WOODWARD

Product Manual 26199
(Revision C)
Original Instructions

Woodward VxWorks®
Real Time Operating System (RTOS)

Software Tools for AtlasPC™
8273-2xx Series

Software Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

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Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

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Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

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Important Definitions

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

⚠WARNING

Automotive Applications

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Chapter 1.
Software Tools

General Description

This manual describes the Woodward VxWorks® * RTOS (Real Time Operating System) software tools available to remotely configure and interact with the AtlasPC™ control platform.

*—VxWorks is a trademark of Wind River Systems, Inc.

The AtlasPC control is designed so that all interface, maintenance, and troubleshooting is done via the Serial and Ethernet Ports. No local keyboard, monitor, or mouse is available to the user, and thus “headless” operation is accomplished using these tools.

IMPORTANT **Your computer screens may differ slightly from those shown in this manual due to newer software revisions.**

IMPORTANT **The AtlasPC control is now shipped with static IP addresses! To avoid Ethernet IP Address conflicts, read this manual before connecting the controls Ethernet Ports to a network.**

Overview

Programming tools are the application creation tools.
GAP™ (Graphical Application Program)/Ladder Logic are used to create the application. The output is assembled, compiled, and linked with the Coder, and the resultant executable file is loaded into the target control. The Woodward NetSim™ simulation tool can be used to test the application.

If a Fieldbus board (PC/104 DeviceNet or Profibus) is installed in your control, the supplied “applicomIO” CD ROM is used to create the configuration files for these boards and their network modules.

Service tools are the interface programs that allow an operator to move files, start and stop the application, configure settings, troubleshoot hardware and software, view status, and ultimately operate the controlled machinery.

⚠WARNING **An unsafe condition could occur with improper use of these software tools. Only trained personnel should have access to these tools.**

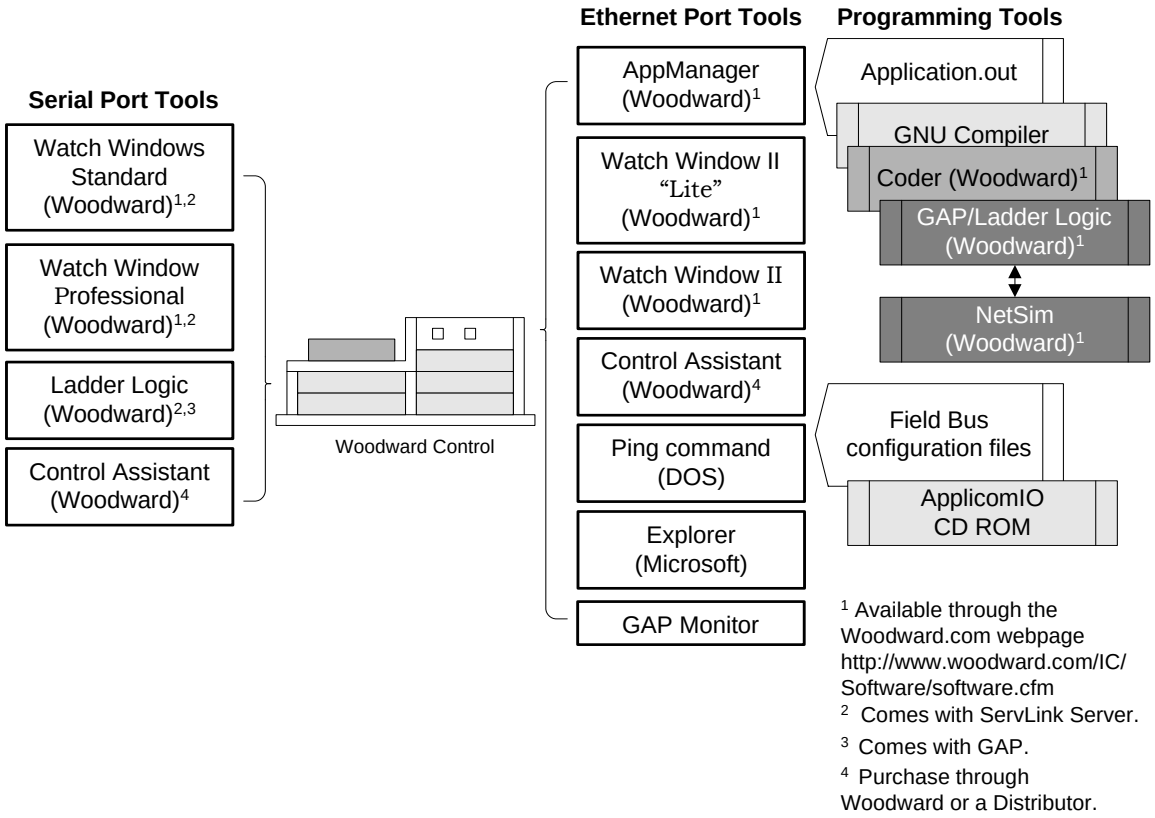


Figure 1-1. Software Interface Tools Overview

Programmers Tools

These tools are useful for creating new applications or for modifying existing ones.

Woodward GAP

GAP (Graphical Application Programmer) allows users to design their control system logic on an integrated drawing package that runs on a PC in the Windows® environment. Once the control logic has been graphically entered, GAP checks the application for completeness and generates a .CDR file for use with Woodward Coder.

GAP Monitor

This debugging tool allows the engineer to view and tune the GAP blocks while the application is running, see the GAP blocks I/O values change, and edit the application. It interfaces with the Atlas Ethernet port via the included Watch Window II tool.

Woodward Coder

Coder is the application that checks the GAP application for problems. If no problems are found, it automatically calls the assembler, linker, and compiler to create the file that can be loaded onto the hardware using AppManager. Error files are created to help in debugging if the Coder finds problems.

applicomIO console
The applicomIO console is a configuration console used to define boards and configure the network and equipments connected to the field bus. The console is a Windows application which you run on your windows NT 4.0, or Windows 2000 PC.

NetSim
NetSim is Woodward's Windows NT based simulator software used for testing control software. It provides a closed loop simulation environment when connected to a modeling package or open loop testing when run in stand alone mode. Connections to ACSL based, Matlab/Simulink, and Matrix X/Systembuild modeling packages are supported.

NetSim Control Executive
This program is an interface used for running simulations of equipment controlled by Woodward systems. Now supports OPC.

User Tools

These tools are useful for moving files, starting and stopping the application, configuring settings, troubleshooting hardware and software, viewing status, and ultimately operating the controlled machinery.

Application Manager


AppManager is a Windows based remote access tool for Woodward CPUs. AppManager allows local and remote access to control applications for transferring, retrieving, starting, stopping and restarting. The AtlasPC is loaded with a service that allows it to interface with AppManager. AppManager can also be used to change Ethernet Network addresses and retrieve Log files, including Applicom/DeviceNet/Profibus files.

AppManager will only function in a Windows NT Operating System such as Windows NT or Windows 2000. Windows 95 is not supported.

Engineering Tools

These tools are useful for system debugging, variable monitoring, Tunable Maintenance, real time data collection, data analysis, and Remote Control. See your Woodward sales engineer for additional information.

Control Assistant


Control Assistant is a custom 32-bit application for Windows 95, Windows 98, and Windows NT. This Woodward utility is designed to support the following control features via Serial or Ethernet communications:

- *Tunable Maintenance*. This feature supports tunable capture, sorting, comparing vs. baseline/GAP, saving, and uploading of new tunables into the control.
- *Datalog Plotting*. This feature supports the capture and plotting of high-speed datalog information.

ServLink Server

 ServLink Server is a DDE server designed to communicate with the control using the Woodward ServLink Protocol. This protocol allows the ServLink Server to access and modify internal control parameters as directed by any DDE client. A DDE client like Visual Basic, Excel, or Watch Window can then monitor, capture, and modify control variables.

Watch Window "Lite"

 Same as Watch Window II (below) except:

- No license required
- Only one inspector
- Only one page

Watch Window II

 Watch Window II is an OPC client designed for Ethernet communication with the Woodward ServLink Server to display and control all control system data. From this interface, variables can be selected for both control and monitoring purposes. Watch Window has the following features:

- Variable access through the ServLink OPC data server
- Loading and saving of different Watch Window II configurations
- Hierarchical Tree View of available data
- Variable descriptions are supported
- Multiple data sheets per Watch Window II
- Multiple Watch Window II views
- Drag and drop support
- Tunable modifications
- Updating of EEPROMs

Watch Window Standard

 Watch Window Standard works over a Serial Port that has been configured in GAP. It is a free engineering and troubleshooting tool that provides the minimum functionality needed to service the control system.

Watch Window Professional

 Watch Window Professional is an engineering and troubleshooting tool that provides all the functionality of the Watch Window Standard along with other useful tools such as Application Loading and the ability to view "Debug" variables, similar to Watch Window II. It works over a Serial Port that has been configured in GAP.

Ladder Logic

 Woodward Ladder Logic comes with GAP and permits customer programming and monitoring of a Woodward control. It is easy for anyone familiar with the basic structure of ladder logic to write and use Woodward Ladder Logic. Commands may be activated using a simple point and click Windows interface.

The Woodward Ladder Logic program runs on a PC connected to a serial or Ethernet port of a Woodward digital control system. The Windows operating environment must be used in the PC. The Ladder Logic program can be written and changed using the PC while the hardware is controlling the running prime mover—changes do not take effect until the Ladder Logic program is loaded into the hardware.

IMPORTANT **The AtlasPC control supports only Ladder Logic versions 1.05 or higher.**

Obtaining Software Tools

The following software tools are available on our web site at
www.woodward.com/ic/software

- BootP
- AppManager
- Watch Window / ServLink
- NetSim
- Woodward Coder
- Woodward GAP / Ladder Logic
- Woodward Control Service Packs
- Woodward Watch Window “Lite”
- Woodward Watch Window II
- GAP Monitor

Control Assistant

- Since it does not have licensing, it must be purchased from Woodward or an authorized distributor. This comes on floppy discs. Order part number 8928-101

ApplicomIO CD-ROM

It is used to configure the Profibus and DeviceNet Fieldbus networks and is supplied with an AtlasPC that has a Fieldbus board installed.

Chapter 2.
Ethernet Networking

IMPORTANT

The AtlasPC is shipped with static IP addresses
Ethernet #1 = 172.16.100.21 (CPU)
Ethernet #2 (optional) = 192.168.10.20 (PC/104)
SubNet Mask: 255.255.0.0
Default Gateway: none

These network settings will probably need to be changed; therefore, care must be taken to understand some networking principals. Consult your Network System Administrator and read the "Internet/Ethernet Discussion" section of this manual for additional information. In addition, networking information can be found on your local WinNT PC in, Start\Settings\Control Panel – Help.

Overview

The Atlas supports two shielded 10/100 Base-TX RJ45 female connectors for TCP/IP sessions. These connections are used for network file sharing, application management, and remote control, as well as other control functions like Ethernet Modbus® *. A client computer using a Windows NT Operating System is required for networking with the Woodward control.

- **A *unique* Ethernet IP address is required for every device on a particular network in order to avoid IP address conflicts.**
- **The AtlasPC control's *Computer Name* is associated with its IP address** when using a network DHCP server or AppManager.
- **AppManager will only work on the Atlas Ethernet port #1.**

*—Modbus is a trademark of Schneider Automation Inc.

IMPORTANT

AtlasPC with *Dual* Ethernet—Both Ethernet Ports should not be set to the same Network Identifier because its Operating System may respond out of only one port. You will need to set one port to a different network to ensure that it will respond. It is recommended that initially, one port be set to the same Network as your local PC network so that you can use the software tools described in this manual. See Figure 2-1 for an example of two separate networks.

First Time Setup Instructions

This section describes how to connect to the Atlas Ethernet ports, and how to make them compatible for your network.

STEP 1:

1. The AtlasPC control's Computer Name label is located on the top cover of the control. It is unique for each AtlasPC control. It starts with "VXA" followed by 5-digits. Record the Computer Name below.

IMPORTANT

There is a page at the back of this manual for you to record Software Setup Information for future use.

VXA_____

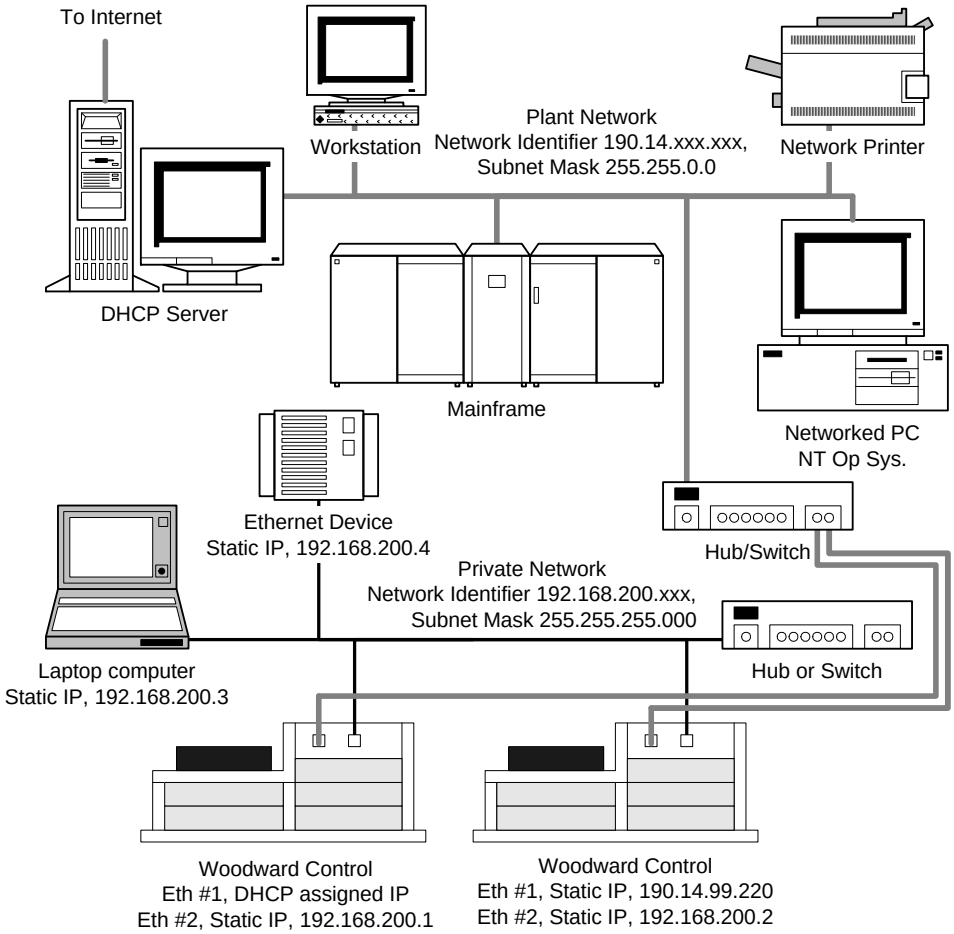


Figure 2-1. Setup Example for Controls with Dual Ethernet

2. Are the factory set IP addresses, Subnet Mask and Default Gateway compatible with your network? Check with your Network Administrator.

YES **NO**

IMPORTANT **TIP—You can see your PC's network settings by opening a DOS Command Prompt window and typing in "ipconfig".**

3. If YES, go to STEP 2.
   If NO, find out what is required for your network:

   Ethernet #1:
   Mode: Static IP or DHCP
   IP Address: _____
   Subnet Mask: _____
   Default Gateway: _____

Ethernet #2:
Mode: Static IP or DHCP
IP Address: _____
Subnet Mask: _____
Default Gateway: _____

Go to STEP 3.

STEP 2:

1. Are the factory set IP addresses being used by another device on your network? See “Pinging the Network” section of this manual.

YES NO

2. If YES, or if you need to change the network settings, Go to STEP 3.
   If NO, you can connect the Atlas control to your network.

Connecting to the Ethernet Port

The Woodward software tool “AppManager” (version 2.2 or higher) is needed to change the Atlas control’s Ethernet IP settings to make the Atlas Ethernet port accessible to your local PC. This tool can be downloaded from the Woodward website. See Chapter 1, “Obtaining Software Tools” section.

To avoid IP address conflicts on your network, isolate the control and your PC that you will be using for setting up the control, from the network. Figure 2-2 shows examples of two recommended methods.

1. On your PC, shut down your network applications but don’t log off.

2. Connect as shown in Figure 2-2 and power up the AtlasPC.

NOTICE **The use of unshielded Ethernet cable when connecting to a local PC has been known to cause permanent ESD damage to the Atlas Ethernet port. Use only shielded cable!**

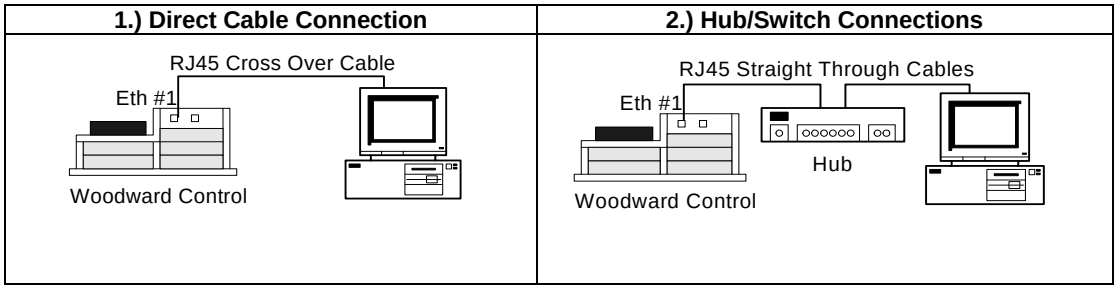


Figure 2-2. Network Cable Connections

- In dual Ethernet controls you can connect both ports to the network; however, only Ethernet #1 can be used to access the system files. Ethernet #2 is only for application program communications.

- When you have the proper connection between the Woodward control’s Ethernet Port #1 and your PC, you will see the green “Link” LED remain on (solid) on your PC AND on the AtlasPC.

IMPORTANT

A Hub/Switch will cause your PC's Link light to be on even when a control is not connected. Ethernet Port #2 on the AtlasPC has two LEDs that can be seen only by looking through the top cover microprocessor fan slots. Look toward the middle of the top cover.

IMPORTANT

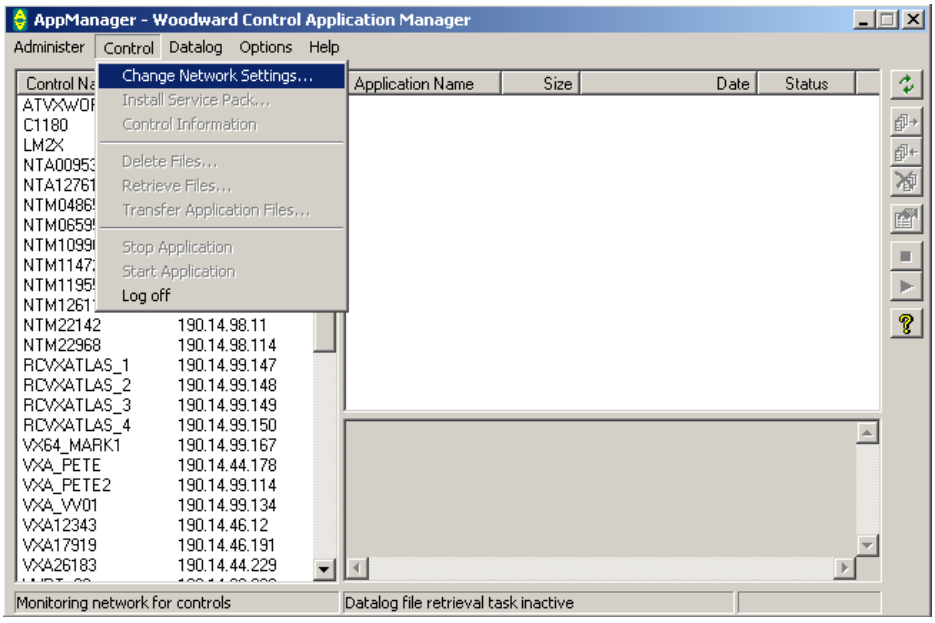
If you can't see the control in AppManager, open a DOS Command Prompt window on your PC and try to "ping" the control's Computer Name or the IP address of the port you are connected to. See the "Pinging the Network" section of this chapter. If pinging is successful, your PC's networking settings may need to be changed. Contact your Network Administrator.

In previous version of AppManager, if a control's Network Identifier is not the same as your local PC's Network Identifier, highlighting the control name within AppManager will cause it to look for an RPC server and may take several seconds.

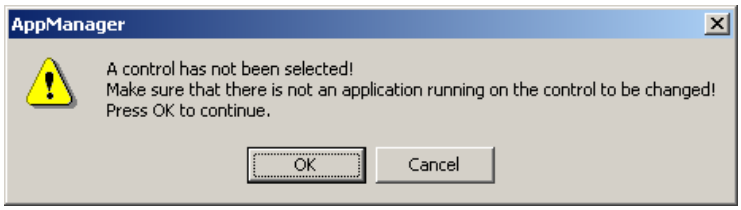
Changing IP Address #1 with Control NOT on the Local Network

Using AppManager, the controls network settings may be changed as follows:

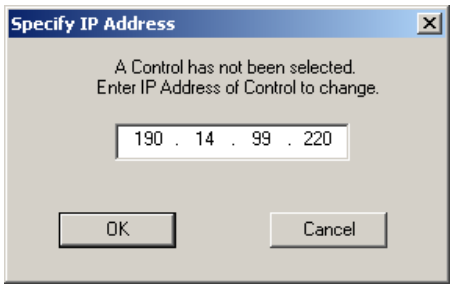
1. On your PC, open AppManager.exe.
2. You should see the AtlasPC control's Computer Name in the AppManager window. Do NOT highlight the control's Computer Name. If it didn't show up, check your connections and verify the Link lights are on—per Step 3.
3. Click "Control" in the top header of the AppManager window, use the pull down menu, and select "Change Network Settings".



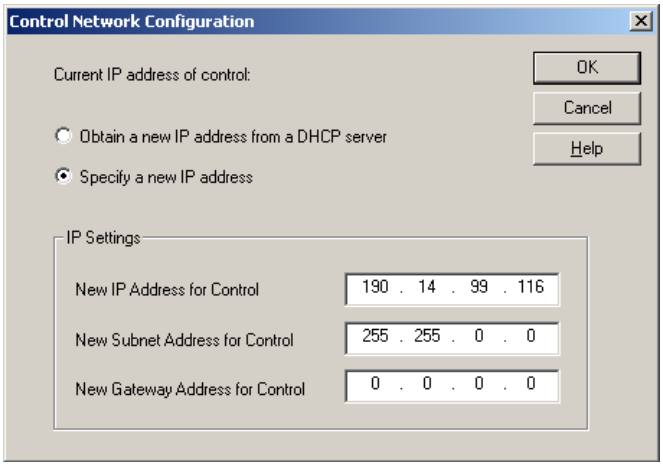
4. Since a control was NOT highlighted, a new pop-up window will caution the user to verify that there are no running applications on the desired control. Select OK if this is a new control or if you are sure the application has been stopped.



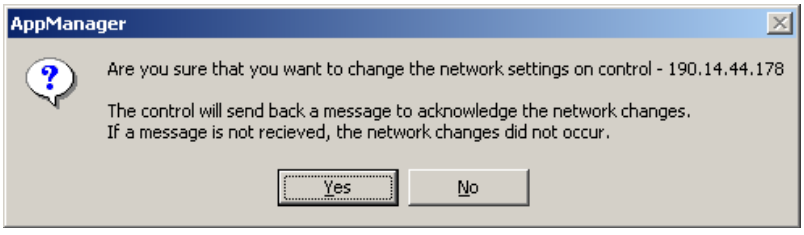
5. Enter the IP address of the control to change. In this example we have entered the factory-set IP address of Ethernet port #1.



6. Select the desired IP Address settings to change to –



7. Select “Yes” to change the settings.



8. If the new IP address is compatible with the network your PC was logged into, you can highlight the controls associated Computer Name in AppManager, and use AppManager without restrictions.

IMPORTANT

Failing to put in a new valid IP address can leave the Atlas in a state where it will not be able to communicate over that Ethernet port. If this happens, see the "Using the Debug Port" section of this chapter.

IMPORTANT

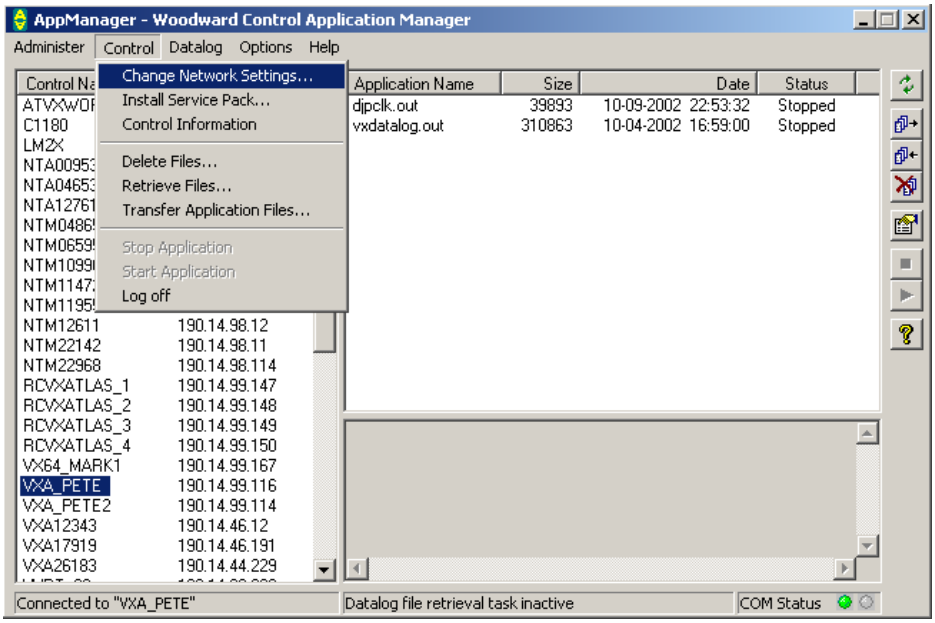
If you can't see the control in AppManager, open a DOS Command Prompt window on your PC and try to "ping" the control's Computer Name or the IP address of the port you are connected to. See the "Pinging the Network" section of this chapter. If pinging is successful, your PC's networking settings may need to be changed. Consult your Network Administrator.

In previous version of AppManager, if a control's Network Identifier is not the same as your local PC's Network Identifier, highlighting the control name within AppManager will cause it to look for an RPC server and may take several seconds.

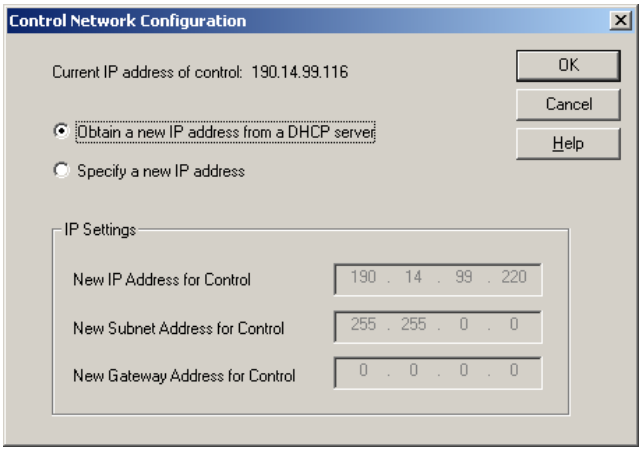
Changing IP Address #1 with Control on the Local Network

Using AppManager the control network settings may be changed as follows:

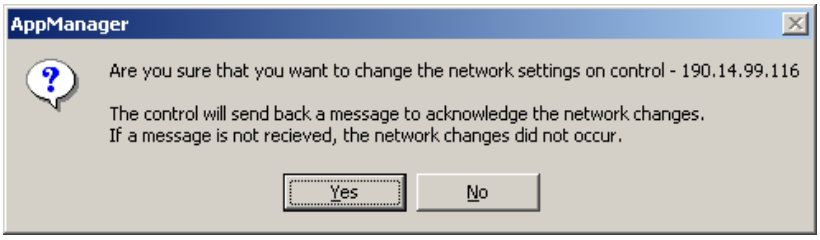
1. On your PC, open AppManager.exe.
2. You should see the AtlasPC control's Computer Name in the AppManager window. Select the control's Computer Name. If it didn't show up, check your connections and verify the Link lights are on per Step 3.
3. Click "Control" in the top header of the AppManager window, use the pull down menu, and select "Change Network Settings".



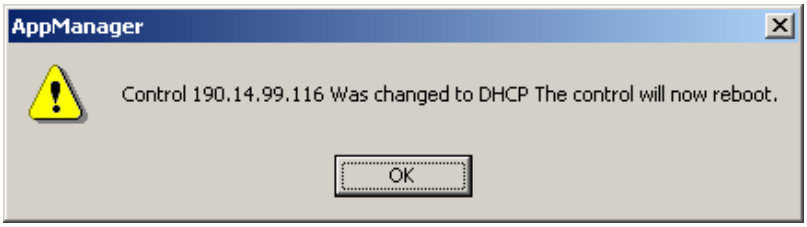
4. Select the desired IP Address settings to change to.



5. Select “Yes” to change the settings.



6. A message will appear stating that the control settings have been changed and is rebooting.



This completes the “First Time Set up instructions”. You should now have one TCP/IP Ethernet port on the AtlasPC that you can put on your plant network and use to access the control for further setup and monitoring.

IMPORTANT

To change Ethernet port #2 settings, you must have *Ethernet port #1* connected.

You cannot see Ethernet port #2 in the AppManager – Control list window.

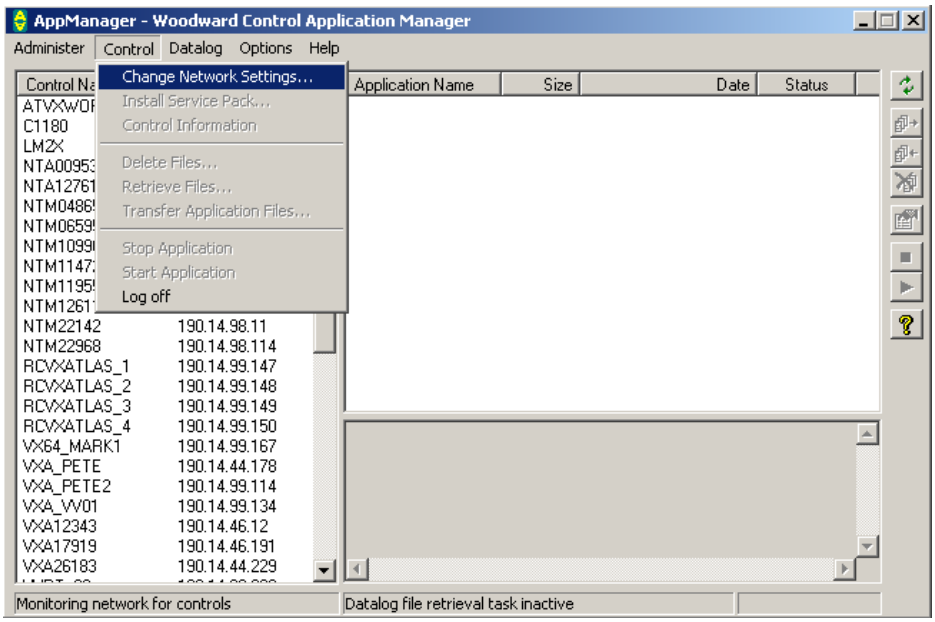
NOTICE

Changing IP Address #2 will change ALL controls that match the specified IP Address.

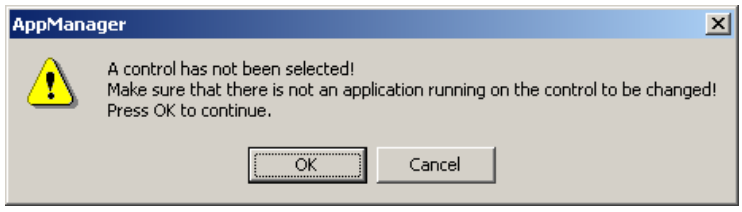
If there is more than one control which matches the specified IP Address, ALL matching controls will change the IP Address and reboot.

Dual Ethernet—Changing IP Address #2 Settings

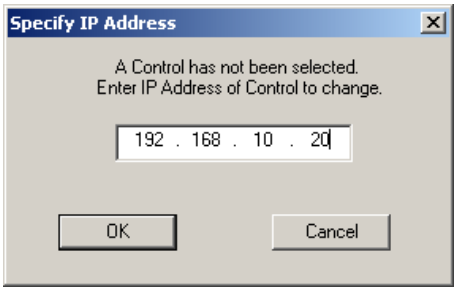
1. On your PC, open AppManager.exe.
2. Do NOT select a control's Computer Name.
3. Click "Control" in the top header of the AppManager window, use the pull down menu, and select "Change Network Settings".



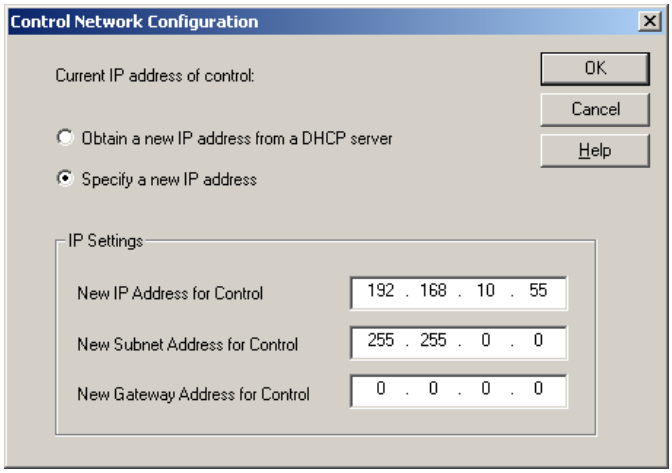
4. Since a control was NOT highlighted, a new pop-up window will caution the user to verify that there are no running applications on the desired control. Select OK if this is a new control or if you are sure the application has been stopped.



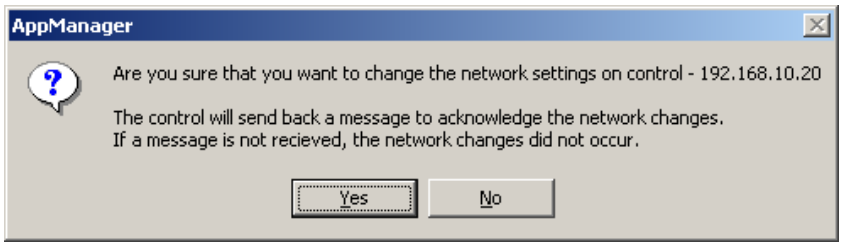
5. Enter the IP address of the controls **IP Address #2** to change. In this example we have entered the factory-set IP address of Ethernet port #2.



6. Select the desired IP Address #2 settings to change to –



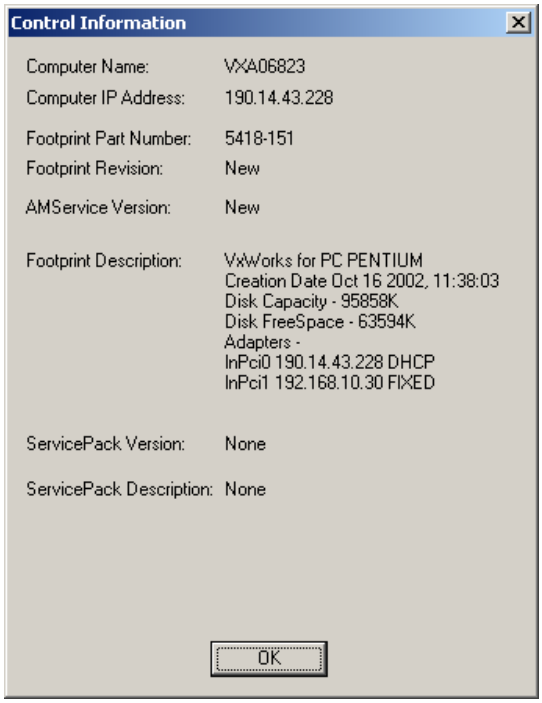
7. Select “Yes” to change the settings.



AppManager—Control Information Screen

This AppManager screen shows the control information about the CPU board and its hard drive.

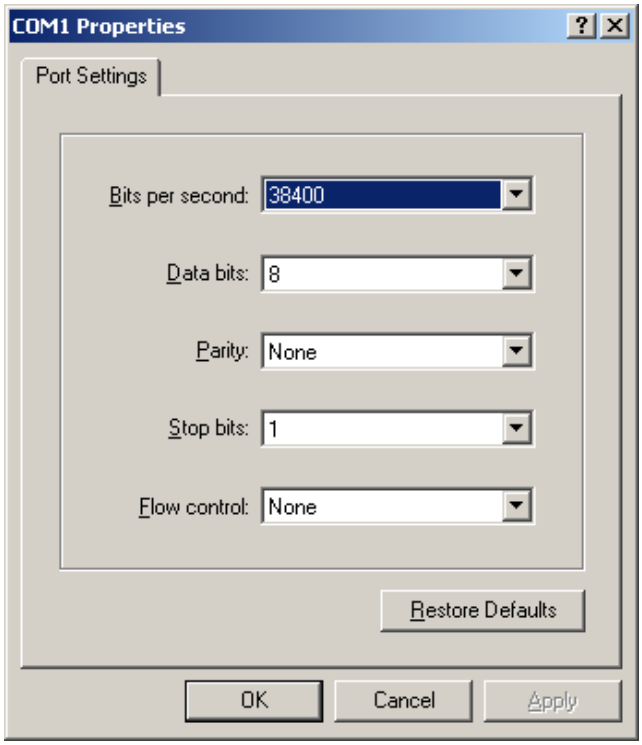
Select the Control in the Control List Window and press [Control Info].



Using the Debug Port (Com 1)

Setup

1. Connect a standard null-modem serial cable from the Atlas COM1 port to a serial port on your local PC.
2. Run “HyperTerminal” (hypertrm.exe) on your local PC (Start – Programs – Accessories – Communications – HyperTerminal).
3. Enter a name for the HyperTerminal setup (AtlasComm).
4. Select “connect using COM1” (or whatever port you selected).
5. Configure the port settings with the following.



6. All other settings stay at default.

Boot Information (in Debug)

Monitoring the COM1 port as the CPU boots, you will see the following text.

About 15 seconds after the Atlas is powered on, messages will be displayed on the HyperTerminal that identify the VxWorks® operating system and its version numbers. This message will be displayed:

Press any key to stop auto-boot…
7-6-5-4-3-2-1-0

If you press any key, the auto boot is halted and the operating system is in a system boot mode:

“[VxWorks boot]:”

From this mode you can perform the following commands:

1. “**help**” (this describes all the commands available)

2. "**p**" (this command lists the boot parameters including the IP address and the Control name.)

```
[VxWorks Boot]: p
        boot device          : ata=0,0
        unit number          : 0
        processor number     : 0
        host name            : c1002
        file name            : /ata0/vxworks
        inet on ethernet (e) : 190.14.99.112          (current IP address)
        host inet (h)        : 190.14.42.99
        user (u)             : pcampro
        ftp password (pw)    : pcampro
        flags (f)            : 0x0
        target name (tn)     : VXA32123               (current Control name)
        other (o)            : lnPci
```

3. "**c**" (this command allows you to change the values of the IP address or the control name).
   - When you type the "**c**" command, the first line will be displayed with the current data value. To change the value, just type in the new value and hit enter. To move on to the next line without changing the current line, just hit enter.
   - To save the new settings, continue hitting enter until you get past the last line. At this time the control will save the values and give you back the debug prompt.
   - To start running the operating system, either type in "@" followed by enter or reboot the Atlas.
4. When you allow the CPU to boot without pausing in the debug mode, there will be many more messages. At the end of all the messages you will be able to hit Enter and get a "->" prompt. The available commands from this menu are available by typing "**help**" followed by Enter.

NORMAL BOOT MESSAGES ON THE DEBUG PORT

```
                VxWorks System Boot

Copyright 1984-1998  Wind River Systems, Inc.

CPU: PC PENTIUM
Version: 5.4.2
BSP version: 1.2/0
Creation date: Aug  1 2002, 13:52:31

Try to read boot line
Attaching to ATA disk device... Ata device /ata0 created

Press any key to stop auto-boot...
 0                                              (This is a count down.)
auto-booting...

boot device          : ata=0,0
unit number          : 0
processor number     : 0
host name            : c1002
file name            : /ata0/vxworks
inet on ethernet (e) : 190.14.99.112
host inet (h)        : 190.14.42.99
user (u)             : pcampro
ftp password (pw)    : pcampro
flags (f)            : 0x0
target name (tn)     : VXA32123
other (o)            : lnPci
```

```
Attaching to ATA disk device... done.
Loading /ata0/vxworks...1755824 + 316816 + 101144
  flags 0
Starting at 0x108000...

Attached TCP/IP interface to lnPci unit 0
Attaching interface lo0...done

Adding 6908 symbols for standalone.


            VxWorks

Copyright 1984-1998  Wind River Systems, Inc.

        CPU: PC PENTIUM
     VxWorks: 5.4.2
  BSP version: 1.2/0
 Creation date: Aug  8 2002
        WDB: Ready.
ERROR: app_driver_init failed                (NOTE—The error will not be here if the
                                              DeviceNet or Profibus card is not installed.)
Time = TUE AUG 27 08:43:37 2002
Setting tShell priority to 100
Setting tNetTask priority to 25
-> VxDCOM 1.0 (Patch Level 1.6.2 (release candidate 2), Patch Date Jul 30 2002)

/HD1/  - Volume is OK
IPAddress2 address is 192.168.10.20          (This is the optional Ethernet #2 IP address.)
Subnetmask2 is 255.255.0.0
FindNetworkAdapters: lnPci0
FindNetworkAdapters: lnPci1
Host Name - VXA32123
IP Address0 - 190.14.99.112
```

Dual Ethernet GAP Setup

The second Ethernet card is activated when the application uses its IP address. To use the second Ethernet card in Modbus, a UDP_P block must be connected to the Modbus block, and the UDP_P block must be connected to the VX CPU parent block.

See Figure 2-3.

1. In the VX parent block, add the second ETHER_2 input by opening the VX_CPU block and clicking on RPT2.
2. At the VX_CPU.ETHER_x inputs, enter the name of the two UDP_P blocks.
3. The UDP_P output from the UDP_P block goes to a MODBUS_M or MODBUS_S PORT_X input.

IMPORTANT **When you have multiple UDP_P blocks, each S_PORT input must be a unique number. See the UDP_P block help.**

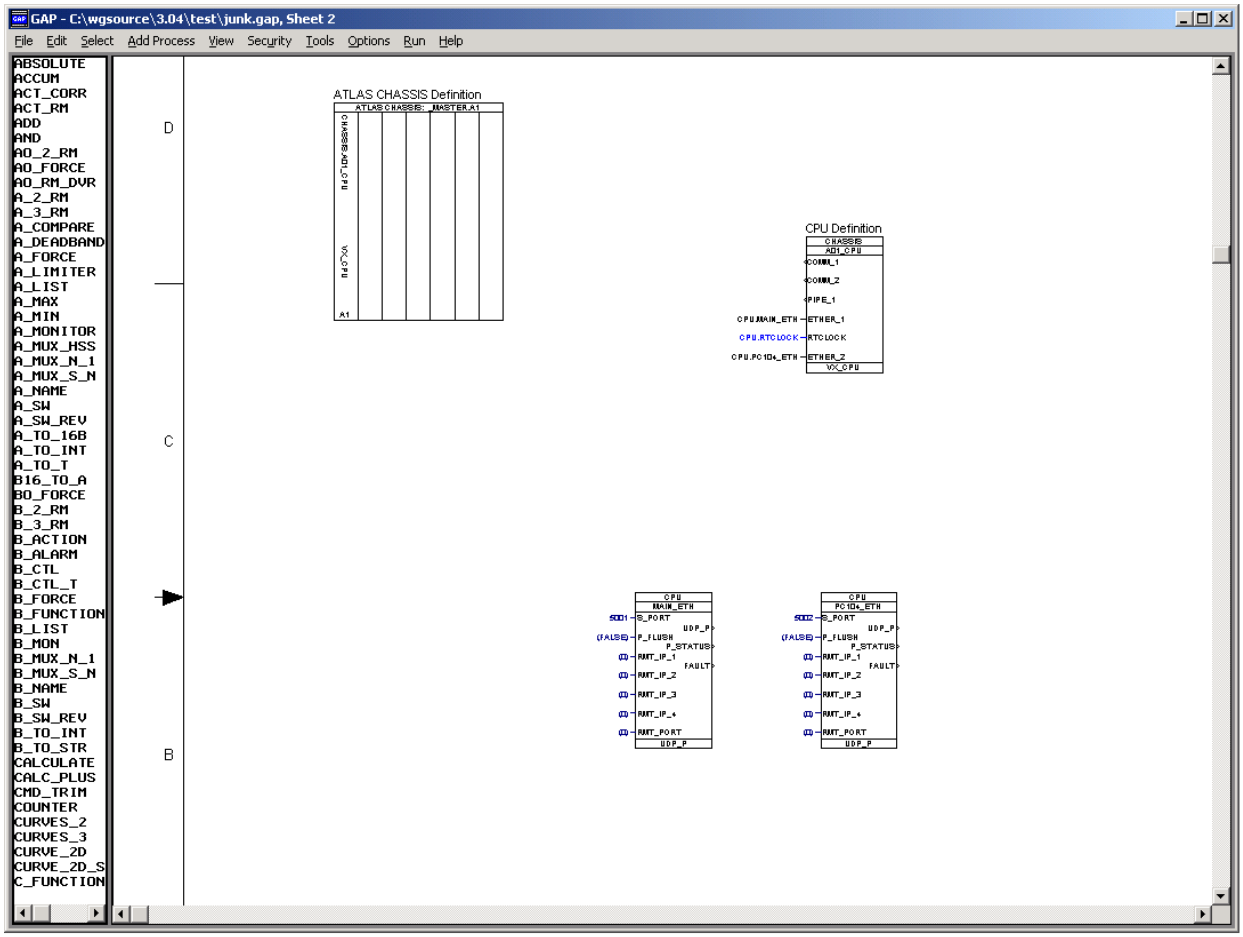


Figure 2-3. Dual Ethernet GAP Example

DCOM configuration settings

The Distributed COM protocol supported by VxWorks is TCP/IP. The default protocol should be changed on your local computer to TCP/IP in order to avoid connection delays when using AppManager, Watch Window II, or another DCOM or OPC application.

On Windows NT 4.0 computers the default DCOM connection protocol should be changed.

1. Run – dcomcnfg.exe
2. Select the Default Protocols tab.
3. Select Connection-oriented TCP/IP and press the Move Up button until it is at the top of the window.

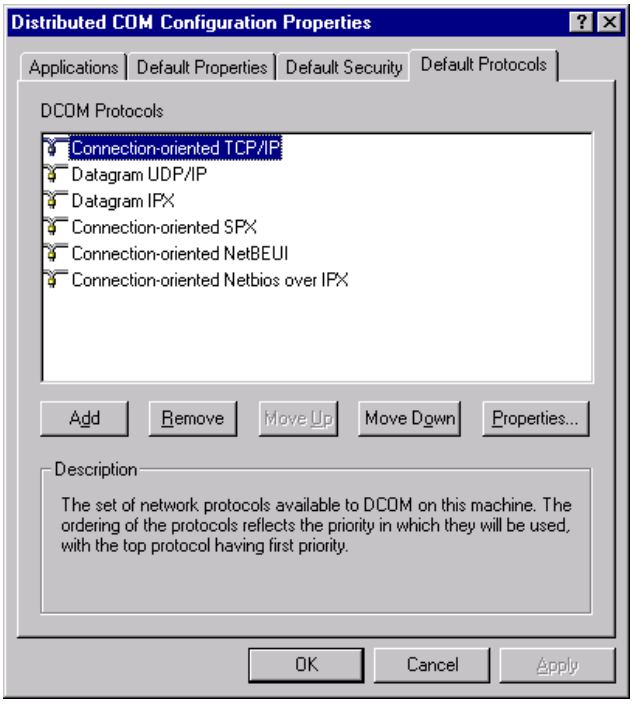


Figure 2-4. DCOM configuration Example

Windows 2000 computers have TCP/IP selected as the default protocol.

Name Resolution

Some application that are used to interface with the control through OPC require proper Name to IP Address resolution to be established. This is accomplished on the VxWorks Atlas control by used the local HOSTS file.

The following is where the HOSTS file is located on your computer—
C:\WINNT\SYSTEM32\DRIVERS\ETC\HOSTS
This text file can be edited with notepad.exe or any other text editor. At the end of the file, add the name of the control followed IP Address of the control separated by a space. Save the file. Below shows Control – VXA12345 resolved with IP Address 190.14.99.116.

```
# Copyright (c) 1993-1999 Microsoft Corp.
#
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
#
# This file contains the mappings of IP addresses to host names. Each
# entry should be kept on an individual line. The IP address should
# be placed in the first column followed by the corresponding host name.
# The IP address and the host name should be separated by at least one
# space.
#
# Additionally, comments (such as these) may be inserted on individual
# lines or following the machine name denoted by a '#' symbol.
#
# For example:
#
#      102.54.94.97     rhino.acme.com          # source server
#       38.25.63.10     x.acme.com              # x client host

127.0.0.1       localhost
190.14.99.116    VXA12345
```

Figure 2-5. HOST File Example

File Transfer Protocol

The VxWorks operating system has an active FTP Server running on the control. Applications such as AppManager use FTP to transfer files between the control and the local computer.

The recommended mechanism for transferring files between the control and the local computer is with AppManager.

The FTP Server follows the FTP standard, so other standard FTP client programs can be used to transfer files if required.

Network Passwords

The control Operating System enforces security by requiring the user to login with valid permissions before the control system can be accessed.

The following logins are supported for accessing the control. The Administrator login is reserved for qualified Woodward personnel. All UserNames and Passwords are case sensitive!

UserName	Password	Permissions
Administrator	********	Read, Write, Execute
ServiceUser	ServiceUser	Read, Write, Execute

Table 2-1. Control User Names and Password List

Pinging the Network

Ping is a DOS command done on the Command Prompt window. It is useful for the following:

- To see if a device with a specific IP address exists on a network. For instance before connecting a Woodward Ethernet port on your network, do this test to your network to see if the IP address that was fixed (static) in a Woodward control is being used by another device.
- To find a Woodward control with an unknown Computer Name or unknown IP address, and confirm you are talking to it by seeing its TX LED blink.
- To see if a TCP/IP Ethernet Port is available to the network.

If the control appears to be unresponsive to Ethernet requests, “ping” the control to determine if the control is available. The DOS “ping” command will send a network packet to the control and monitor the Ethernet for a response. If a successful response occurs, it will annunciate the control IP address and the travel time of the communications packet. This indicates the hardware is working.

Pinging Instructions
You can “ping” an AtlasPC control by IP address as follows:

1. A shielded crossover cable is needed when you are connected Host to Host. A Straight-through cable is needed when there is a Hub or Switch. Verify that you have a green “Link” light, which indicates a good connection.
2. On your PC, select [Start]\Programs. Find the Command Prompt shortcut and type in a ping command.
3. Example: c:> ping 190.14.98.173. See Figure 2-4.
4. Type in “ping” [Enter] to see ping options. See Figure 2-5.
5. To close the command Prompt Window, type in “exit” [Enter].

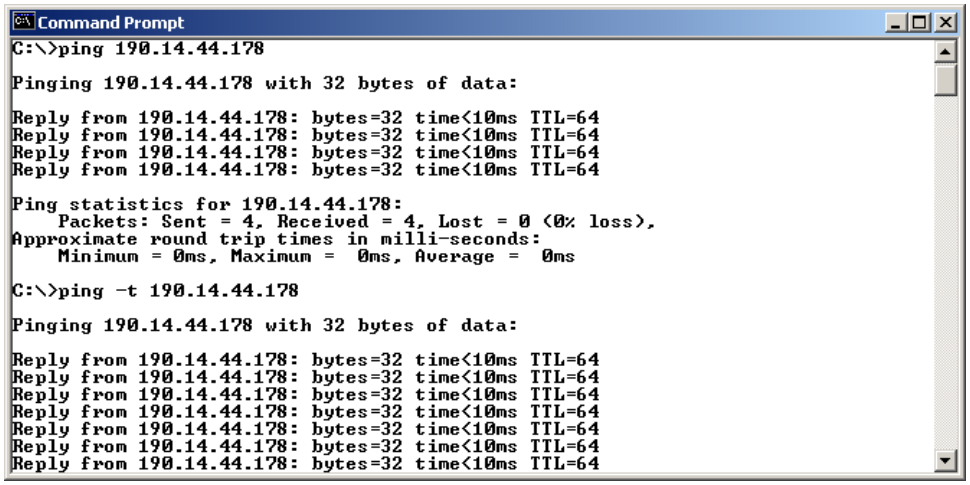


Figure 2-6. DOS Ping of IP Address (example)

IMPORTANT **When pinging the AtlasPC control's Ethernet #1 port, you should see the red TX LED turn on in response to each ping, through the top cover slot.**

IMPORTANT **TIP—Pinging with a “-t” suffix will continually ping until you press [CTRL]+[C].**

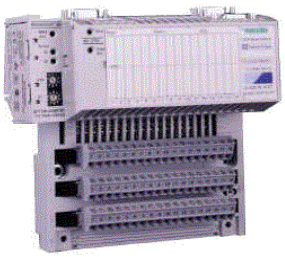
Ethernet Distributed I/O

For Ethernet Distributed IO, “BootP” is a Woodward tool that is available from the Woodward website (www.woodward.com/ic/software). It’s an IP/UDP bootstrap protocol, which allows a client machine to discover its own IP address. The protocol operates as a server, continuously listening for a request. When the server gets a request, it looks for an entry in the BootP database that matches the MAC address of the request. If the server finds a match, it sends a response message with the IP address from the entry that matched.

Distributed I/O is covered in considerable detail in volume 2 of the AtlasPC Hardware manual (85586V2).

As an example of how to set up a distributed I/O node, a Modicon, analog 16-channel single ended module will be used (170 AAI 140 00).

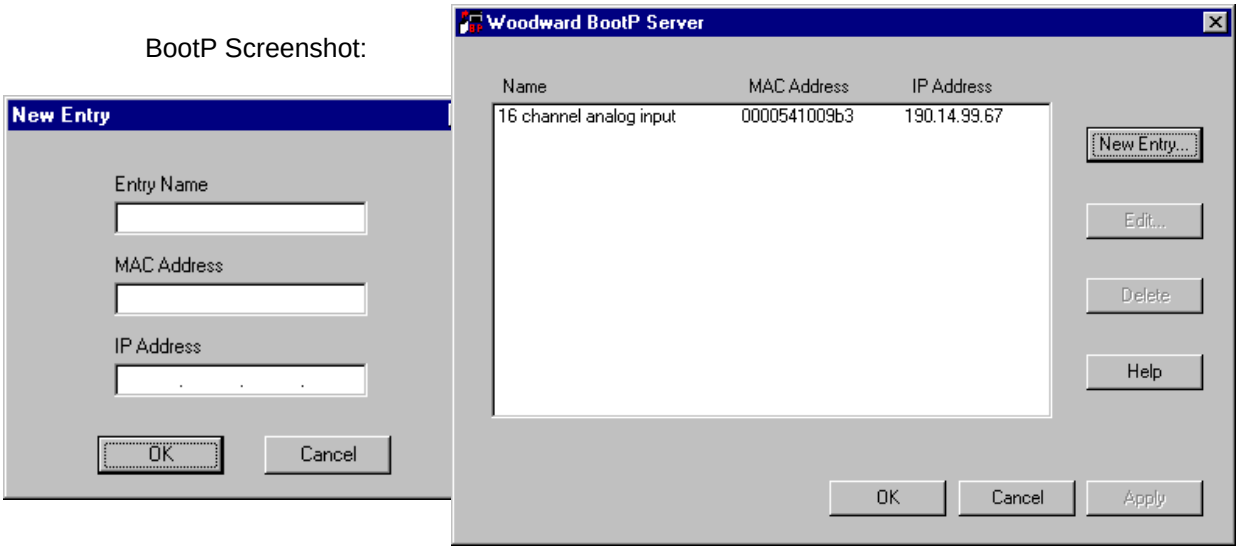
This module can be configured for ±10 V, ±5 V, or 4–20 mA inputs.



Giving the module an IP Address
Each distributed I/O device has an IP address associated with it. For some devices, this address is set by a terminal emulator over an RS-232 line and for other devices, it is set automatically by a server called BOOTP. Modicon uses the BootP program.

On each Modicon node there is a MAC address (usually some kind of sticker) which is a unique address given to this node. This address, along with a valid IP Address, can be obtained from the system administrator, as well as an “Entry Name” field or description. Enter as shown, and the module will adopt this new IP Address.

BootP Screenshot:



Ethernet Distributed IO and GAP

- In GAP, use FBUS_M to scan Ethernet IO over the network. It will work with any distributed IO that uses the Modbus over TCP/IP standard. It is designed to establish a TCP connection with one device. The block is found in GAP, “Add Hardware”, “TCP/IP Fieldbus Blocks”.
- The blocks FBUS_INITA and FBUS_INITB are used to initialize a distributed IO module.
- The FBUS_AI, FBUS_AO, FBUS_BI, FBUS_BO, FBUS_AIO blocks support the Modbus functions.
- Use GAP help for information to get the GAP interface written. Contact Woodward for additional help with Ethernet distributed I/O.
- The Modicon manual will give you information on how to configure inputs for a voltage or current input. It will also give you information about how to scale the raw counts coming from the module into the atlas.
- Gap Help on the above mentioned blocks will instruct the user how to configure the gap blocks to accept the incoming raw counts into a voltage or current signal.

More information can be found in Woodward manual 85586V2, *AtlasPC Hardware Manual, vol. II* (Distributed I/O).

Chapter 3.
Application Setup and Configuration

Introduction

The application program for the control must be created and loaded before the control will perform any useful function. This section describes what steps the system engineer must perform to properly create, load, and maintain software on the control.

Creating the Application

The application software is created using Woodward GAP™ and Coder tools described in Chapter 1. The GAP application defines the I/O configuration and range settings, as well as the signal flow of the control application. If Ladder Logic is used, this application must be defined and linked to the GAP as well. When the application is complete, a completeness check is performed in GAP. This results in output called the .CDR file, which is processed by Woodward Coder. The Coder tool uses the .CDR file to create the target software (.OUT files). This file is then loaded into the control's non-volatile memory.

Downloading and Running the Application

The AppManager tool is used to transfer the application to the control. AppManager must first be installed on a PC that is networked to the control. Then, the AppManager's "*Transfer Application Files*" command is used to move the .OUT file to the control's non-volatile flash memory (flash disk). AppManager makes sure the application files are transferred to the proper area on the control for execution.

IMPORTANT

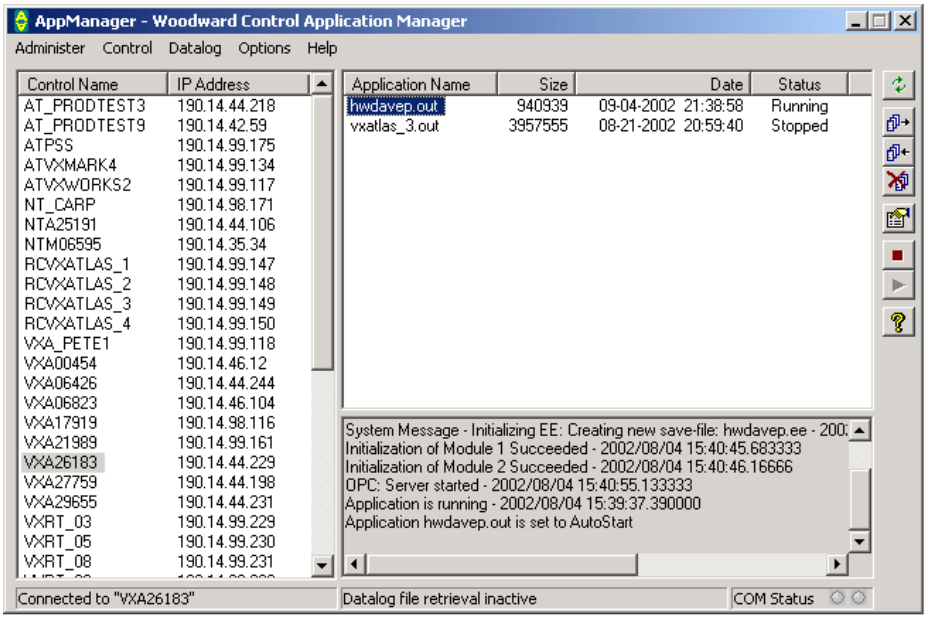
AppManager requires a valid Login to the control before the application can be manipulated by a new user or workstation. See Chapter 2, "Network Passwords" section, Table 2-1.

Once the application file (.OUT) is transferred to the control, follow these steps to start the application:

1. Select the Control Name. The Control List displays the computer names of all controls attached to the network. When you select a control name from the list, the Application List (right window) is updated.

2. Select the application you want to start by highlighting it on the Application List.

3. Press the [Start Application] button to run the application. AppManager will start the application software. Initialization Status information will be displayed in the lower right window. You can also double-click the application name to start or stop the application.



Once the application is running, the Status LEDs on the boards that are configured in GAP will turn off, and AppManager will indicate that the application is marked as the Auto-Start Application. This means that if the control's power is cycled, or if the control goes down for any reason, the current application will automatically restart when the control comes back up. This feature eliminates the need to connect to the control with AppManager every time the control is powered up to get the application software running.

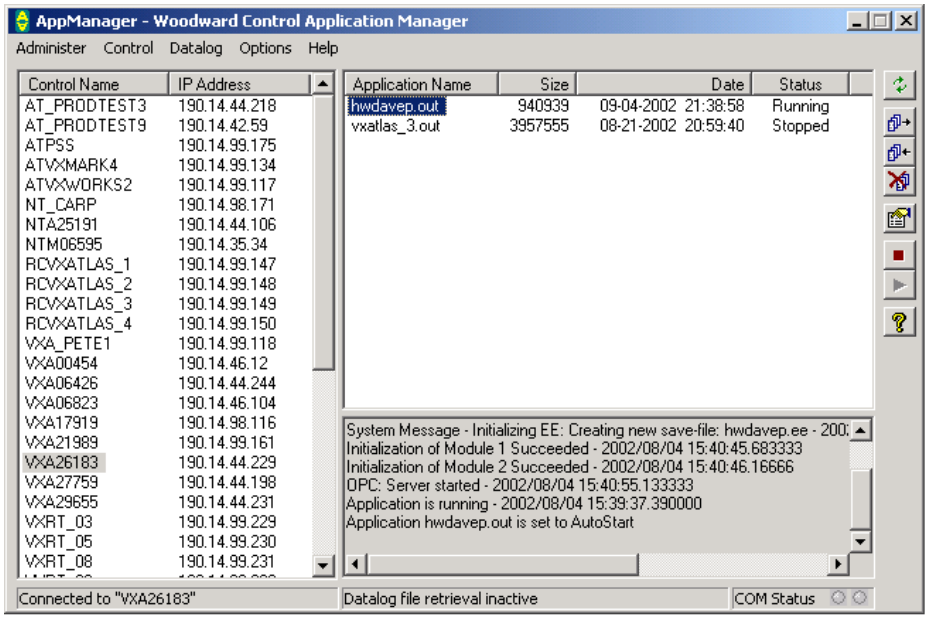
When an application is stopped using AppManager's Stop Application command, AppManager un-marks the application as the Auto-Start Application.

IMPORTANT

The first time the application is started, a .EE file is created which holds all of the tunable values in the application program. This file is located in the same folder as the .OUT file. See the "Tunables Management" section at the end of this chapter.

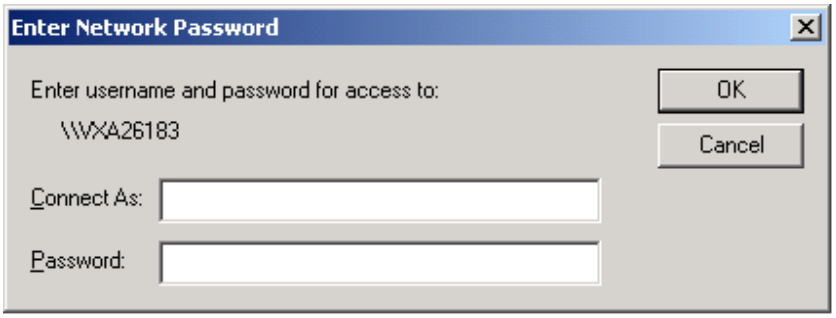
Changing the Application

To change an application that is running, highlight the running application name, and then press the [Stop Application] button.



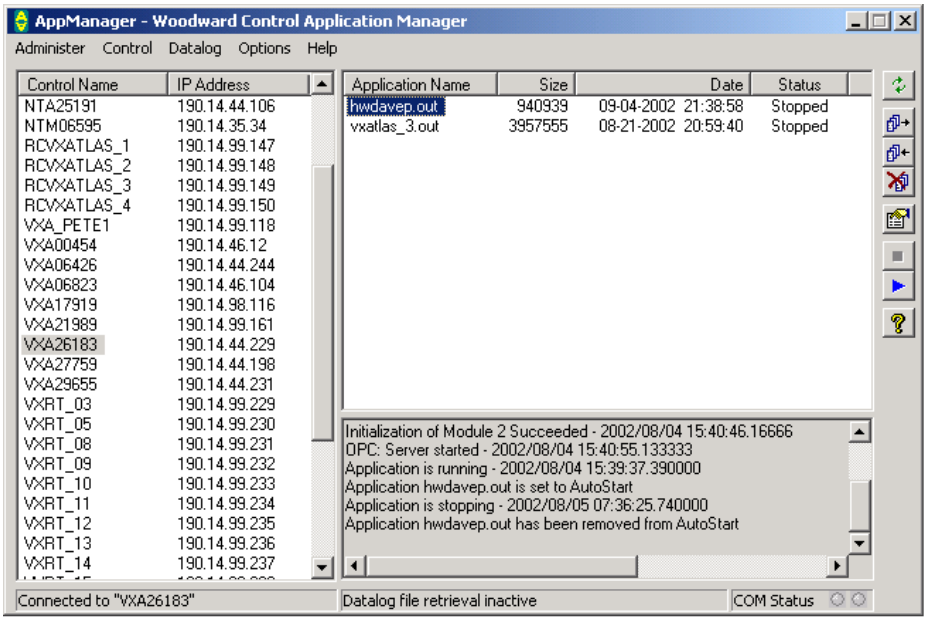
AppManager will ask you if you want to stop the currently running application. Select [YES].

AppManager will ask you to login:



AppManager will ask you to confirm that you want to stop the application:

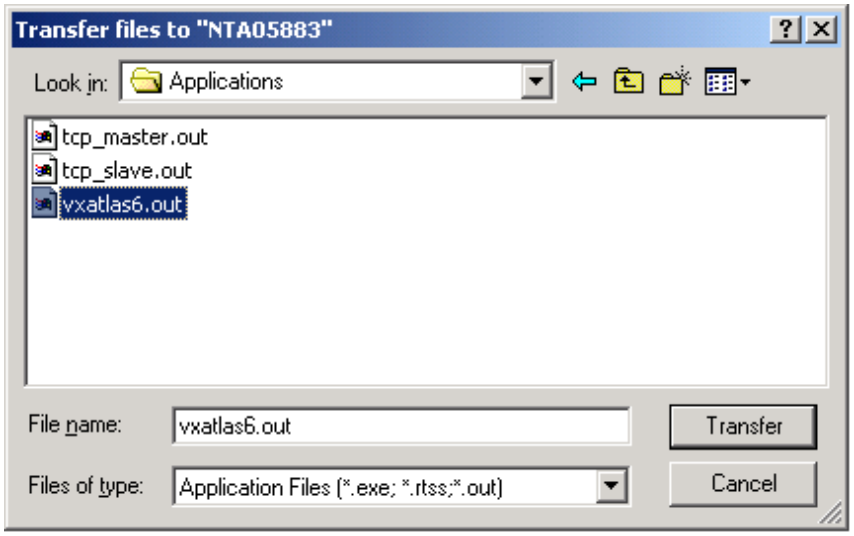
The Status Message Display and Application List will indicate when the application has stopped and it is removed from the AutoStart list.



Next, you will need to transfer an application to the control (skip this step if the application is already available on the Application List). The [Transfer App Files] button is used to move the application from your local PC to the control's flash memory.

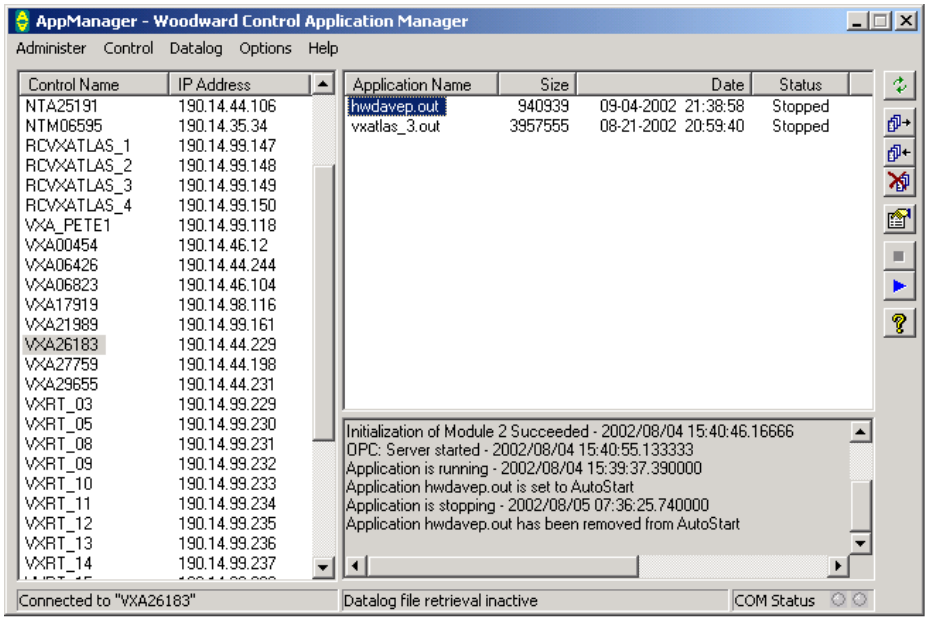
If the application has not yet been loaded to the control:

- Make sure you have the proper control selected on the Control List, then press [Transfer App Files]. A dialog box will appear that allows you to select an application to load to the control:

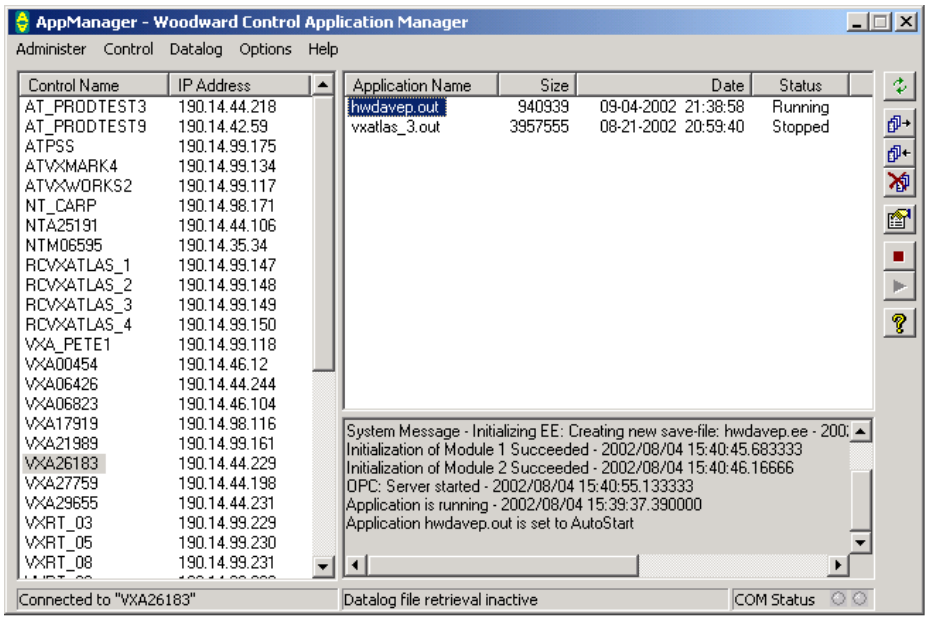


- Select the .OUT file of the application you want to transfer and press Open. AppManager will transfer the .OUT file to the control. You will be prompted before overwriting existing files. You cannot overwrite an application that is currently running.

- Once the application is transferred, it will be displayed on the Application list. Highlight the one you want to start and press the [Start/Stop Application] button to start the selected application.



The Status Message Display will indicate that the Application is initializing and show status of the initialization process.



Once the application is finished initializing, the Status Message Display will indicate that the Application is running and is set to AutoStart.

If desired, the old, stopped application may now be deleted from the control's flash memory by highlighting the Application Name and selecting [Delete App Files].

Rebooting the Control

The control is designed to reset upon power-up, so you must cycle power to the control to reboot. If an application is running when the power to the control is cycled, this application is marked as the Auto-Start Application, so that it will automatically restart after a power cycle.

Tunables Management

"Tunables" are the application's variables that are changeable on-line (without the need to modify the GAP application). The application programmer may make certain Boolean, analog, or integer values tunable by adding an asterisk (*) in the GAP application and defining a tunable range.

Tunable values are stored on the control as an .EE file in binary format. This file is not transferred with the .OUT file when AppManager's [Retrieve App Files] or [Transfer App Files] commands are executed, but may be manually retrieved (for archiving purposes) using AppManager's [Retrieve App Files] command.

To view and modify individual tunables while the application is running, use Woodward's Watch Window or GAP Monitor and Watch Window tools.

There are several ways to capture and adjust tunables in GAP applications, and there are two ways to view (in one document) all the tunables from an application that have been loaded into a control.

IMPORTANT	**As part of a best practices commissioning process, Woodward recommends that any saved tunable settings be validated (following any Save operation), by power-cycling the control and re-verifying the values.**

To capture and adjust tunables in one document, from an application that has been loaded into a control:

1. No GAP setup is required. Use Watch Windows to retrieve a .CFG file, which is an ASCII file that can be opened in Microsoft Notepad, Word, or Excel. It will show the name and current value but not the High Limit or Low Limit. You can change the values, save it, and load it back into the control.
   - In Watch Window II (Ethernet Port)—Right click on the IP address in the Explorer window and select App Settings\Save to File.
   - In Watch Window Professional or Standard (Serial Port)—Right click on the Explorer windows header tab and select App Settings\Save to File.
2. Set up in GAP a Serial or Ethernet Port using an INTERFACE and a TUNE_VARS block. (See the GAP help file under "Interface Tools" and "Common SIO Port Configurations" for more details.) Then use the Control Assistant tool to transfer the .CNF tunable list for viewing, comparing, sorting, and uploading.

To capture and adjust Tunables in GAP applications:

1. In GAP, select from the header, File\Database\Export Tunable List to Database. This will give you a .MDB file that can be opened in Microsoft Access database. You will see the Tunable Name, Nominal Value, Low Limit, High Limit, and Type. These can be changed and imported back to the Application.
2. In GAP, select from the header, File\Create ASCII File\Tunable List File. This will give you an ASCII (.TUN) file that can be opened in Microsoft Notepad, Word, or Excel. It will show the name and current value but not the High Limit or Low Limit. You can change the value, save it, and use Watch Window to transfer it to the control running this application.
3. Import tunables to GAP from a .CFG file. If the control's tunables have been adjusted and now you want to get those changes into the GAP application file, select from the GAP header, File\Import Watch Window Tunables, and upload it.

Chapter 4.
ServLink/Watch Window

Overview

Watch Window II uses the Ethernet port, and nothing needs to be done in your GAP™ application to support this. It uses the OPC server that starts when the GAP application is started.

Watch Window Professional and Watch Window Standard are a DDE client designed for serial communication with the Woodward ServLink Server. The GAP application needs to be set up to support these two serial tools.

ServLink comes with Watch Window applications when you down load it from the Woodward web site.

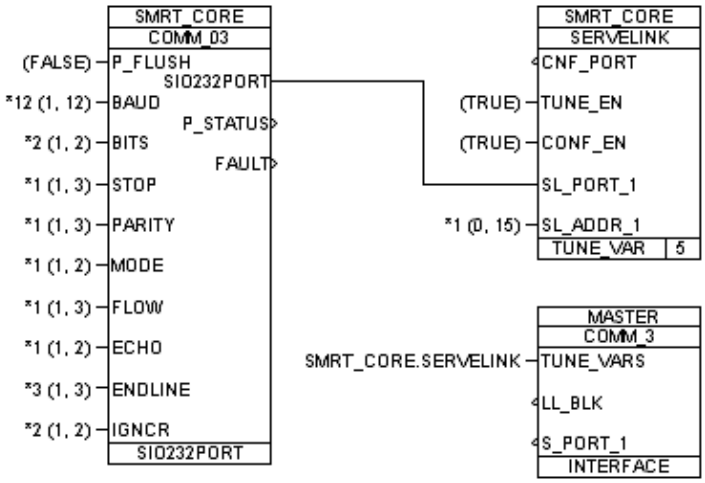
Watch Window has the following features:

- Variable access through the ServLink DDE server
- Loading and saving of different Watch Window configurations
- Hierarchical Tree View of available data
- Variable descriptions are supported

ServLink GAP Setup

To set up a Gap application to communicate with the ServLink Server via a serial port on the AtlasPC control, see the following example.

- Use either an SIO232PORT or SIOPORT block with the inputs configured as pictured below. The SmartCore board serial inputs are capable of communicating at 115 200 and CPU serial ports limited to 57 600. Any baud rate can be used as long as the GAP port settings match the PC port settings. The two most important non-standard settings not commonly remembered are to set the “Endline” (End of line Character) input to a tunable 3 and the “IGNCR” (Ignore Carriage Return) input to a tunable 2.
- The output of the SIO232PORT block will go into the SL_PORT_x input on the TUNE_VAR block.
- An “INTERFACE” block must be used and its TUNE_VARS input would be the name of the TUNE_VAR block input.



Using Watch Window over a Serial Port

1. A null modem cable is connected from your PC to a serial port that is set up in GAP for ServLink as described previously.
2. Start ServLink on your PC, and select the port your PC is using and the baud rate. Mode: is “Point-to-Point”. See Figure 4-1.
   - For more information on ServLink Server, consult the online help.
3. It will pull in application information from the control and create a filename.net file.
4. Save this .net file with a unique name. It will be associated the Watch Window that you will build.
5. Open Watch Window Professional or Standard. See Figure 4-2. Open a New file. You can Add sheets and build the window.

IMPORTANT

If you have made minor changes to an application, or have re-coded it with a different version of GAP Coder, you can still use the Watch Window that was created earlier by:

1. **Transfer the application to the control and run it.**
2. **Open a new ServLink file and save it using the previous .net filename.**
3. **Open your previous Watch Window.**
   - **If a message window pops up saying “The control ID has changed”, open the Watch Window .wwi file in Notepad and edit each line’s ID to match the ID shown in the ServLink window. Save the file and open Watch Window again.**

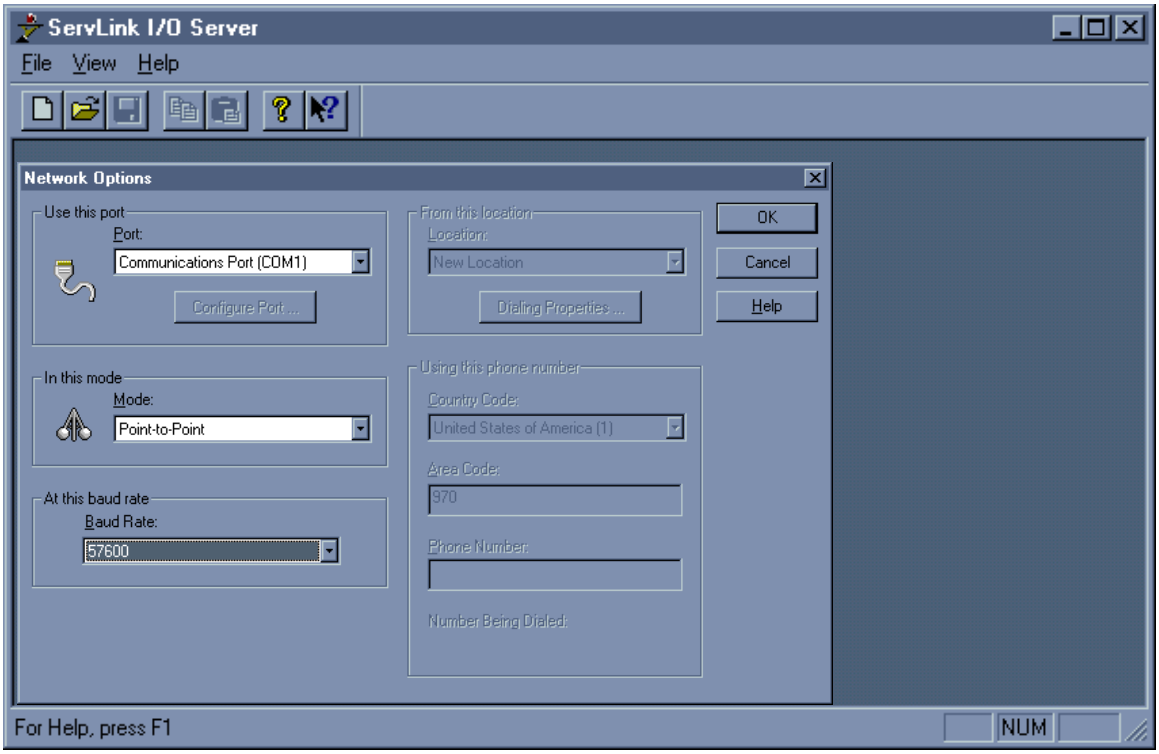


Figure 4-1. ServLink Screen

Watch Window is supported on the AtlasPC, but certain functions are not. In order to use certain functions some procedures must be followed for them to work correctly. If a right mouse click is performed on the .net file tab under the left “Explorer” window, the following functions are displayed (see Figure 4-2):

- Load Application
- Load Configuration from File
- Save Configuration from File
- Reset
- Enter Configure Mode
- Save Values

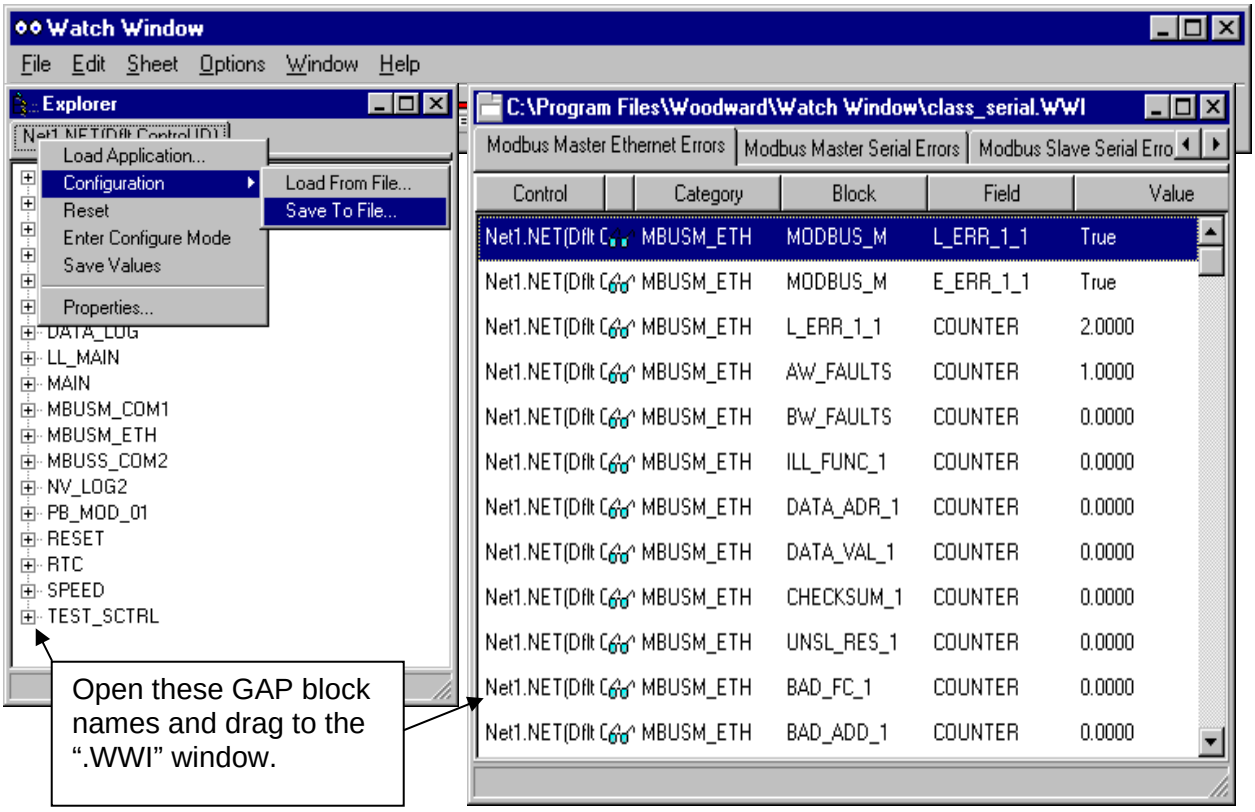


Figure 4-2. Watch Window Screen

Watch Window Functions

“Load Application”

- Function is not supported on the operating system running on Atlas. The function is performed by AppManager.

“Configuration / Save to File”

- Function is supported.

“Configuration /Load from File”

- Function is supported however a certain procedure must be followed.
    1. When this function is pressed, Watch Window will prompt the user to “Shutdown the control” click on YES.
    2. Watch Window will then prompt the user to “Enter configure Mode”. Click on YES. The configuration file will then be uploaded to the control.

3. When the upload is complete, Watch Window will prompt the user to “Restart the Control”. Click on NO. Watch Window does not have the capability to stop/start the application, which is essentially what a Restart is.
4. After NO is clicked, Watch Window and ServLink can be shut down and AppManager must be used to restart the application with the new configuration.

“Reset”

- Function is not supported. AppManager performs this function.

"Enter Configure Mode"

- Configure and Service Mode is not supported through Watch Window.

“Save Values”

- Function is supported. This saves the GAP applications “Tunable Values” to the control in its C:\Woodward\Applications\filename.ee.

IMPORTANT	**As part of a best practices commissioning process, Woodward recommends that any saved tunable settings be validated (following any Save operation), by power-cycling the control and re-verifying the values.**

IMPORTANT	**For more information on Watch Window consult its online help.**

IMPORTANT	**TIP—Use Watch Window II to check the GAP settings of the serial ports.**

Chapter 5.
PC/104 Fieldbus

Overview

There are three steps in configuring an AtlasPC Fieldbus network:
1. Install the applicomIO console program with SP3 (Service Pack 3).
2. The applicomIO CD is used to configure Profibus, DeviceNet, and CANOpen. One configuration file is produced (applicomIO.ply). This gets loaded onto the AtlasPC control.
3. Build the GAP application to interface with the Fieldbus boards and their networked modules.

More information can be found in Woodward manual 85586V2, *AtlasPC Hardware Manual, vol. II* (Distributed I/O).

Install the applicomIO Console with SP3

The applicomIO CD-ROM starts automatically. Once your operating system has started, inserting the CD-ROM in your drive will cause automatic start-up of the "CD-Browser" navigation application.

The applicomIO installation program carries out the following steps:
- Installation of Internet Explorer 5.0—If you do not have Internet Explorer 5.0 or greater on your machine, you will be requested to install it. You cannot continue the installation process until IE 5.0 or greater is installed. (See the prerequisites below.)
- Validation of the license contract.
- Uninstallation of a previous version, if present. You cannot continue the installation process until it has been uninstalled.
- Request for user information (name and company).
- Choice of installation directory. You are strongly recommended to use the default path. In addition, you are strongly recommended not to select the path corresponding to a previous version of applicomIO.
- After applicomIO has been installed on your machine (see Installation Procedure on next page), you must reboot.

Prerequisites:
- The applicomIO product is only compatible with Microsoft Windows NT 4.0 and Windows 2000 operating systems. It is impossible to install applicomIO on computers running on Windows 95 or Windows 98 operating systems.
- The computer must either have its own CD-ROM drive or have a network connection to a computer with the CD-ROM drive.
- The user session opened must be "Administrator". (Consult your network administrator otherwise.)

- Under Windows NT 4.0, Internet Explorer 5.0 or greater must be installed. If not, the installation process will prompt you to install it if your operating system is in one of the following languages: German, English, Spanish, French, Italian. Otherwise, you must make this installation from another source. You can find it at the following address: **www.microsoft.com**.
- All your applications must be closed before starting the installation process.

For an update:

- If you have a previous version of applicomIO installed, ***you do not have to remove it before starting the installation process***. It will be removed automatically.

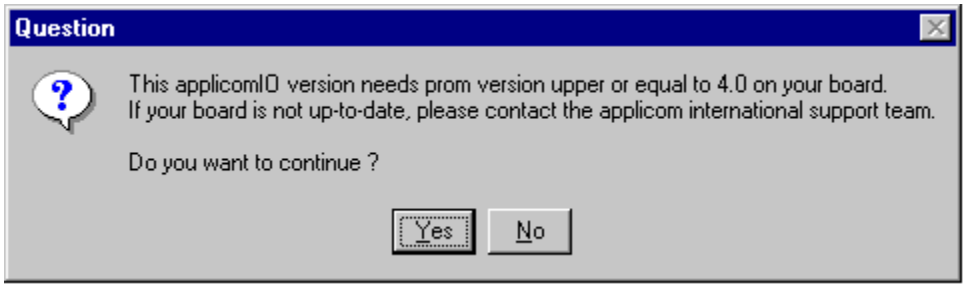
NOTICE

This version of applicomIO offers a new, more advanced configuration interface (configuration by detection of equipment on the field bus) which does not allow migration of a previous configuration made using a version of applicomIO less than applicomIO 2.0.

Installation procedure:

To install the applicomIO product on your computer, proceed as follows:

1. Start Windows NT 4.0 or Windows 2000.
2. Open an **administrator** session.
3. Close all applications.
4. Insert the applicomIO CD-Rom. (The CD-Browser welcome menu starts automatically. Otherwise, run "setup.exe", which is stored in the root of the CD-Rom).
5. Select a language. You can select **Documentation** and load the Adobe Acrobat 4.0 from the icon, and read all the user documentation if you want.
6. Select **Install Products**. The program now runs and the CD-Browser closes automatically.
7. Select **applicomIO 2.1**.
8. A question screen will pop up. Click [Yes].



Install applicomIO Console SP3:

1. Download applicomIO Service Pack 3 from the Applicom website (**www.applicom-int.com**) and save the *.exe file (for example, V21.325P3.exe) on your PC.
2. Extract files by double-clicking on the file. A directory named “DISK1” will be created with all the setup files in it.
3. Navigate into the DISK1 directory and execute “setup.exe”.
4. Follow the steps to install SP3.

Example—Configuring Profibus and Distributed I/O Network

There are two sides to configuring a Profibus network, the distributed I/O or slave side and the Atlas or master side.

- In the Console program, Board1 is the master.
- Master devices are able to control the bus. When it has the right to access the bus, a master may transfer messages as it desires.
- Slave devices are simple peripheral devices such as the GE Fanuc VersaMax™ Profibus Network Interface Unit. Slaves have no bus access rights—they may only acknowledge received messages, or at the request of a master, transmit messages to that master.
- The Protocol architecture of Profibus is based on the Open Systems Interconnection (OSI) reference model in accordance with the international standard ISO 7498.
- Number of Stations—32 stations in every segment without repeaters. With repeaters, extendible up to 127.
- Transmission Speed—9.6, 19.2, 93.75, 187.5, 500, 1500 Kbits, 3 Mbits, 6 Mbits, 12 Mbits. The bus length determines which baud rate may be selected.

Ease of configuration varies widely among the many different manufacturers. Some manufactures offer vary limited configurations, which makes configuration easy while others offer a wide variety of options, which makes configuration more difficult.

A little research will have to be done to decide which manufacturer to use to suit your needs. Most of this information is available on the Internet at each manufacturer's web site. However, the best place to start is at **www.profibus.com**.

Applications Note: Applicom/Coder compatibility
For an AtlasPC control using the Profibus PC104 module, the following combinations will function together:

- NT only
- Applicom Profibus firmware 3.9.0 or 4.0.0 (labeled on the board)
- Applicom I/O configuration tool version 1.1 (no service packs)
- Coder 3.01 or 3.02
- AtlasPC footprint part number 5414-223

OR

- NT only (SmartCore w/ Actuator)
- Applicom Profibus firmware 4.0.0 (labeled on the board)
- Applicom I/O configuration tool version 2.1 (no service packs)
- Coder 3.03 or newer
- AtlasPC footprint part number 5466-431

OR

- VxWorks
- Applicom I/O configuration tool version 2.1 w/ SP3
- Coder 3.05 or newer
- AtlasPC footprint part number 5418-151

Profibus ApplicomIO Configuration Example

The setup described below uses ApplicomIO 2.1 and is somewhat generalized. Your setup may vary slightly with newer releases of ApplicomIO. Use the Atlas manuals, Profibus Manufacturers manual, and the Applicom Utility to configure the network.

More information can be found in Woodward manual 85586V2, *AtlasPC Hardware Manual, vol. II* (Distributed I/O).

- If you don't have the applicomIO Console program installed, see the relevant section in this chapter.
- Decide which manufacturer you are going to use, order the different nodes or modules, and acquire the ".GSD" file from the manufacturer.

IMPORTANT

Configuration without a GSD file can be carried out using the "Generic device". This functionality is available in the "Equipment library" area of the applicomIO console. The "equipment" properties allow modification of its main characteristics. Modification of the configuration string of each module or the creation of a parameter string is possible only by activating the "Expert Mode".

1. Start Apcnfgio.exe found in C:\Program Files\ApplicomIO\2.1\… or from the shortcut named ApplicomIO Console.
2. If you are writing a new configuration, select, File\Configuration Manager\New, and select "Simulation Mode" for [Board Location]. Select File\Preferences, then select "Expert Mode".
3. See Figure 5-1 for an example. "Board 1" will be the PC/104 Profibus board that is installed on your AtlasPC. "PC104_DPIO".
4. Double Click [Boards Configuration], [Diagnostic & Manual Configuration].
5. Select PC104/ISA, Select PC104_DPIO, DBRAM Base Address = D4000, Interrupt Vector change to IRQ5. [OK]. This adds this Profibus Master to the right screen.
6. Double click the "Profibus Master" that was added to the right panel and set the parameters. Set the "Profi Master Address" to 000. This is the Atlas PC/104 Profibus Board.

- External Modules are called Communicator Adaptors in the lower left screen. Equipment Available, Select your Interface Module. Right click, Insert in Configuration.

7. Add the modules desired, in the order they will be physically from the interface module from left to right, in the "Module Configuration" tab (see Figure 5-1). **NOTE**: If your interface module is listed in the available module section, add it first.
8. Set the "Station" to the hardware switch address you want the external Interface Module to be. This must match in the GAP, EQUIP_NO input on the FB_EQUIP blocks.

- The "Module Configuration" tab shows x bytes input for the modules and x bytes for output. Make a note of these input and output bytes because you will need them for writing the GAP application.

9. File\Save. Start the "Board(s) Initialization" command from the pull-down menu or by pressing the green flag button at the top. A file named "applicomIO.ply" will be generated.

10. File\List and Print. This will give you a hard copy of the Receiver Module set up.

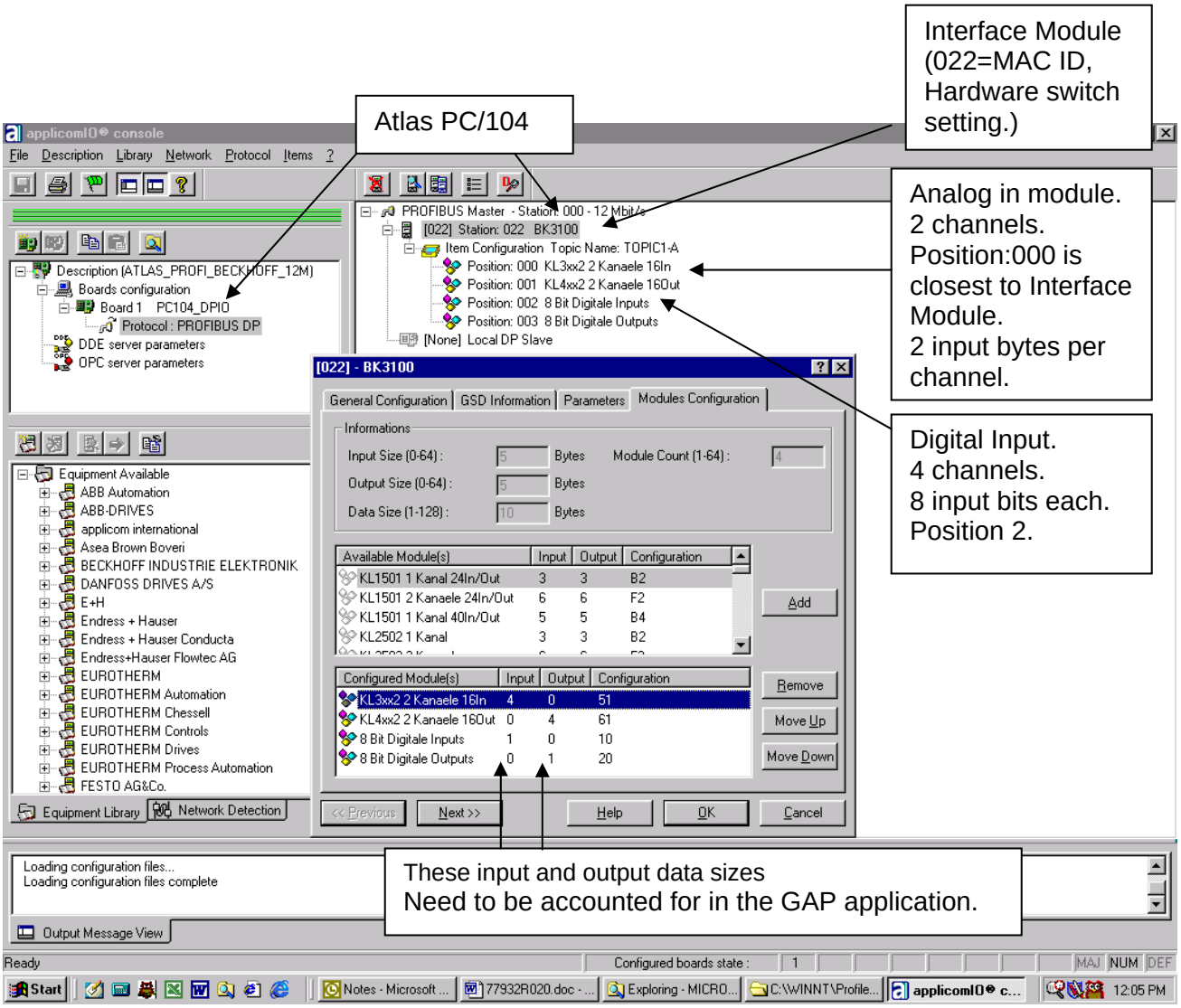


Figure 5-1. Profibus Applicom Configure Screen

IMPORTANT

Use AppManager to transfer the .ply file from the C:\Programs\applicomIO\2.1\ConfigIO directory to the AtlasPC. In the "Transfer Files To" window, select "All Files (*.*) from the "Files of Type" pull-down menu.

Profibus GAP Overview

Build the GAP application to interface with the Fieldbus boards and their networked module. The difficult part is finding how many bits or bytes each module uses and configuring the GAP blocks that represent each module to the correct offset. The Input bits get added up and so do the output bits for a given slave interface. See Figure 5-2.

Profibus GAP Setup

1. In GAP, double click in the chassis block, slot 6 or 7, and add the FB_MODULE. Select “Generate Channel Sheet” and the block FB_MODULE will be added on a new sheet. This is the parent block. Refer to Figure 2-3 for an example.
2. Add the FB_EQUIP block. The IO_B_x input of the FB_MODULE needs to point to this FB_EQUIP block, which represents a set of slave modules.
3. Add FB_AI, FB_AO, FB_BI, FB_BO etc. These represent the IO modules.

Block Details from the example

- **FB_MODULE**: Parent Block for all Fieldbus slave sets.
- **FB_EQUIP**: Semi-Parent Block for one Fieldbus slave set.
  EQUIP_NO (FB_EQUIP Input) this corresponds to the hardware switch setting and MAC ID, of the Interface module that was set in the applicomIO configuration tool.
  IO_B_1 (FB_EQUIP Input) Name each Fieldbus IO module. FB_AI, FB_AO etc.

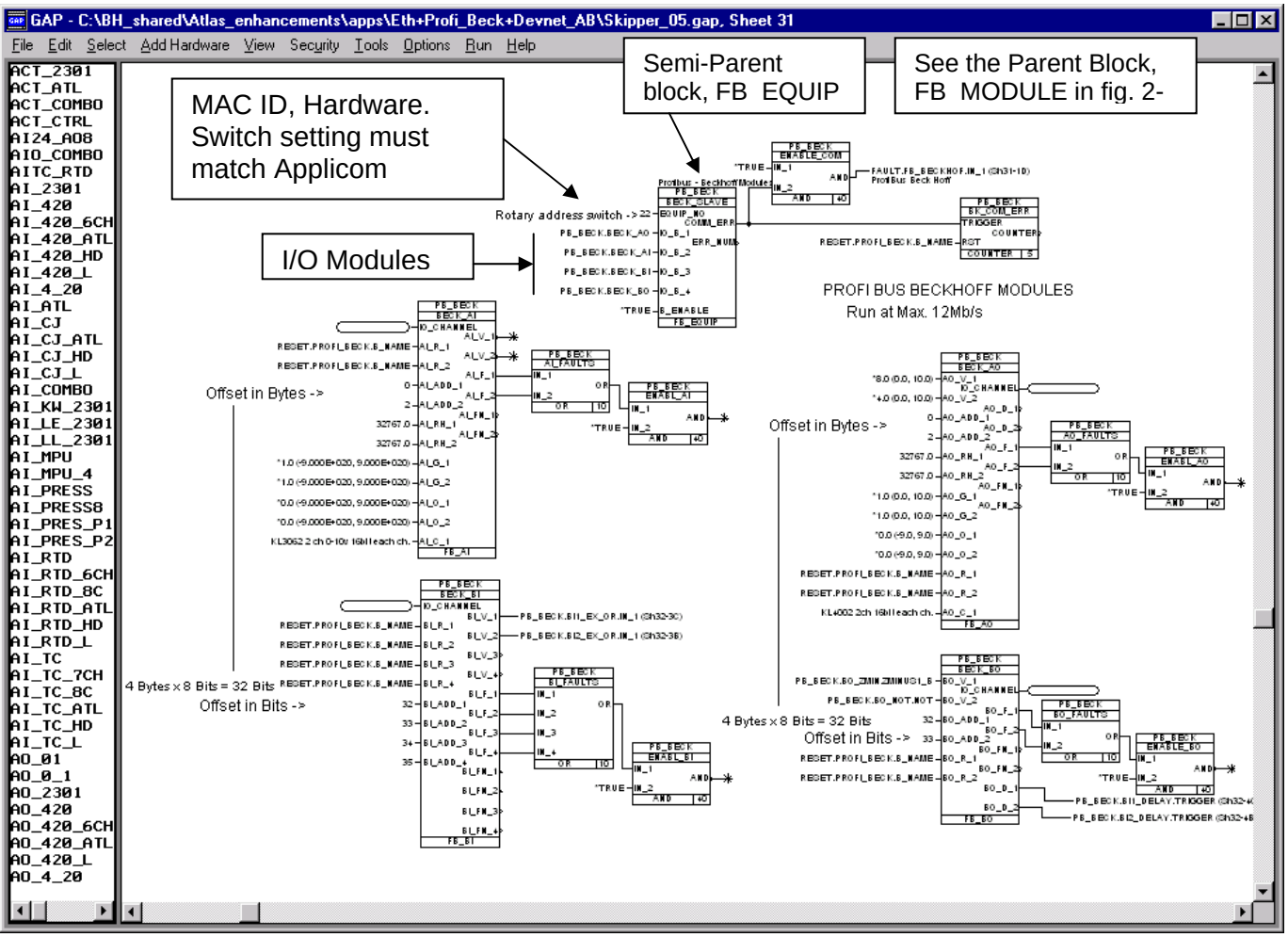


Figure 5-2. Profibus GAP Example

- **FB_AI** Analog input. There were two analog input channels on the physical module. Open the block and select RPT to add a repeat input.
  AI_ADD_1 (FB_AI Input) The physical module used four input bytes total. It has two channels so each takes two input bytes. This module is physically to the immediate right of the Interface Module so channel 1 needs no offset. This input is set to 0.
  AI_ADD_2 (FB_AI Input) to account for the 2 input bytes that channel 1 uses, this second channels needs an offset of 2.

- **FB_BI**: Boolean Input. There are four channels of boolean inputs on the physical module. Open the block and select RPT to add three more repeat inputs.
  BI_ADD_1: (FB_BI Input) Since this is a boolean module, the input data is in bits. (Low resolution.) It is physically position 002 and the other input module; the 2 channel Analog input module was position 000 which already accounted for 4 Bytes or 32 bits of data. Therefore the first boolean in channel needs an offset of 32 (Bits). The second channel needs 32+1=33.

Profibus Troubleshooting

Applicom PC/104 Device Initialization Verification

- This is done while initializing in the Simulation mode. The board number box must turn green.

Applicom Driver Check

- See messages in the AppManager window.

Applicom Device Fault Check

- If the PC/104 card is not working and the AppManager message window shows the “applicomIO driver is loaded success”, then use Watch Window to view the FB_EQUIP, COMM_ERR output, the FB_AO or FB_AI Blocks FN (Fault Number) outputs and compare to the error codes found in the GAP online help for that block.

Profibus Card not Talking to External Modules, but is Initialized

- Check equipment (hardware) configuration and match with the values set in the Console configuration setups.

DeviceNet Example

The DeviceNet network is configured using the applicomIO CD supplied with the AtlasPC control (applicomIO Console). This tool is used to define the AtlasPC control as a DeviceNet Master or Slave. For master operation, the slave devices are defined and configured by importing their EDS files and assigning network addresses.

IMPORTANT

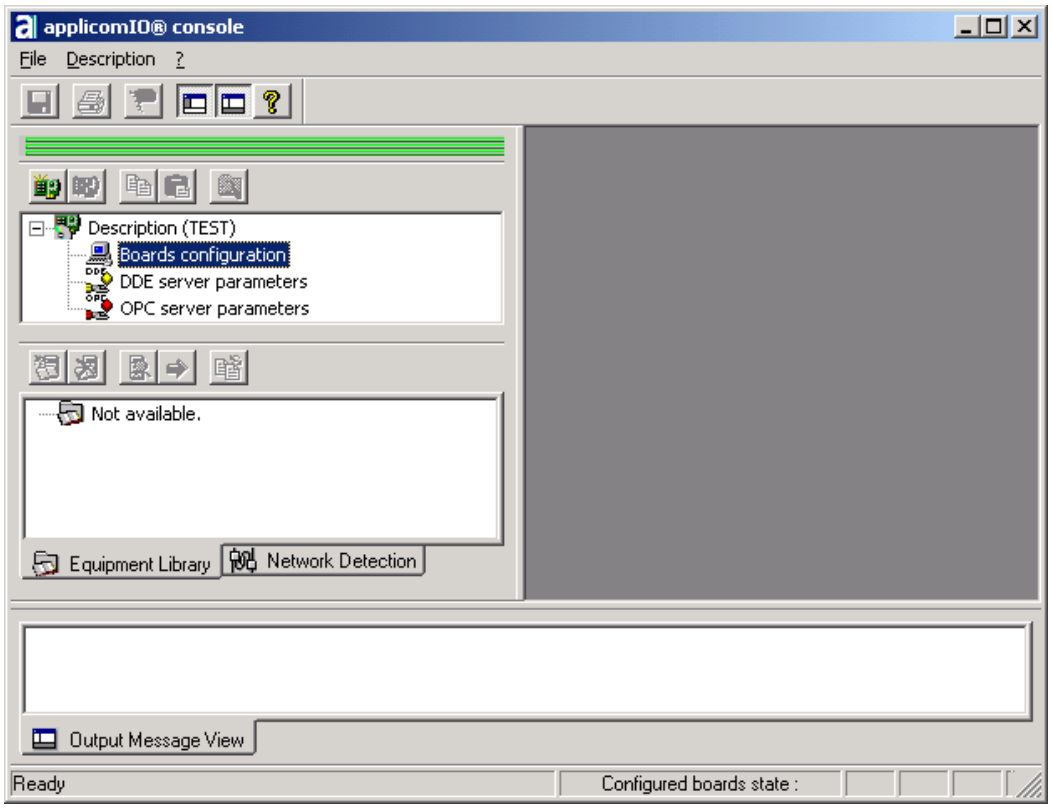
An "EDS" file is supplied with the device by the manufacturer. It is necessary for configuration using the applicomIO console. It characterizes the device by defining the types of connections to be managed as well as the size of associated input/output and the list of possible parameters specific to the DeviceNet.

- We recommend that you obtain a recent version of the EDS file, either directly from the manufacturer of the DeviceNet equipment or from ODVA (www.odva.org).
- When the device is supplied without the EDS file, the applicomIO console can, upon user request, generate a minimum file from information originating from the device installed on the network. This EDS file will then be automatically inserted in the equipment library.

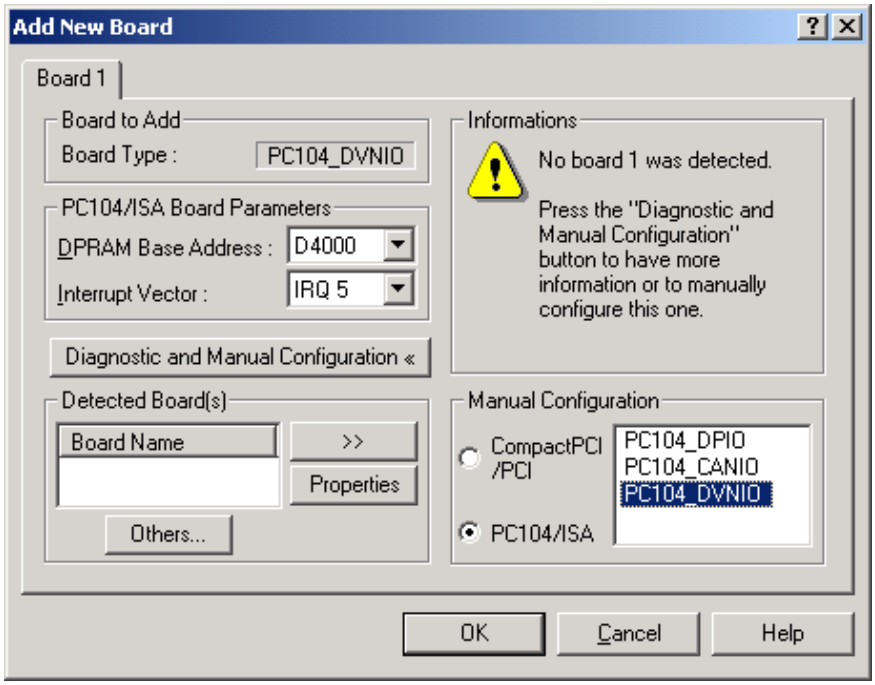
DeviceNet applicomIO Configuration Example

If you don't have the applicomIO Console installed, see the relevant section in this chapter.

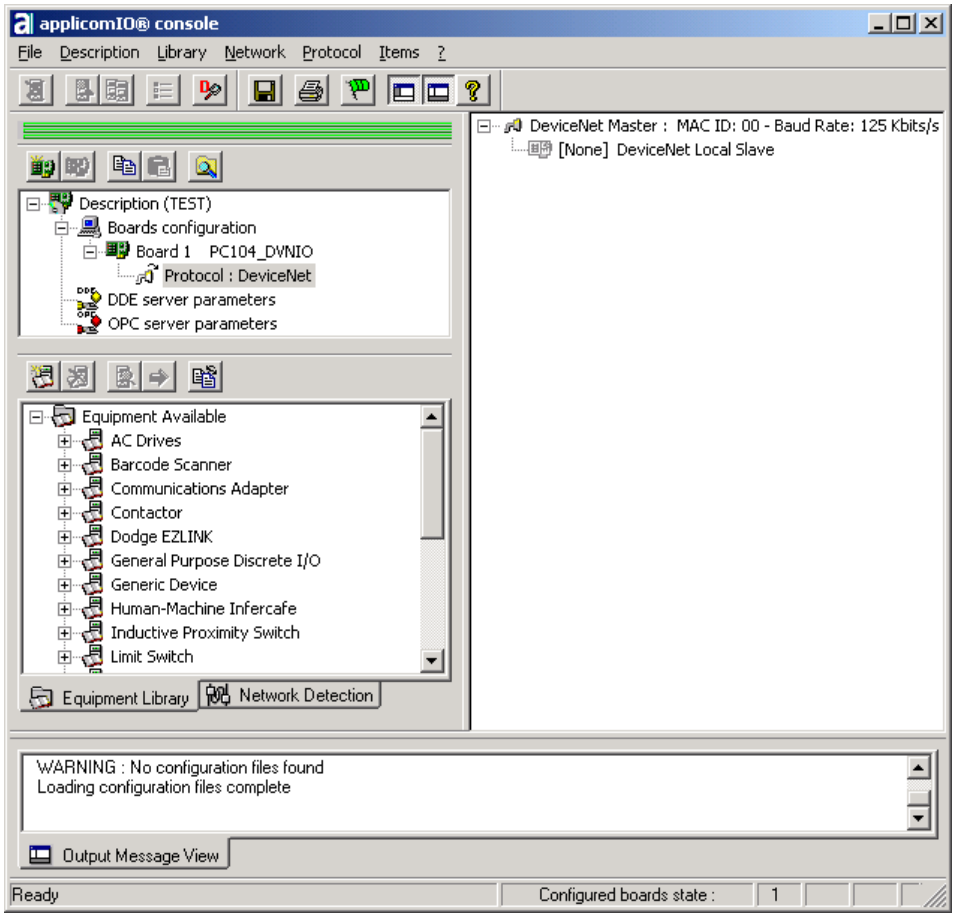
1. Start Apcnfgio.exe found in C:\Program Files\ApplicomIO\2.1\… or from the shortcut named ApplicomIO Console.
2. If you are writing a new configuration, select; File\Configuration\Manager\New.



3. Under Board Configuration, select Add Board.
4. Under Add New Board, select Diagnostic and Manual Configuration.

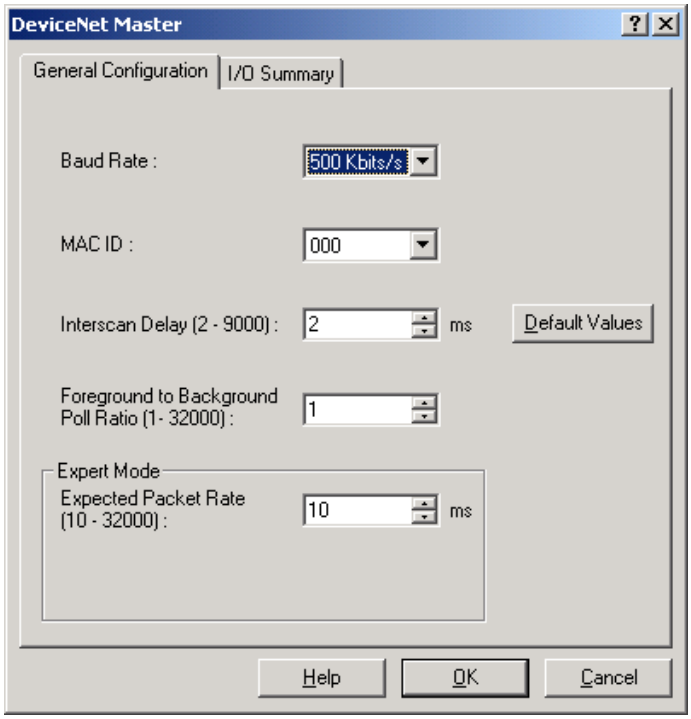


5. Select D4000, IRQ 5 and PC104_DVNIO for a single FB application.

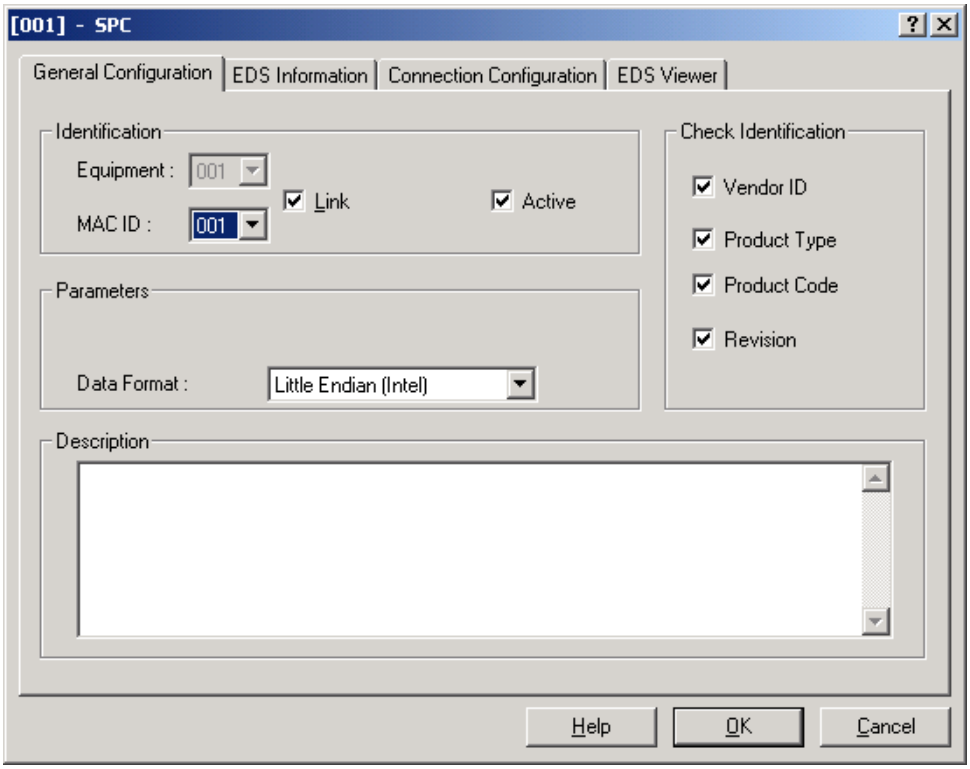


6. Under Files --> Properties, Make sure Expert Mode is checked.

7. Under Protocols, select Properties.

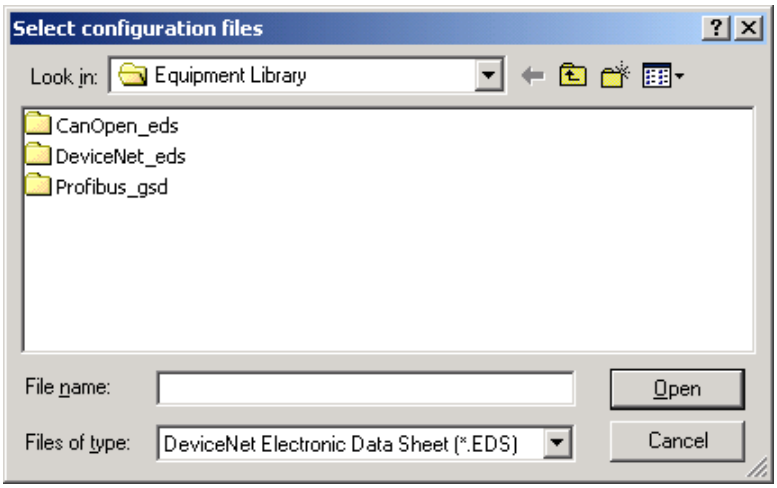


8. Select the correct Values for the Network. The DeviceNet Timeout will be four times the expected packet rate, and must be set with care.
9. Drag and Drop all nodes in the Network from the Equipment Library to the DeviceNet Master.

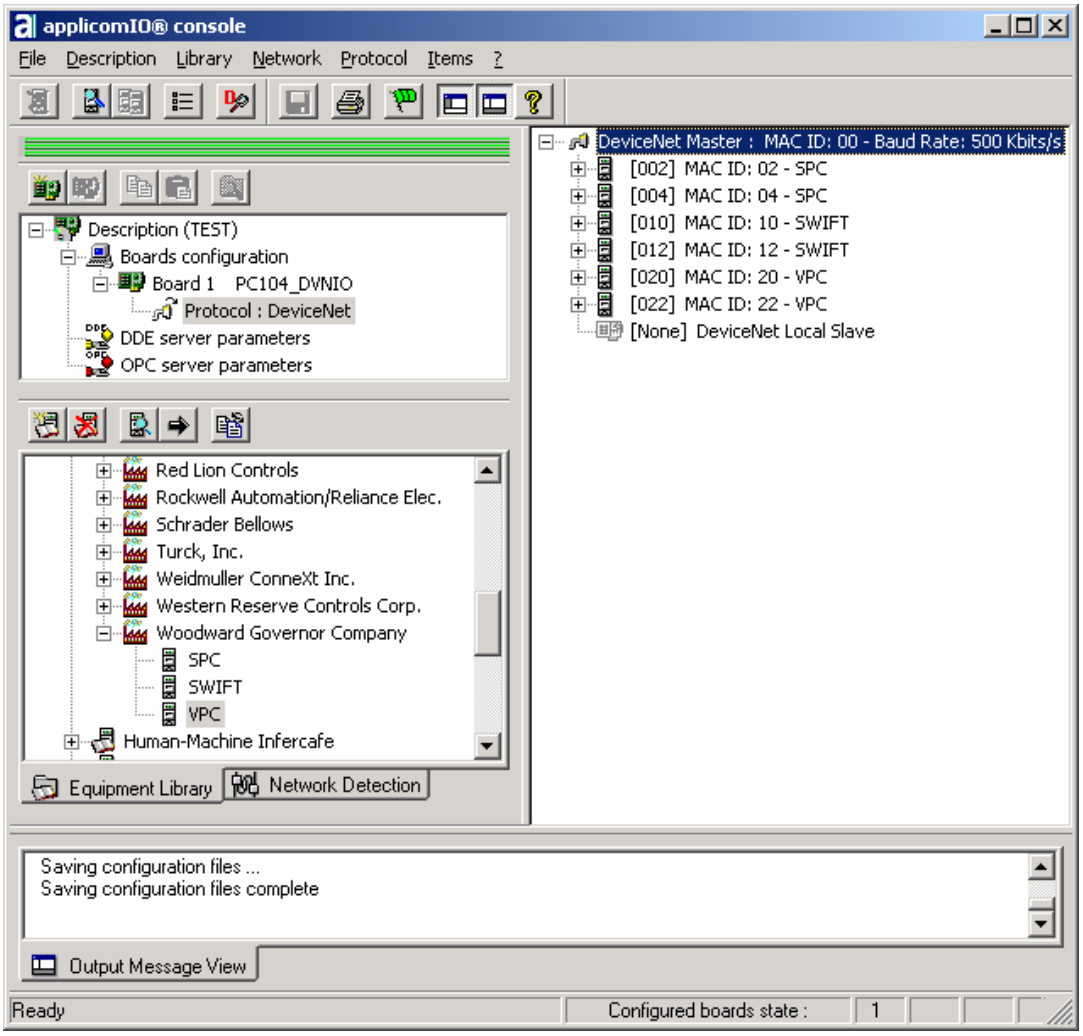


10. Select a unique MACID for each node.

11. Select Little Endian vs. Big Endian.
12. If a node cannot be found in the Library, It can be added using Library→ Add.



13. Select the EDS file supplied by the Nodes Manufacturer.
14. Once all nodes have been entered, select File→ Save.

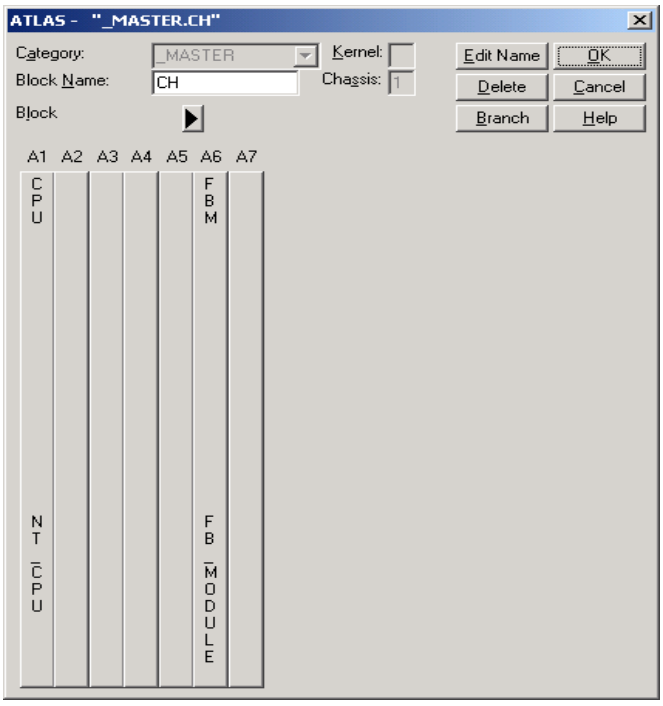


15. Make sure “Simulation Mode” was selected from the Configuration Manager. Start the “Board(s) Initialization” command from the pull-down menu or click on the green flag button. A file named “applicomIO.ply” will be generated.
16. Download this file in the Atlas PC control using AppManager or via Explorer to the “/Woodward/applications” directory.

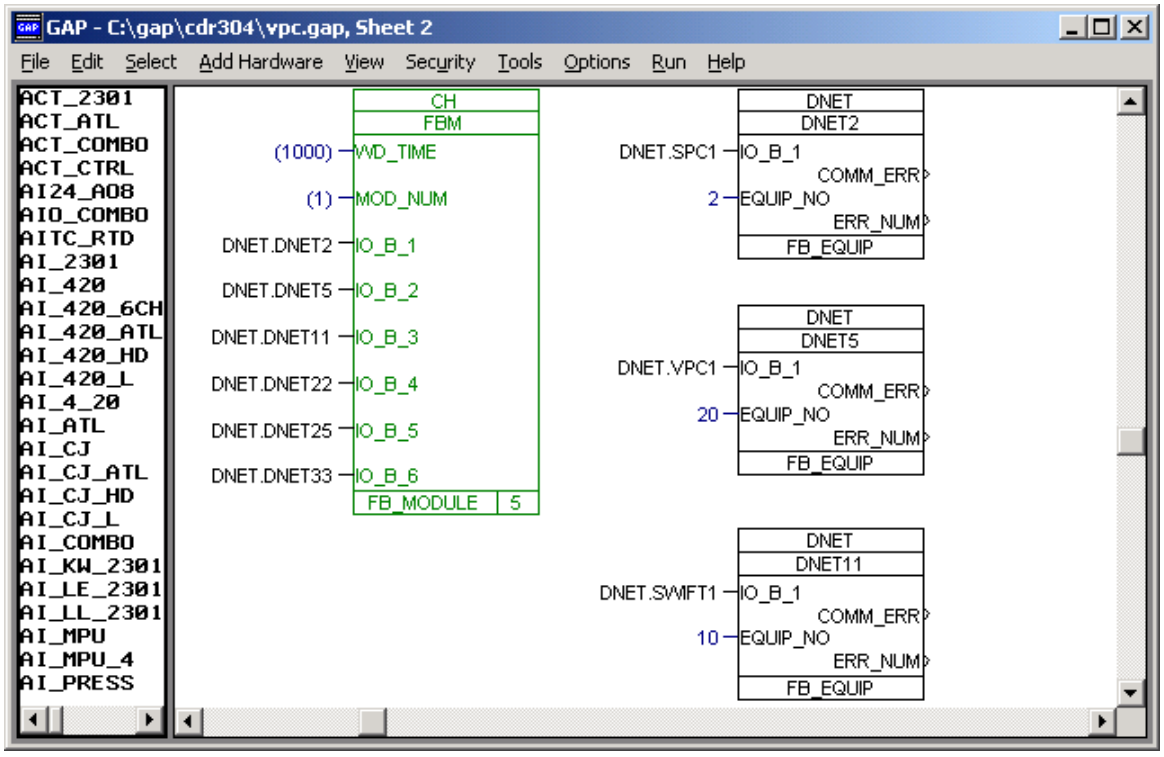
DeviceNet GAP Setup

After creating the DeviceNet I/O, the GAP application must be programmed to match this configuration. The steps necessary to use DeviceNet with the AtlasPC Control are as follows:

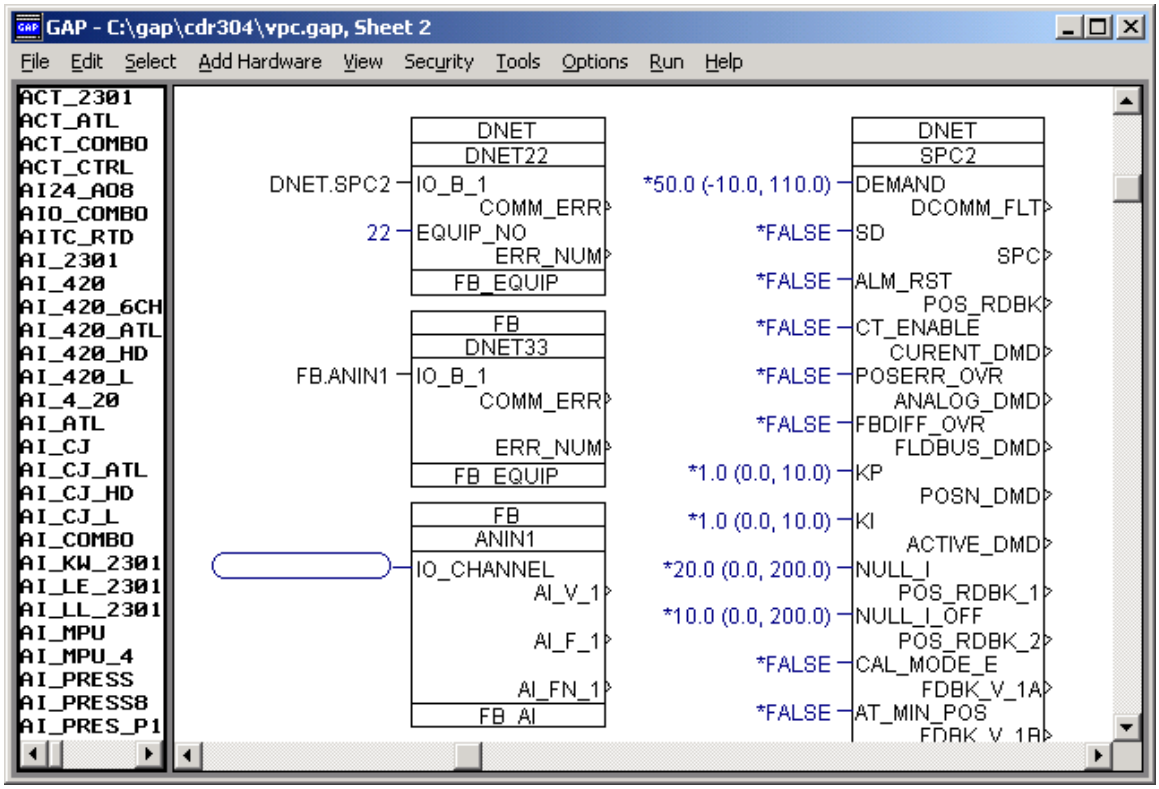
1. Select FB_MODULE for slot 6 and or 7 in the GAP application. All Fieldbus modules use the same Parent Block.



2. Select a FB_EQUIP Block for every node in the Network and assign the FB_MODULE as its Parent Block. Every FB_EQUIP block must have its EQUIP_NO set to the MACID of its respective node.



3. Every Node is then defined using specific GAP blocks (i.e. SPC,VPC,SWIFT) or generic blocks (i.e. FB_AI, FB_AO, FB_BI, FB_BO).



4. The coded GAP application must be compiled, filename.OUT, downloaded to the AtlasPC control using AppManager.

- Once the GAP application is started on the AtlasPC, the DeviceNet module will automatically initialize and start the DeviceNet Network. All nodes will be updated from the Applicom module sequentially, once every scan rate. The GAP application will update its values, once every rate group (defined in FB_MODULE). See the “Troubleshooting” section of this chapter if you need to verify the PC/104 DeviceNet board initialized.

IMPORTANT **The timing of the Applicom scan rate will depend on the nodes in the network and will be independent of the rate group structure.**

DeviceNet Troubleshooting

The PC/104 DeviceNet is initialized, but its Com (D1) and I/O status (D2) LEDs are off, and the external DeviceNet Module status LEDs are off.

- Make sure you have proper termination resistor(s) across CAN L and CAN H at the receiver. See the AtlasPC Hardware Manual.
- Check the modules power (+24 V external power)

Applicom PC/104 Device Initialization Verification

- This is done while initializing in the Simulation mode. The board number box must turn green.

Applicom Driver Check

- See messages in the AppManager window.

Applicom Device Fault Check Using Watch Window

- If the PC/104 card is not working and the AppManager message window shows the “applicomIO driver is loaded success”, then use Watch Window to view the FB_EQUIP, COMM_ERR output, the FB_AO or FB_AI Blocks FN (Fault Number) outputs and compare to the error codes found in the GAP online help for that block.

DeviceNet Card not talking to external modules but is Initialized

- Check equipment (hardware) configuration and match with the values set in the Console configuration setups.

DeviceNet Status LEDs

D1 COM (Channel Status)

Green	OK
Red	MACID duplicated
Red Blinking	Network error, or missing device
Off	The channel is not online, or no power supply (24 V)

D2 I/O Status

Green	OK
Off	Channel error, scanner not active
Blinking	At least one device error

Chapter 6. Internet/Ethernet Information

Internet Protocol

The Internet Protocol, (IP), is a network layer Internet protocol. IP facilitates communication from the two Transport Layer Protocols, TCP (Transmission Control Protocol) and UDP. (User Datagram Protocol). They run on top of the IP layer and are identified by Port Numbers.

IP Addresses

The IP address is a 32-bit number made up of four, 3-bit segments separated by periods. The Subnet Mask controls which bits are the network identifier and which bits are the station identifier. (The binary 1's mark which bits of the IP address represent the network identifier. The binary 0's indicate which bits of the IP address is your device ID#—for example, a Subnet Mask of 255.255.0.0 = 11111111.11111111.00000000.00000000.) The first 16 bits of the IP address identify the network, and the last 16 bits identify the device.

There are three classes (sizes) of IP networks: A, B, and C. Classes are determined by how many unique devices and sub networks are possible based on how many of the IP address bits are used for designating the network number and how many bits are identifying the device number. A network identifier between 192—223 is class C size, because the first three bits of the IP addresses are used to identify the network.

IMPORTANT **Some IP address ranges are reserved. Consult your Network Administrator if you want a "fixed/static" IP address for a control.**

The Gateway is a device or computer that forwards data to a destination on another domain. The Port number is a logical number that increases the number of devices that can talk without increasing IP addresses. Port Numbers 1-1024 are reserved for protocols such as HTTP, POP, FTP etc. Port numbers 1025 to 65000 are available for our typical PC, AtlasPC and MicroNet sessions.

Logging on to a Network in DHCP Mode

When a device running TCP/IP, (Atlas, MicroNet, PC) logs onto a network, it sends out a DHCP Discover message. The DHCP server receives the message and sends out an IP address with the subnet mask and a lease time to the hardware or MAC address of the device. (A typical lease is 30 days.) The device broadcasts a message of acceptance, implements the new identity, and is ready for TCP/IP sessions. The host has Address Mapped the device and associates its MAC address (Computer Name) with its IP address. Because servers periodically do this, it may take up to an hour before the server makes a new Computer Name and IP association available to the network.

GAP and Ethernet

We typically use UDP blocks in GAP to talk Modbus through Ethernet ports. UDP is mainly used for time-sensitive, low-priority data and has no reliability associated with this layer. Transmission is in small, static-size packets. The sender assumes all packets are received and normally doesn't re-transmit. However, in MicroNet and Atlas, the "Modbus" blocks (C code) tells the master to send data to the slave, and the slave will normally accept the data and respond to the master, so the communications loop will not produce any errors. Should the slave not accept the data (if it receives invalid or no data), the slave will not respond. The master will wait for its time-out period to expire and re-send to the slave. If the master again does not get a response from the slave, the master will generate a Link Error. In addition, the slave is looking for the master to talk to it at static time intervals. If it doesn't get a transmission, it will generate a Link Error. The UDP header consists of [Source Port, Destination Port, Header Length, and Checksum].

Internet Vocabulary

IP	Internet Protocol—Designed to link networks together.
IP Address	32-bit number made up of four 3-bit segments separated by periods.
TCP	Transmission Control Protocol—Designed to link networks together.
UDP	User Datagram Protocol—Connectionless/ Host to Host protocol in the Transport Layer of IP.
DHCP	Dynamic Host Configuration Protocol—Automates the IP address assignment.
Gateway	A device or computer that forwards data to a destination on another domain.
Subnet Mask	The binary 1's mark which bits of the IP address is the network. The 0's are your stations ID#.
Port	A logical number that increases the number of devices that can talk without increasing IP addresses.
MAC	Media Access Control—A unique 48-bit number burned into the hardware of the device.
Address Mapping	When a host broadcasts to all MACs and associates its IP address to its MAC address when it responds.

Woodward Software	www.woodward.com/ic/software
Microsoft VisualC++	msdn.microsoft.com/visualc
Internet Explorer 5.0	www.microsoft.com
Profibus Information	www.profibus.com
Applicom	applicom-int.com
DeviceNet	www.odva/org

Table 6-1. Websites Mentioned in This Manual

Software Setup Record

AtlasPC Part Number _____

Find via AppManager:

Computer Name VXA_____

Footprint Part Number _____

Footprint Rev _____

Service Pack Version _____

Ethernet #1:

Mode Static IP or DHCP

IP Address _____

Subnet Mask _____

Default Gateway _____

Ethernet #2:

Mode Static IP or DHCP

IP Address _____

Subnet Mask _____

Default Gateway _____

Tunable .cfg File Name _____.cfg

Tunable .mdb File Name _____.mdb

Tunable .tun File Name _____.tun

applicomIO Configuration Name _____

ServLink .net File Name _____.net

Watch Window .wwi File Name _____.wwi

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 26199C.

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