address and initial IP in the Relations list. Other devices may also be in the list. You may click on them and use the delete button to remove them from the relations list if you wish. Corsair will not serve out IP addresses to relations that do not have an entered final address.

Step 8: Select the desired device in the relations list. Click on 'Edit' and enter the desired final IP address. The 'Final IP' button may be used to pick addresses from the Corsair database if desired. The bottom edit box may show if the final address is unreachable by the computer. This serves as a warning that the entered address may be wrong or an adapter setting may need to be changed on the computer later in the procedure.

Step 9: If desired, clear any requests from the requests list.

Step 10: Use the button to turn BootP on. Cycle the power by either interrupting the power to the device or by picking 'Power Cycle' from the menu. Wait for the MAC address to appear in the Requests window. It may take more than one request before the IP address appears in the Requests window. The requests from that device should stop.

Step 11: Use the button to turn BootP off. Cycle the power by interrupting power to the device or picking 'Power Cycle' from the menu. Close the BootP window.

Step 12: The procedure is done when the final IP address appears in the ping scan showing the correct MAC address. It may take a few ping scan cycles for this to happen.

Procedure 'B'

Step 1: Your Corsair license must have the 'CIP Expert' option. This is verified from the 'Help – View License' menu selection. Go to the 'Options' tab and verify that 'CIP Expert' is checked.

Step 2: Pick the 'Tools – TCP Expert' menu selection. Hit the 'Protocol' button. Select the 'EtherIP' radio button option.

Step 3: Hit the 'Computer IP' button. The IP selector will show the addresses of adapters that are on your computer. Select one that is compatible with the final address that is desired for the equipment.

Step 4: Hit the 'Ping Scan' button. Wait for the scan to complete and show '254 done'. It may take two cycles for all the addresses to appear. Addresses that are in use will show with an orange or green color.

Step 5: Verify that the target 'final' IP address that is desired for the device is not shown on the Ping Scan. If it is there is a device that needs to be removed from the network or you need to use a different Final IP.

Step 6: Pick the 'View – Requested BootP' menu selection. Two lists will appear. The Requests list is on the top and the Relations list is on the bottom. Requests should be coming into the top list. Select a request that matches the MAC address of your device. Click on 'Add to List' to place your MAC in the relations list.

Step 7: Select your MAC in the relations list. If there are other entries in the list they can be deleted. Corsair will not serve out IP addresses to relations that do not have an entered final address.

Step 8: If desired, clear any requests from the requests list.

Step 9: Click on 'Edit' to enter a final IP in the relations list item. An initial IP is not needed. The 'Final IP' button may be used to pick addresses from the Corsair database if desired. The bottom edit box may show if the final address is unreachable by the computer. This serves as a warning that the entered address may be wrong or an adapter setting may need to be changed on the computer later in the procedure.

Step 10: Wait for the MAC address to appear in the Requests window. It may take more than one request before the IP address appears in the Requests window. The requests from that device should stop. Requests from other devices may continue. They can be ignored.

Step 11: Use the button to turn BootP off. Cycle the power by interrupting power to the device or picking 'Power Cycle' from the menu. Close the BootP window.

Step 12: The procedure is done when the final IP address appears in the ping scan showing the correct MAC address. It may take a few ping scan cycles for this to happen.

Procedure 'C'

Step 1: Pick the 'Tools – TCP Expert' menu selection. Hit the 'Protocol' button. Select the 'No Specific Protocol' radio button option.

Step 2: Hit the 'Computer IP' button. The IP selector will show the addresses of adapters that are on your computer. Select one that is compatible with the initial address that is loaded into your equipment.

Step 3: Hit the 'Ping Scan' button. Wait for the scan to complete and show '254 done'. It may take two cycles for all the addresses to appear. Addresses that are in use will show with an orange or green color.

Step 4: Verify that the target 'final' IP address that is desired for the device is not shown on the Ping Scan. If it is there is a device that needs to be removed from the network or you need to use a different Final IP.

Step 5: Click on the IP address that corresponds to the initial (current) IP address that is loaded into the device. It should show a MAC address on the bottom of the window. Verify that it matches the MAC address that is labeled on the device.

Step 6: Pick the 'View – Transmit BootP' menu option. The window should appear initialized with your device's MAC address and current IP address. Change the IP address to the desired Final IP. A button is available to help you select an address from the Corsair database if desired.

Step 7: Click on 'Start' so that Corsair will start to send BootP messages. Shut off the power feeding your device. After a short time turn the power back on again. Do not close the BootP window. Move it so that you may see the desired final IP address on the ping scan window.

Step 8: As soon as the desired final IP address is shown on the ping scan window you may close the Corsair TCP expert. Do not cycle power to the device before loading a program into it using the manufacturer's programming software.

Procedure 'D'

Step 1: Pick the 'Tools – TCP Expert' menu selection. Hit the 'Protocol' button. Select the 'No Specific Protocol' radio button option.

Step 2: Hit the 'Computer IP' button. The IP selector will show the addresses of adapters that are on your computer. Select one that is compatible with the final address that is desired for your equipment.

Step 3: Hit the 'Ping Scan' button. Wait for the scan to complete and show '254 done'. It may take two cycles for all the addresses to appear. Addresses that are in use will show with an orange or green color.

Step 4: Verify that the target 'final' IP address that is desired for the device is not shown on the Ping Scan. If it is there is a device that needs to be removed from the network or you need to use a different Final IP.

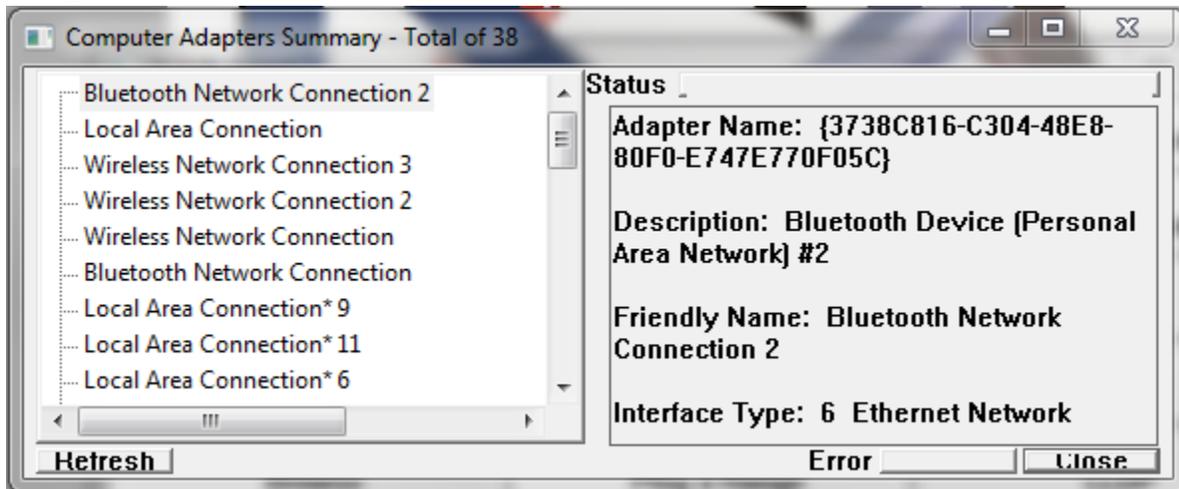
Step 5: Click on the IP address that corresponds to the final (current) IP address that is desired for the device.

Step 6: Pick the 'View – Transmit BootP' menu option. The window should appear initialized with the final IP address. Determine the devices MAC address from the label that is on it. Type it into the window.

Step 7: Click on 'Start' so that Corsair will start to send BootP messages. Shut off the power feeding your device. After a short time turn the power back on again. Do not close the BootP window. Move it so that you may see the desired final IP address on the ping scan window.

Step 8: As soon as the desired final IP address is shown on the ping scan window you may close the Corsair TCP expert. Do not cycle power to the device before loading a program into it using the manufacturer's programming software.

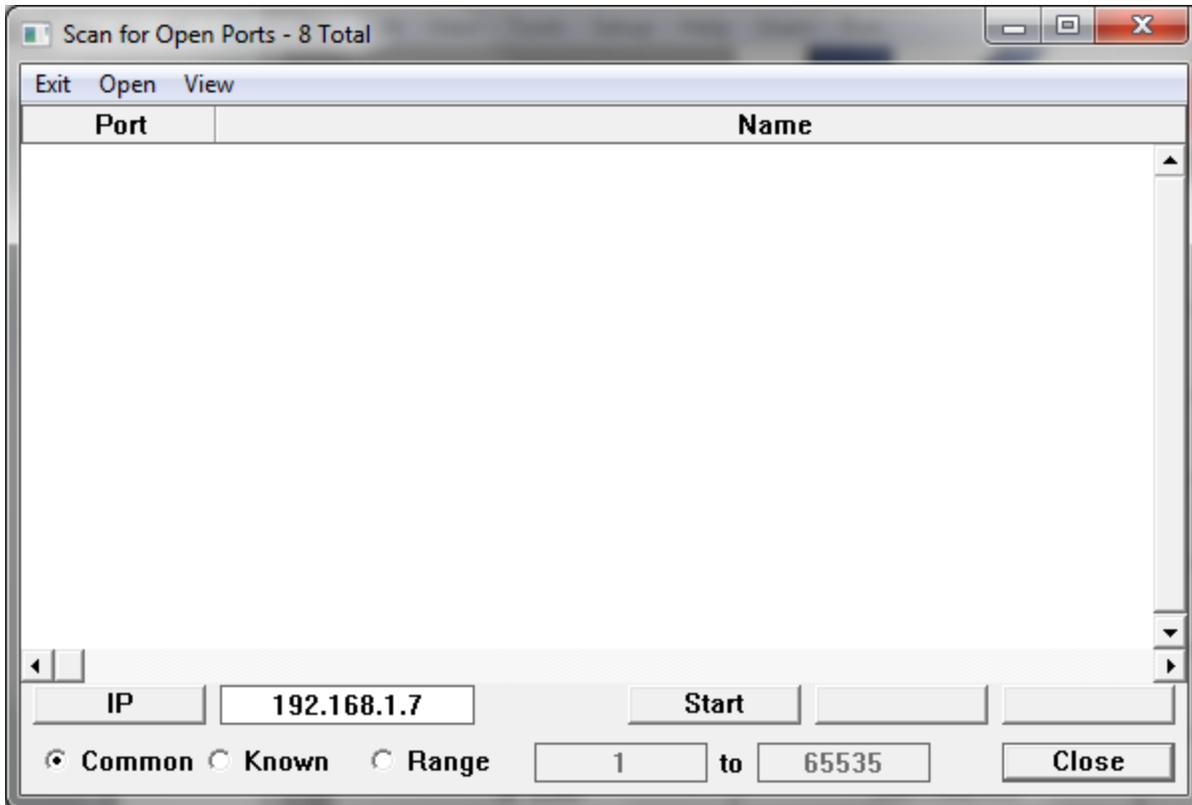
Adapter Summary



The adapter summary window provides a listing of all the adapters that are present on a computer, their status, and their assigned IP addresses. This window is helpful with diagnosing IP address and subnet issues. It also provides a way to discover adapter 'friendly' names to use for the Adapter Status program block.

Scan Open Ports

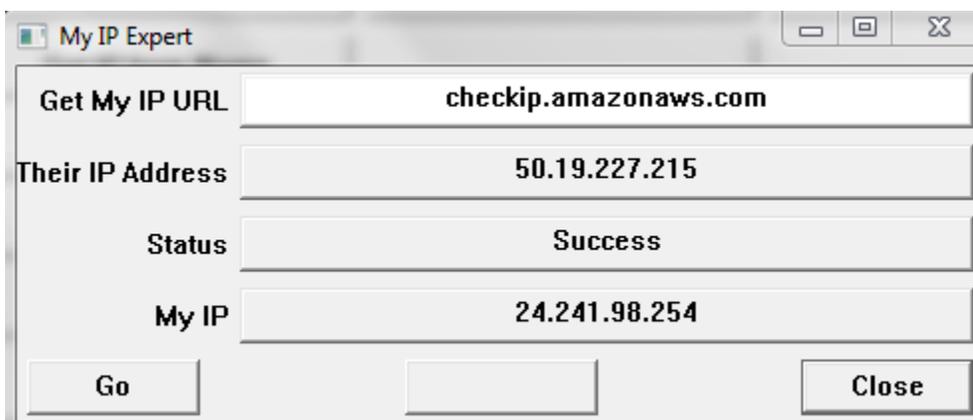
When a nonzero IP address has been entered the 'Scan Open Ports' button appears. It opens a window that scans that IP address to see what TCP ports it has open.



The 'View' 'Known Ports' menu option opens a window listing port numbers that are known to Corsair. There are far more known ports than what is listed here. These ports are numbers that are of interest for industrial control work. A subset of these ports is marked as 'Common'. The scanner gives the option of scanning for Corsair's Common ports, for Corsair's Known ports, or for a range of port numbers. The range can be as large as from 1 to 65535. Scanning for a large number of ports can be a very slow process.

My IP

The My IP Expert is used to see if a web address can be used to determine the Internet address of the Corsair computer. The developer types in a URL address of a service that provides IP information.



After the address is entered the 'Go' button is used to try the read. If successful the window shows the IP address of the service and the address on the Internet for the Corsair computer. This address may change periodically depending on the Internet Service Provider and what plan options have been purchased.

Suggested URLs for the service to get the IP address include:

checkip.amazonaws.com

whatismyip.akamai.com

Other services are possible. This expert window gives the developer an opportunity to test them. Successful addresses can be used on the Web tab of the computer properties for automatic My IP operation.

ASCII Experts

ASCII stands for American Standard Code for Information Interchange. It is a system for storing letters and words in computer memory. Corsair's ASCII expert functions are used as aids for doing ASCII communications programming work. These include an ASCII character table and window to assist with translating between ASCII strings and PLC register data using different encodings.

The SQL Expert

Structured Query Language (SQL) is a standard for other computer programs to communicate with database programs. Corsair programs with the SQL license option can work with SQL-compatible databases. The expert is used to setup and verify database connections. The Corsair developer can verify an SQL connection, see if a database exists, create and delete databases, tables, and columns, and view database rows. It performs some of the functions of simple SQL management console.

SQL Expert

Exit Get Put View Action

Database Type MS SQL Server

Use DSN? DSN Driver

Server Database Schema dbo

Table Trusted? User

Password Extra

Close

The SQL Clocks Window

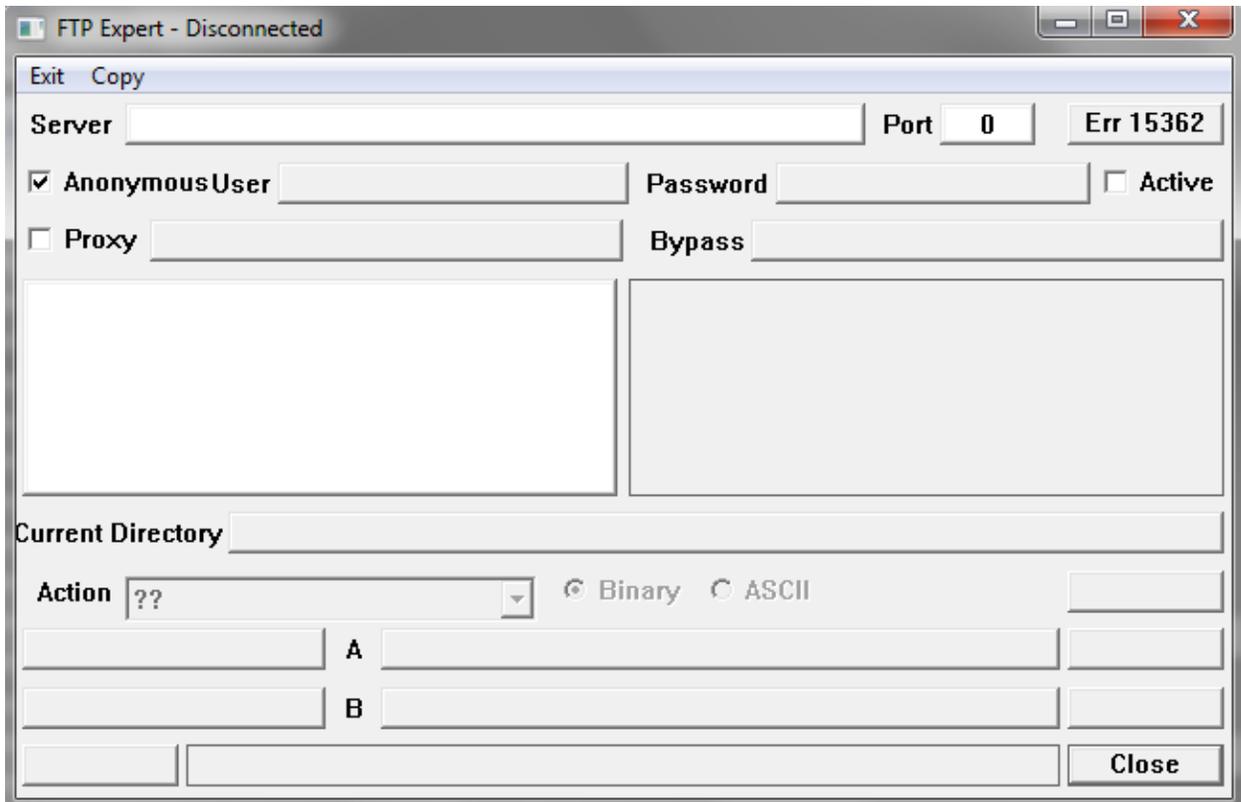
This window displays a time that comes from a remote SQL database engine computer. It also shows the time from the local Corsair computer. The time can be downloaded to the Corsair computer manually or automatically at regular intervals.

The FTP Expert

The function of the FTP expert is to aid the developer in setting the Corsair program to do FTP file transfers. It can then be used to verify FTP communications during system commissioning.

The Corsair program can act as an FTP client and not as an FTP server. This means that it can initiate FTP communication to a server. Another computer program acting as an FTP client cannot initiate communication to the Corsair program.

The FTP expert is only available when the development level is set to Administrator. It is access from the main Corsair menu through the Tools / Experts option.



The top section of the expert window had edit controls for editing the FTP server data. The name of the server is the first thing to be entered. The next is the port number that is to be used. Normally the entered port number is left at zero. Corsair will then use the default port value for the FTP protocol. Port numbers should be entered in decimal and not in hexadecimal.

The window defaults to an Anonymous log-in. If Anonymous is not checked a user name and password will have to be entered. When the server data is ready a 'Connect' button on the upper right side of the window will be available to access the server. If it cannot connect a button on the lower left will show an error code. If it connects successfully the button on the upper right can be used to disconnect. The window also disconnects automatically when it is closed.

When Corsair is connected to the server the contents of the current FTP directory are shown on a tree control on the left side of the expert window. Clicking on an item enables display of data about it on the right side.

The lower part of the expert window contains a selector that is used to set an action. Below the action selector is an entry field that is used to set up the action. When an action is ready to be executed the button to the right of the action selector changes to 'Do It'. Clicking on it executes the action.

Action Type: ??

Two question marks is the undefined type when the developer has not selected an action yet.

Action Type: Download File

Downloading a file is the process of copying a file from the FTP server to the Corsair computer.

Action Type: Rename File or Directory

Action Type: Upload File

Uploading a file is the process of copying a file from the Corsair computer to the FTP server. The entry field is for the name of the file that is to be uploaded. A Browse button is provided to assist in finding this file.

Action Type: Check if a file exists

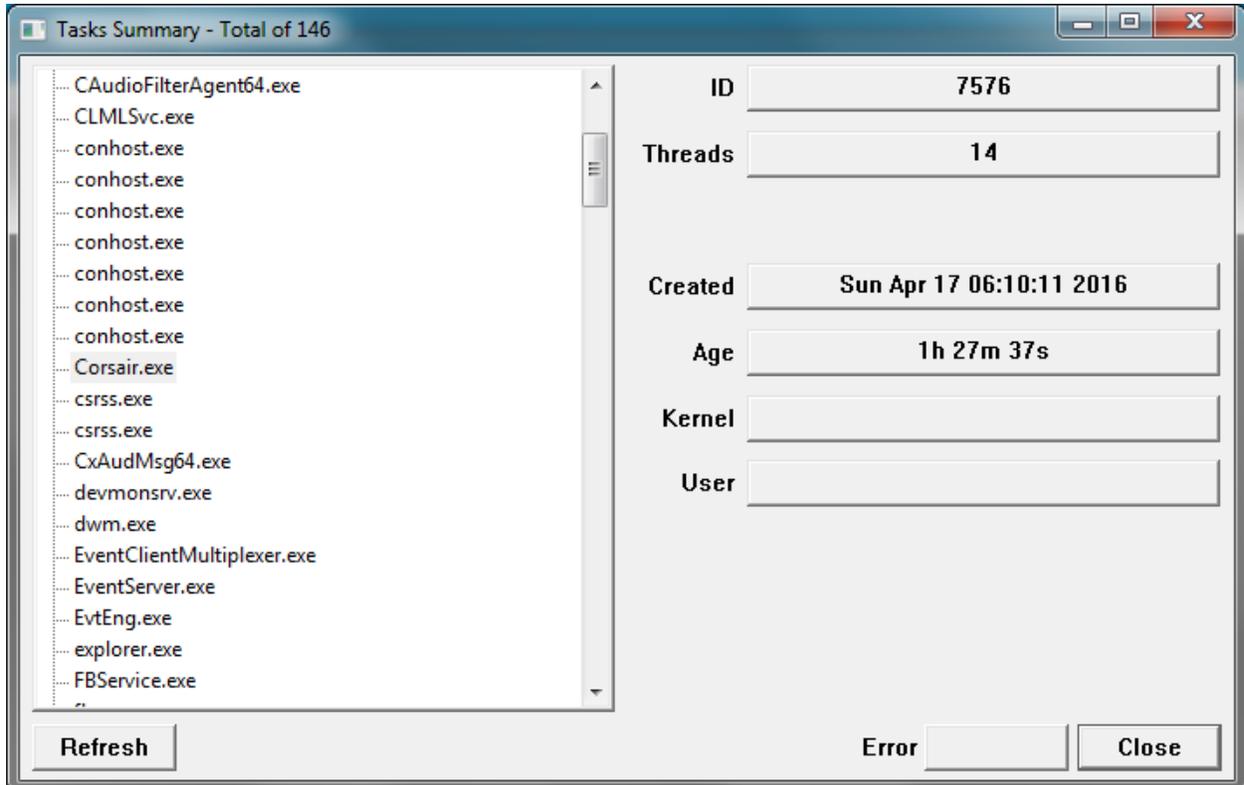
Action Type: Change Directory

Action Type: Create Directory

Action Type: Remove Directory

Task Summary

The task summary is used by the operator or the Corsair developer to see what tasks are running on the computer's operating system. The advantage over the systems Task Manager is that operators can see the tasks in phone support situations without being able to control them.



Text File Viewer

Text files are files on the hard drive of a computer that contain information that can be read by a human operator. The Corsair Text File Viewer is a read-only viewer that can be used to see what is in the file without allowing the operator to make any changes in the file. In this way it is more secure than programs like a word processor or other programs that come with the computer's operating system.

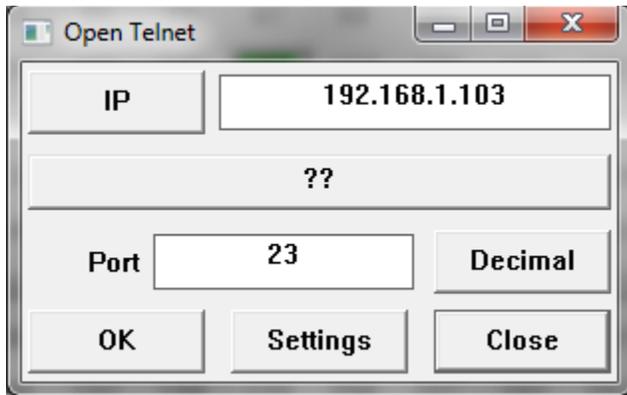
CSV File Viewer

CSV (comma-separated-value) files are a specific type of text file. They contain lines that correspond to data records. Each line consists of fields that are separated by commas. The fields may be within quotation marks. These files may be viewed with the Corsair Text File Viewer but that viewer does not understand the format of a CSV file. A spreadsheet program can open and change CSV files. The Corsair CSV file viewer allows operators to look at the data in a CSV file without permitting them to change it. This is important if the data is a history of process performance.

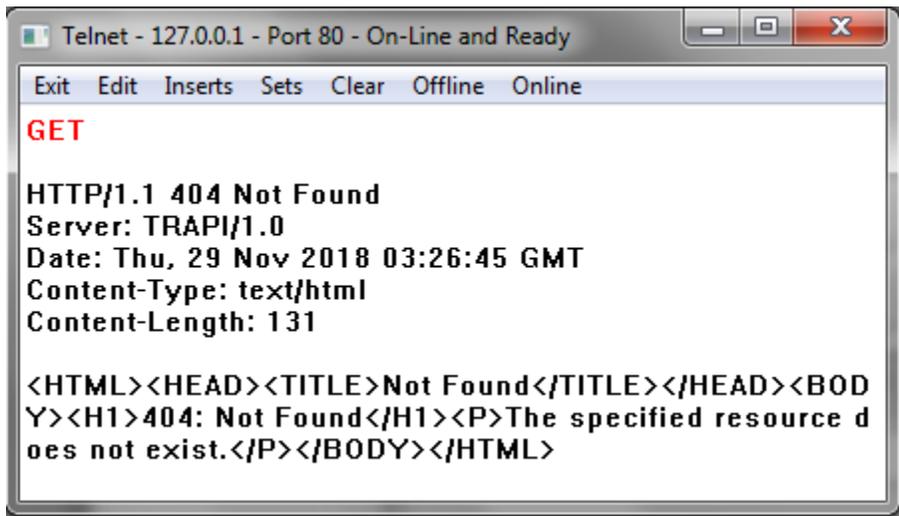
Telnet

The Telnet protocol is an older method to hook computers into other devices over a network. Telnet Client programs may not be found in the factory configuration of some computers. Corsair contains a light version of Telnet that is adequate for many purposes. It can be used as a tool to analyze connections that use the HTTP protocol. It can receive and parse JSON data that is sent via HTTP.

Opening a Telnet connection to a device requires specifying an IP address and a port number. Corsair defaults to the normal port value of 23. Devices that use HTTP typically use port 80. Other port numbers can be entered.

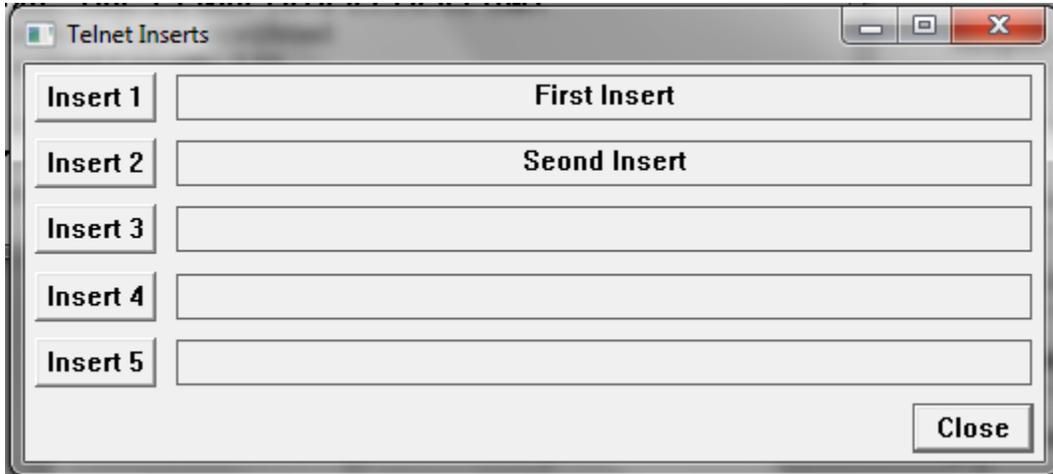


When an IP and port care entered the developer can go onto the Telnet window.

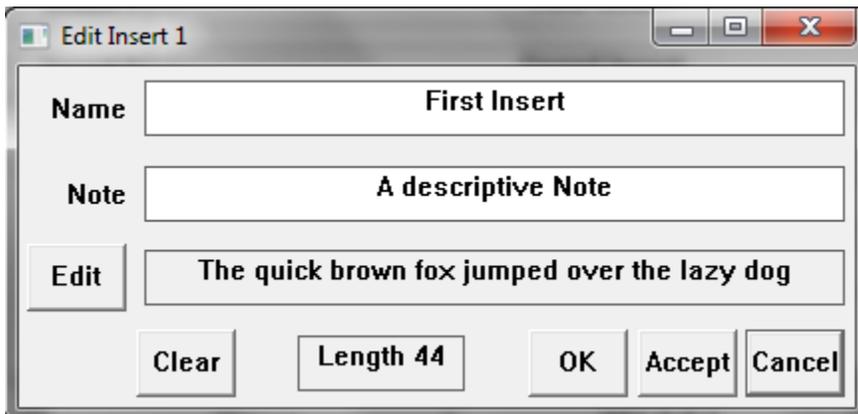


The 'Online' and 'Offline' menu options are to establish and shut down the TCP connection. The 'Clear' option is used to erase what is shown on the window. The characters that are typed from the computer keyboard are shown in red. The reply from the other device is shown in black.

It is possible to type in complete HTTP requests using this system but it is not easy as everything has to be entered perfectly or the request fails. One answer to this problem is the use of Telnet 'Inserts'. An insert is a series of characters that the developer enters into one of the 5 possible Inserts. Each insert can have a name. The 'Edit' Inserts' menu option shows the names of the 5 inserts.



The button on the left permits editing of the insert.

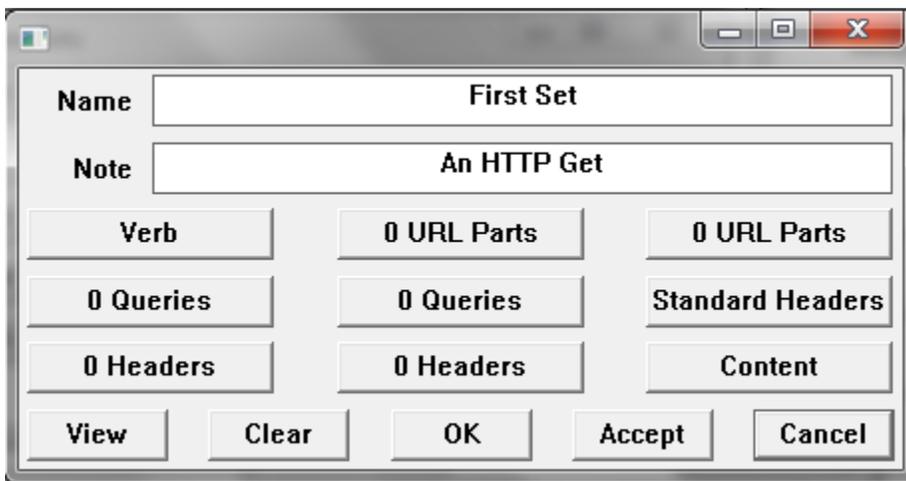


The name and description of the insert are entered here. The edit button permits entry of multiple lines of text in the insert. After an insert has been entered the developer can go back to the telnet window and pick the desired insert from the 'Inserts' Trigger #' menu options. Corsair will send the text of the insert just as if it has been typed in from the keyboard.

Inserts can be used to send complete HTTP requests but the developer must have a very complete understanding of the protocol and any encodings that are needed. It is much easier to use one of the 5 available 'Sets'. They are shown with the 'Edit' Sets' menu option.



The button on the left permits editing of the set.

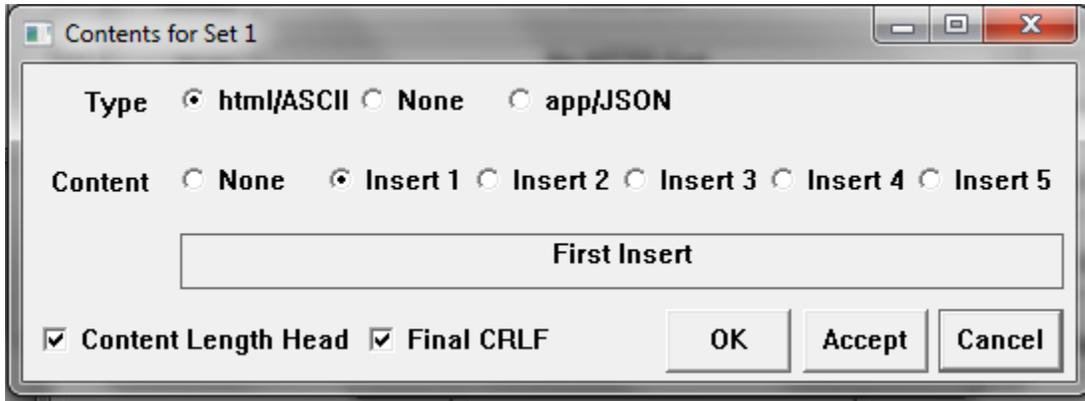


Sets are specially designed for the HTTP protocol. Several windows specify standard and nonstandard options for the set's HTTP request.

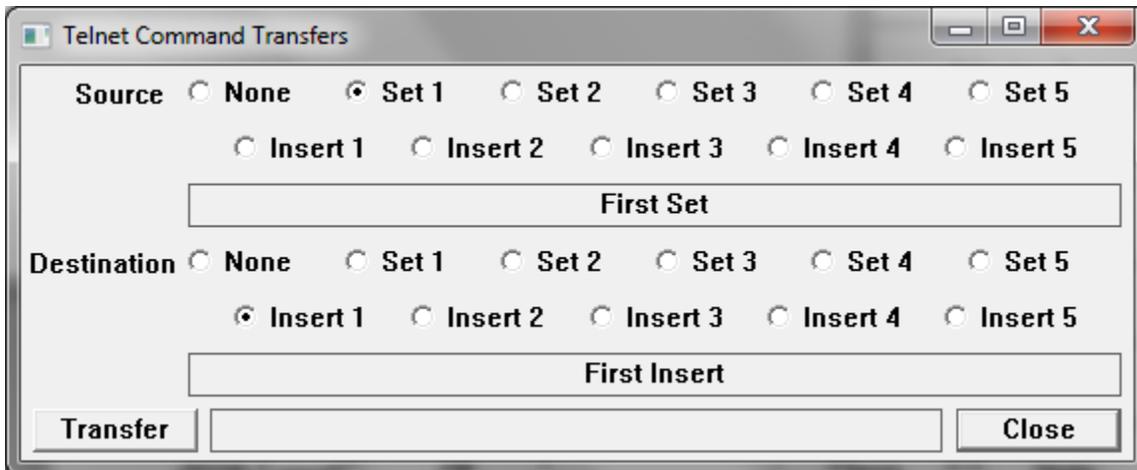
The 'View' button lets the developer preview what the set will send.



An insert may serve as the content portion of an HTTP request specified in a set.



It is possible to transfer (copy) the contents of one insert to another, from one set to another, or the results of a set to an insert for further modification.



It is not possible to transfer an Insert to a Set.

The 'Print Configuration' menu option prints the current Telnet configuration including inserts and sets. The Telnet configuration can be saved to a disk file and loaded from a disk file.

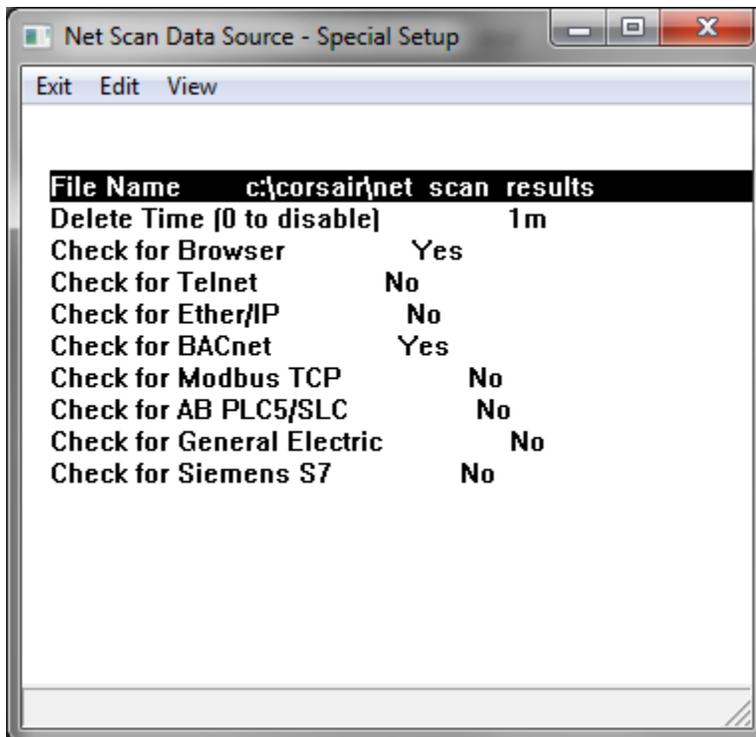
When the Telnet window receives a stream of data it shows it in black. The 'HTTP Packet' menu option shows the results of Corsair's attempt to interpret this as an HTTP packet. If the data in the reply is formatted in JSON the 'JSON Expert' menu option opens the JSON expert and offers a JSON interpretation of the packet. Data read in this way is limited by the size of the Telnet receive data buffer. Longer JSON replies can be retrieved using an option on the JSON Expert window.

Network Scan

Corsair's network scan function is used to provide a maintenance and diagnostic interface for many devices on an Ethernet network. After a small amount of development work is complete it runs continuously in the background determining what devices are present and what their capabilities are. The goal of the function is to have as much capability as possible with as little development time as possible. The scanner presents its results in a tree control. When devices are added or taken away from the network the tree control updates automatically.

The first step to configure the network scanner starts with the 'Edit''Data''Drivers' menu option. A driver record must be created. It gets the 'Net Scan - Network Scanning' driver type. Zooming on the 'PLCs' Zoom field opens a local view of the Data Sources that are on the driver. A data source must be created. A typical name for it would be 'Net Scan Data Source'.

Each network scan data source can scan the 254 addresses in a subnet. To scan from 192.168.1.1 to 192.168.1.254 any address in that range must be entered in the IP address column on the data source. The data source Real field should be set to 'Yes'. Pressing 'F7' or 'Z' on the data source record opens the special data editing that is needed for a source on this driver.

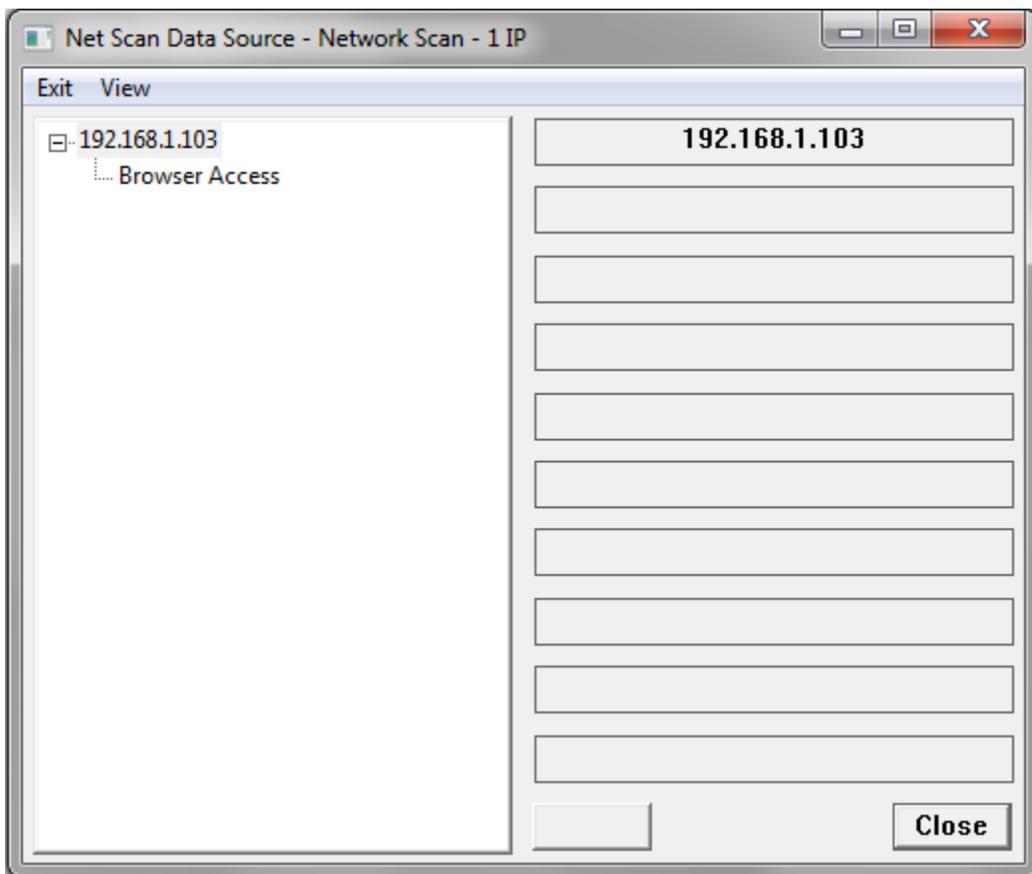


A file name must be specified to store the results of the scan. 'C:\corsair\net_scan_results' is recommended for the name. A delete time must be entered if the scan is to automatically remove deleted items from the tree. Other entries are used to determine what types of things the Corsair computer will scan for. Turning off unneeded items will speed up the scanning activity.

The delete time is used for Corsair's 'three strikes' method. When a device is sensed on the network Corsair marks that it has a good status and remembers the time. Each time that it can't read the device for more than the delete time it counts a strike. The next count after the third strike means the device will be deleted from the list.

Assume that the delete time is set for 10 minutes. A device is sensed on July 3 at 5 PM. The computer is shut down and not turned back on until August 4. If it sees the device at that time Corsair remembers the good status. If it does not see the device at that time Corsair marks it with one strike and remembers the time. The timing for the second strike begins when the first strike happened, not when the last good communication occurred. Strike timing is not extremely precise as the scanner has many things to do. A missing device is guaranteed to not be deleted in less time than 4 times the entered delete time.

The network scan's tree control is normally accessed as a register monitor on the data source.



Various monitor and control options appear as the 'Open' button on the bottom of the screen. Checking the 'View' 'History' menu option changes the view to display the scanning status of the item including the three-strike system.

The 'Create' menu section is used to create Corsair tags from network scan results. Administrator Development must be turned on. The program will not create a tag where one already exists.

The 'All' create option creates as many tags as Corsair can from the entire network scan tree data. The 'Selected' option only does a tag for the tree item that is currently selected. The 'Selected Family' option creates for the item that is currently selected and for all the items that are under it.

BACnet Explorer

The BACnet Explorer subprogram is accessed through the general network scan function. It is used to discover, monitor, and control devices on a BACnet IP building automation network. Corsair talks BACnet IP through an Ethernet port. This frequently goes to another device that translates to a serial communication standard like BACnet MS/TP.

The network scan shows BACnet devices and their properties. It shows objects under the device. It shows properties under each object. If the 'Open' button shows when a tree item is selected the button is used to open a window to control or monitor that item.

The Door Pseudo-Code Printout

This printout produces PLC pseudo-code that helps in the writing of PLC programs for corrections applications.

PLC Register Monitoring

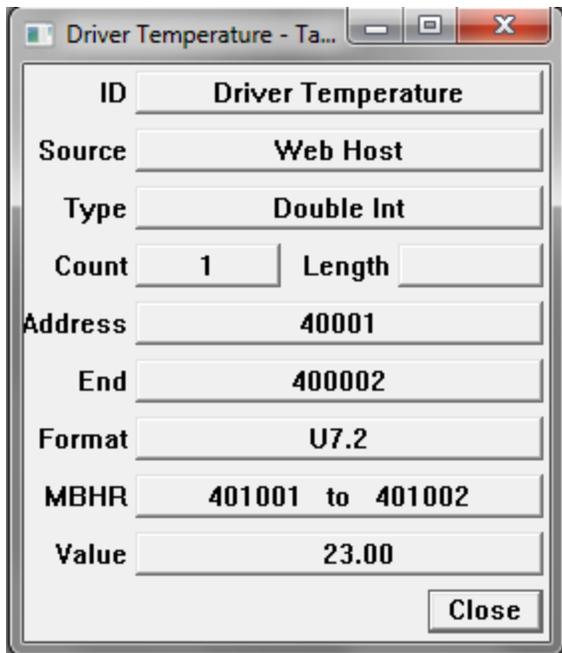
The general PLC Register Monitoring window allows entry of a PLC register address. The Corsair program then displays the data at that address or a set of consecutive addresses. Several formats are available for the display. This window also allows for register data entry. Some communications drivers have specialized versions of the register monitoring window that are specific to that driver.

Data Exports

Corsair offers several types of data exports that produce CSV files for use with other software. This includes a file of labels for door status bits that may be imported into PLC programming software.

Maintenance Windows

When an operator is viewing an interface screen he can place the cursor next to a graphic placement. If he presses the 'M' 'Maintenance' key Corsair will show a development maintenance window associated with the placement if one is available.



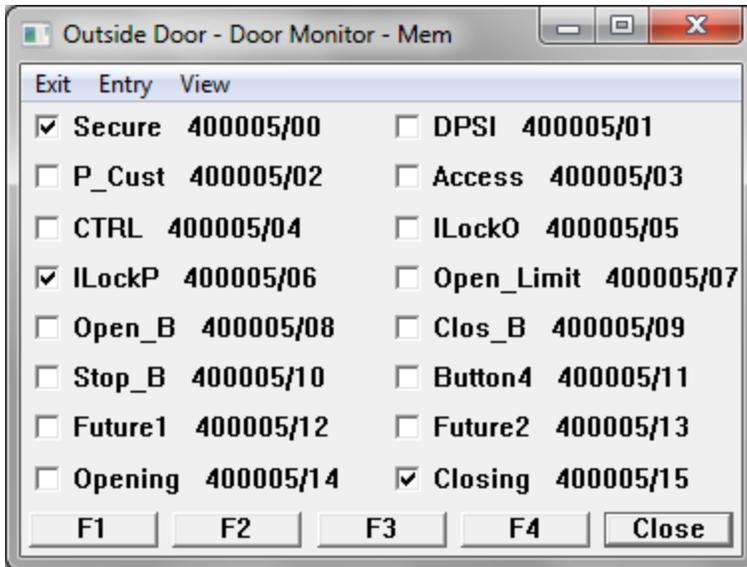
This window shows the data source that the tag is under, it's address, and other information. The current value is shown at the bottom. Other types of database records have different maintenance windows.

The Tag Data Monitoring Window

The data monitoring window shows the current values of tag data including all elements of the array and the addresses of each element.

The Door Data Monitoring Window

Corrections versions of the Corsair program offer a special window for monitoring the 16 data bits of a door.



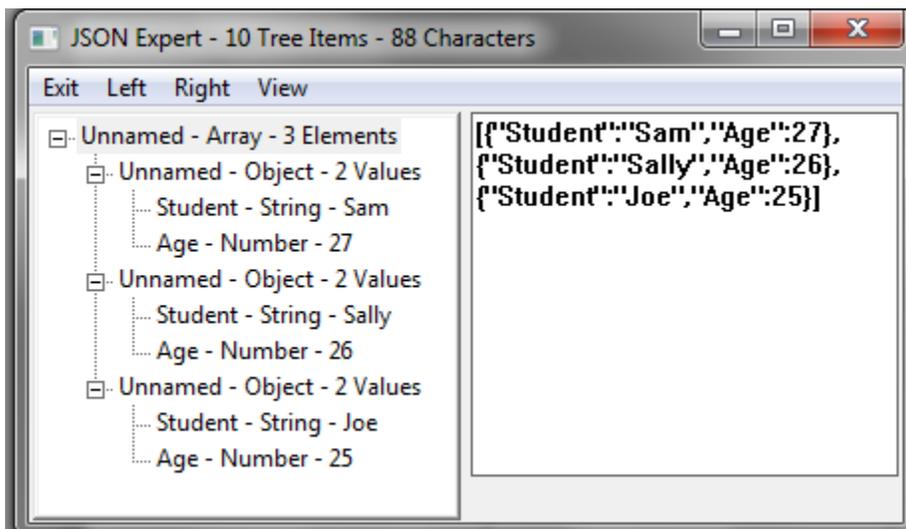
The bits that are turned on are checked. The F1 to F4 buttons can be used to operate the door.

The DXF Expert Window

Computer drafting programs can produce files in .DXF format. Corsair can import portions of these drawings as Corsair graphic placements. The DXF Expert window can be a great help in understanding DXF files. It is explained in the 'DXF Import' section of the Developer manual.

The JSON Expert Window

Javascript Object Notation (JSON) is a way to format data as a stream of characters. These characters may be in a text file or they may be transmitted through a network. The window can be opened from the Experts menu or it can be opened from the Telnet window.



The window has a tree control on the left side and a text entry window on the right. JSON data can be entered or pasted into the right side entry. The 'Left''Generate' menu option converts this to Corsair's JSON tree data format and shows it on the left side tree control. (Future) The 'Right''Generate' menu option translates the tree data into JSON text on the right. Both sides have Clear and Print menu options.

There are menu options to save the JSON tree data into a file and to load it back again. Some Corsair drivers depend on properly formatted JSON tree data files. These files can only be produced from the Corsair JSON expert.

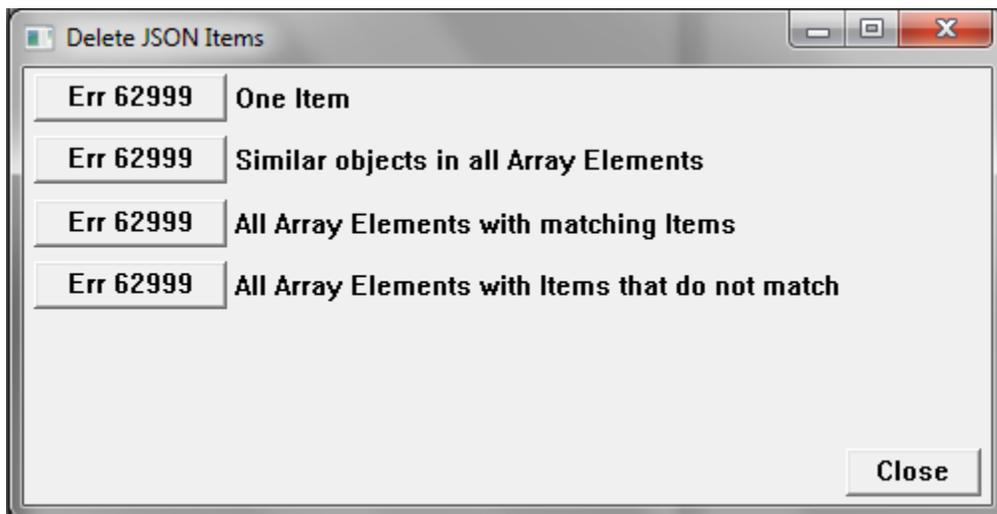
Sometimes a large amount of JSON data may need to be read into the expert. This may be more than what can be handled directly from the Telnet window. If the JSON expert is accessed from the Telnet window the 'Get Data' menu options can fetch the data directly into the JSON tree. This procedure bypasses the text entry window on the right side.

Sometimes it is desired to 'prune' branches from the JSON tree before saving the tree file. Pruning can speed up tree data searches and simplify monitoring of tree data. This is done with the specialized 'Delete' functions.

Suppose there is an array of objects. Each object contains information about an individual.

```
[ { "Name": "Sam", "Age": 27, "Married": true, "City": "Cleveland"},  
  { "Name": "Pete", "Age": 32, "Married": false, "City": "Miami"},  
  { "Name": "Mary", "Age": 64, "Married": true, "City": "Cleveland"},  
  { "Name": "Sue", "Age": 27, "Married": true, "City": "St. Louis"} ]
```

The developer selects an item on the tree and presses the Delete key. This opens up a window that gives him options for his delete.



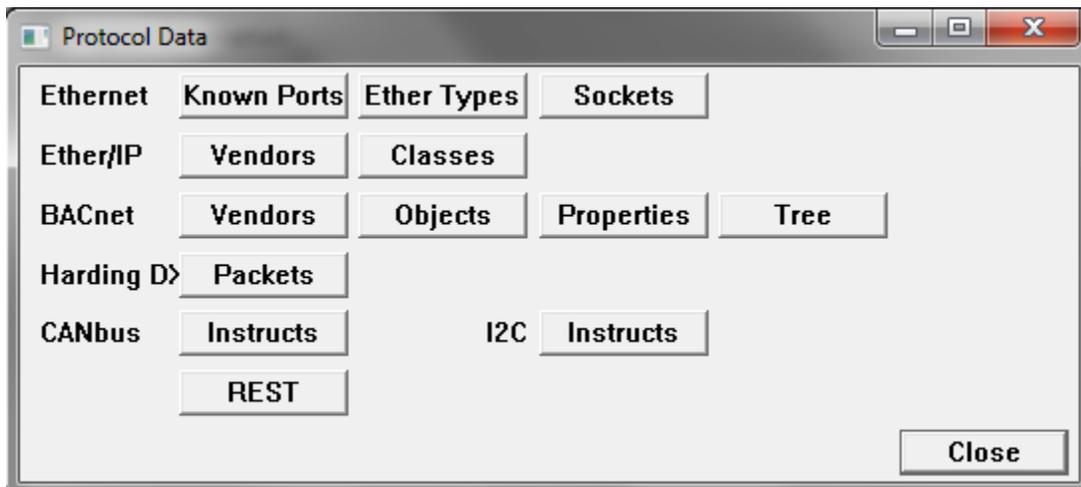
Suppose that the City record for Mary is selected. It has a value of 'Cleveland'. If One Item is selected the City value is deleted from her record. The rest of the Mary object stays there and the City information for the others is untouched.

Deleting Similar objects in all Array Elements means that Corsair will delete the City value in every record that is in the array.

Deleting All Array Elements with matching Items means that Corsair will delete all records where the City value is set to 'Cleveland'. Deleting All Elements with Items that do not match means Corsair will delete all records where the City value is not equal to 'Cleveland'.

Protocol Data

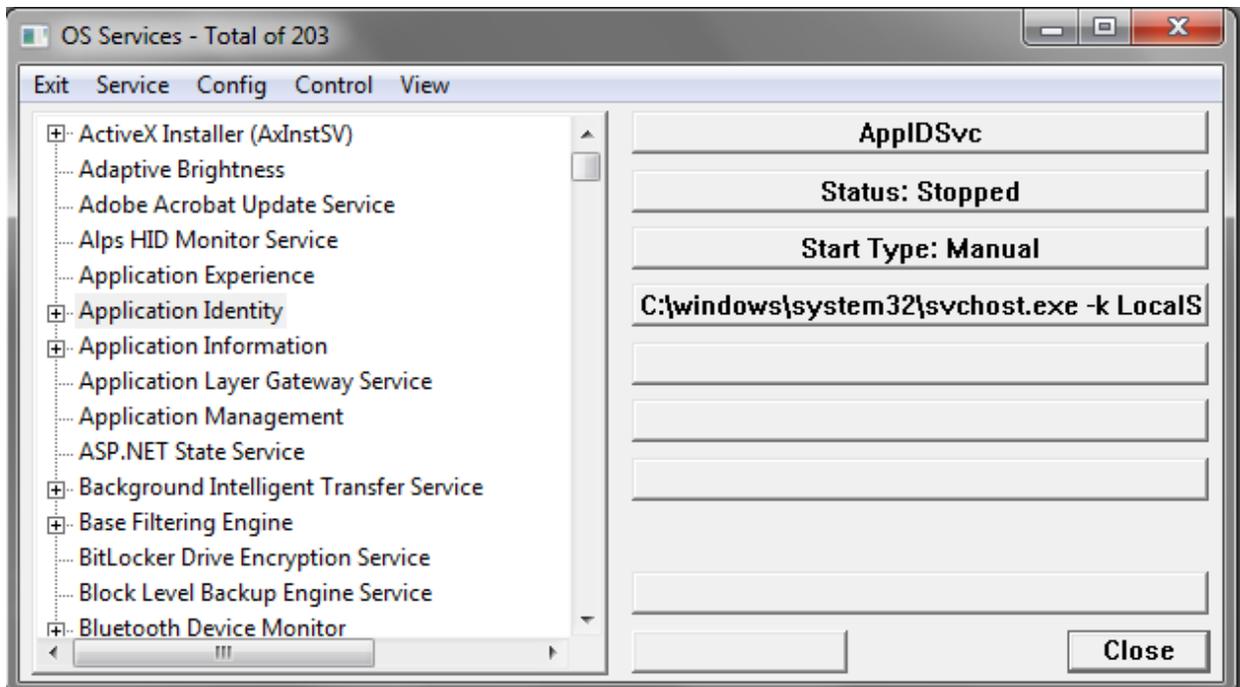
Corsair's Help/Program Information menu option opens a window showing buttons to show and print information about the Corsair program. The 'Protocol Data' button is used to open a window with information about communications protocols that are used by Corsair.



Each of these buttons opens a row and column or a tree display of information about the protocol. They can be used by the developer to learn about the protocol and to determine what Corsair knows about it.

The Services Expert

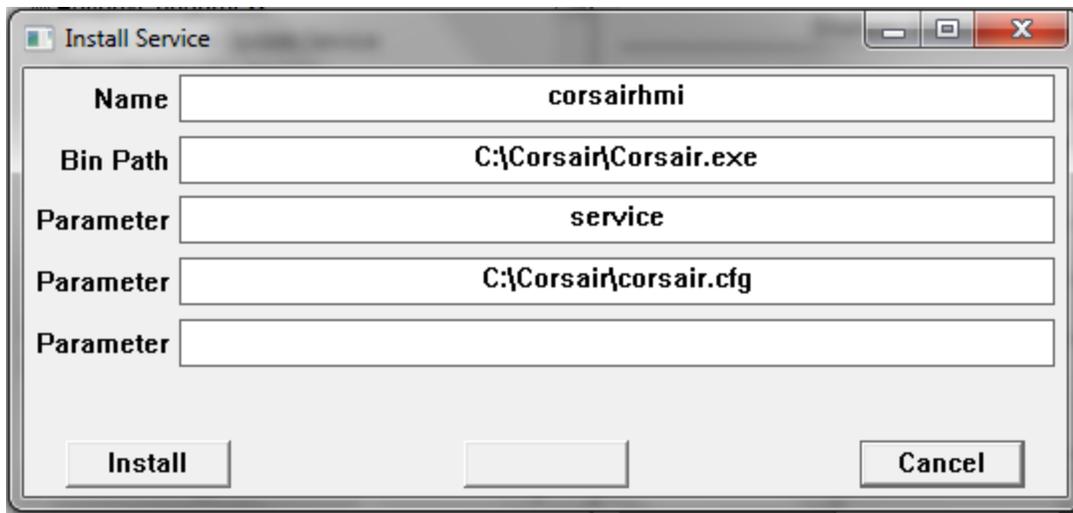
Windows services are programs that the operating system starts up and operates in the background without visible windows. The operating system has a database listing programs that are configured to run as services. The Corsair Services Expert is a window that can be used to list the records in the services database. To use it the program must be run by a Windows administrator and the developer must be a Corsair administrator.



The tree control on the left side of the expert window shows the programs that are installed as services with their 'display' names. The first item on the right side is the 'service' name. The Status item shows if the service is stopped, running, or in some other state. The Start Type item shows if the service will start automatically when the computer boots or if it must be started by an operator. The final item shows where the program file is located and any parameters that are passed to it when it starts.

Any version of the Windows Corsair program has the Services Expert window. If the program has the 'Diagnostic' build and license options the Expert can be used to control services. It can change the startup type of a service and start and stop it. It can create and delete entries from the services database. This is an extremely powerful feature that must be used very carefully. Accidental deletion of a critical service could make a computer unusable.

The Expert can be used to create entries in the services database list. One possibility for this is to run the Corsair program as a service. The 'Create' menu option opens a way to do this.



The window opens with suggested values to install Corsair as a service. The 'Binary Path' entry is an absolute path specification to the Corsair executable file. One parameter that must be passed to the program is the word 'service' to configure how it is supposed to run. Another parameter is the path to the computer configuration file that the service is to use. Typically, this file tells Corsair to enable Web host operation.

Some difficulties may arise when the Corsair service and a copy of Corsair running in a window are running at the same time using the same computer properties file. Both cannot host web on the same port at the same time. The best procedure is to use the window version to make a .cfg file for the service to use. That file needs to be renamed to a different name than the default 'corsair.cfg'. That name should then be used in the parameter specification when the service is installed.