WinPLC and
Serial I/O Module
Installation and Operation

Manual Number: H2-WPLC-M

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If you contact us in reference to this manual, remember to include this revision number.

Title: WinPLC and Serial I/O Module Installation and Operation
Manual Number: H2-WPLC-M

Issue	Date	Description of Changes
Original	*4/99*	Original Issue
2nd Edition	*12/99*	Describe T&D ESP usage Added H2-SERIO Chapter 2
3rd Edition	*3/01*	QuarkXPress conversion Added Workbench Chapter 3

GETTING STARTED

CHAPTER
1

In This Chapter...

Manual Overview

Overview of this Publication

The WinPLC and Serial I/O manual describes the installation of the modules, port configuration, power budgeting, and basic operation of the WinPLC and Serial I/O modules. There is also a brief discussion of Ethernet cabling issues.

Other Reference Materials

You may find other technical publications useful for your application. For technical information related to your PC-based control software or Windows® CE, please refer to the appropriate publication for those products. For more information about the *Direct*LOGIC™ products, you may want to read the following:

> • DL205 Installation and I/O Manual

Who Should Read This Manual

You will find the WinPLC manual helpful if you have chosen to use the following:

> • WinPLC running PC-based Control software

> • Our DL205 I/O

You will find that a familiarity with Ethernet communications and with the setup and installation of PLCs is helpful. An understanding of electrical codes and industrial control is essential.

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Special Symbols

When you see the "notepad" icon in the left-hand margin, the paragraph to its immediate right will be a **special note**.

When you see the "exclamation mark" icon in the left-hand margin, the paragraph to its immediate right will be a **warning**. This information could prevent injury, loss of property, or even death (in extreme cases).

WinPLC Overview

The WinPLC (part number H2-WPLC1-xx) is an open-platform CPU running the Windows→ CE operating system. It plugs into the CPU-slot of a ***Direct*LOGIC DL205** base and "talks" across the backplane to standard digital and analog input and output modules.

The Windows→ CE operating system is a familiar favorite for embedded systems in a wide variety of applications. Using Windows→ CE in the WinPLC makes it a flexible control platform with the ability to run PC-based Control software from a number of sources, as well as Visual Basic and Visual C programs.

The operating system is resident in the module and does not require battery back-up. The user program is backed by a five-year lithium battery.

The WinPLC's operating characteristics will largely be determined by the PC-based Control software running in it. The PC-based Control software provider chooses how to use the available features in their implementation of the product.

Battery

RS232C Port

DIP Switches

Ethernet
10BaseT Port
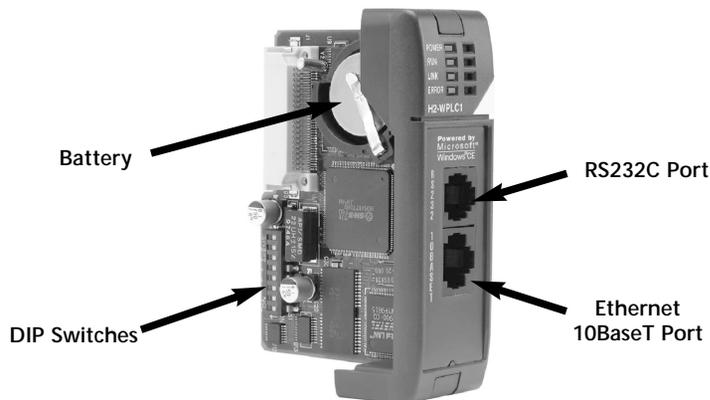
Features Depend on Software Implementation

Support of the following features depends on your PC-based Control software implementation:

- the frequency of I/O updates
- the available support for RS232C serial communications
- the uses of the DIP switches
- the uses of the LEDs

If you are using the Visual Basic for CE or Visual C for CE version of the WinPLC, you will receive an SDK (software development kit), a utility called WinPLC Workbench, and a Viewer. The SDK will provide functions to access the features above, WinPLC Workbench will give you a means to set up the WinPLC, and the Viewer will make it possible to load your Visual Basic for CE or Visual C for CE programming the WinPLC.

The WinPLC LEDs

The WinPLC module has four LED indicator lights. The green POWER and RUN LEDs are individually addressable. Their exact meaning will depend on the PC-based Control software you are using. The green LINK LED has a double function. It indicates that the unit is connected successfully to an Ethernet network, and it indicates that there is activity on the network. The LINK LED will come on intermittently to indicate that it sees Ethernet traffic. The LINK LED will blink faster to indicate an increase in network activity. The red ERROR LED comes on steady to indicate that a hardware error has occurred internal to the WinPLC.
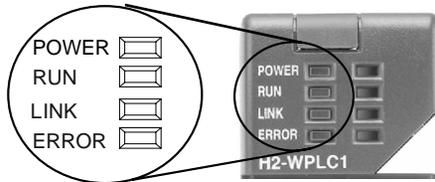
Inserting the H2-WPLCx into the DL205 Base

The H2-WPLC1 plugs into the "CPU" slot of any DL205 base.

- Locate the grooves on the inside top and bottom of the DL205 base.
- Align the module with the grooves and slide the module into the slot until the face of the module is flush with the power supply.
- Push in the retaining clips to secure the module.

Align the H2-WPLC1 with the grooves in the base and slide in.

Push the retaining clips in to secure the module to the DL205 base

WARNING: To minimize the risk of electrical shock, personal injury, or equipment damage, always disconnect the system power before installing or removing any system component.

DL205 Power Wiring and Grounding

The DL205 power supply is an integral part of the base. The DL205 also has three power options: 12/24VDC, 125VDC, and 120/240VAC.

The diagram shows the terminal connections located on the power supply of the DL205 bases. The base terminals can accept up to 16 AWG. You may be able to use larger wiring depending on the type of wire used, but 16 AWG is the recommended size.

110/220 VAC Base Terminal Strip

85 – 264 VAC

G

LG

+
24 VDC OUT
– 0.3A
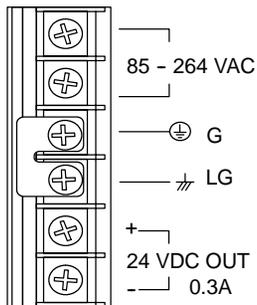
12/24 VDC Base Terminal Strip

+
12 – 24 VDC
–

G

125 VDC Base Terminal Strip

+
90 – 264 VDC
–

G

D2-09BDC-2
range is
115-264 VDC

+
24 VDC OUT
– 0.2A
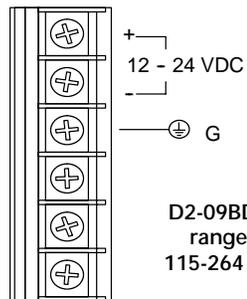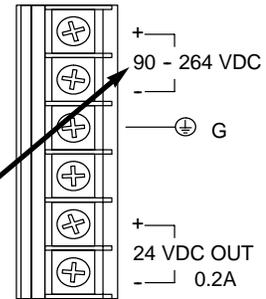
*NOTE: You can connect either a 120 VAC or 240 VAC supply to the AC terminals. Special wiring or jumpers are not required as with some of the other **Direct**LOGIC™ products.*

WARNING: Once the power wiring is connected, install the plastic protective cover. When the cover is removed there is a risk of electrical shock if you accidentally touch the wiring or wiring terminals.

10BaseT Network Cabling

The H2–WPLC1–xx supports the Ethernet 10BaseT standard. The 10BaseT standard uses twisted pairs of copper wire conductors.

10BaseT Connections

H2-WPLC-xx

The H2-WPLC1-xx has an eight-pin modular jack that accepts RJ45 connector plugs. UTP (Unshielded Twisted-Pair) cable is rated according to its data-carrying ability (bandwidth) and is given a "category" number. We strongly recommend using a category 5 cable for all Ethernet 10BaseT connections. For convenient and reliable networking, we recommend that you purchase commercially manufactured cables (cables with connectors already attached).

RJ12 Serial Port RS232

RJ45 for 10BaseT
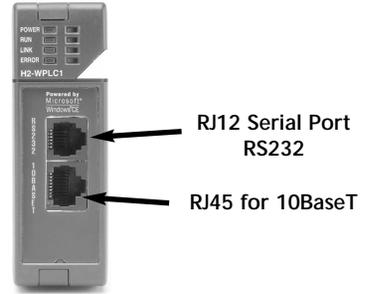
10BaseT

To connect an H2-WPLC1-xx (or PC) to a hub or repeater, use a patch cable (sometimes called a straight-through cable). The cable used to connect a PC directly to a WinPLC or to connect two hubs is called a crossover cable.

The diagram below illustrates the standard wire positions in the RJ45 connector. We recommend all WinPLC 10BaseT cables to be Category 5, UTP cable.

8-pin RJ45 Connector (8P8C)

1 2 3 4 5 6 7 8

Patch (Straight-through Cable)

RJ45		RJ45
1	OR/WHT — OR/WHT	1
2	OR — OR	2
3	GRN/WHT — GRN/WHT	3
4		4
5		5
6		6
7	GRN/WHT — GRN/WHT	7
8		8

Crossover Cable

RJ45		RJ45
TD+ 1	OR/WHT — GRN/WHT	TD+ 1
TD– 2	OR — GRN	TD– 2
RD+ 3	GRN/WHT — OR/WHT	RD+ 3
4		4
5		5
RD– 6	GRN — OR	RD– 6
7		7
8		8
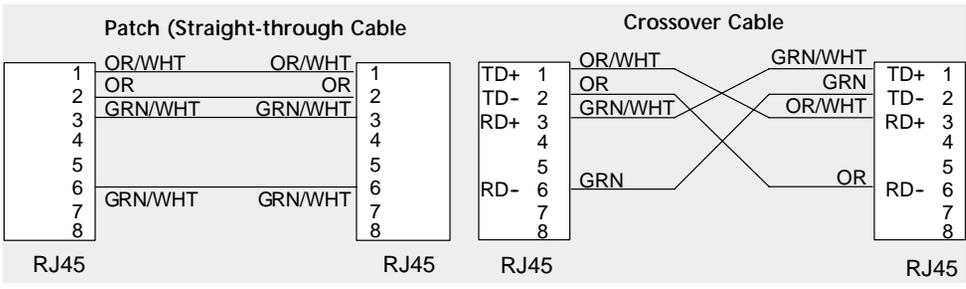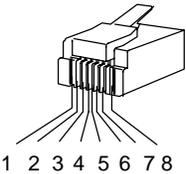
NOTE: See page 1-7 for 10BaseT distance limitations.

Maximum Ethernet Cable Length

The maximum distance per 10BaseT cable segment is 100 meters or 328 feet. Repeaters extend the distance. Each cable segment attached to a repeater can be up to 100 meters. Two repeaters connected together extend the total range to 300 meters.

10BaseT Distance Limitations

100 meters (328 feet)

100 meters (328 feet)

100 meters (328 feet)

100 meters (328 feet)

100 meters (328 feet)
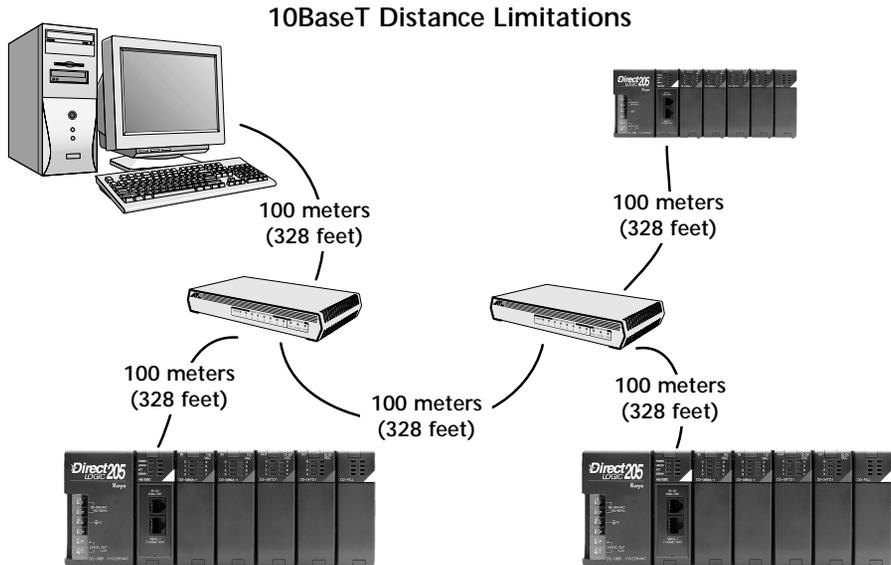
H2-WPLC-xx Serial Port Pinouts

Pin Assignments for: H2-WPLC-xx serial port			RJ12 (6P6C) Female Modular Connector
1	0V	Power (–) Connection (GND)	
2	5V	Power (+) Connection	
3	RXD	Receive Data (RS232C)	
4	TXD	Transmit Data (RS232C)	
5	RTS	Request to Send	
6	0V	Signal Ground (GND)	
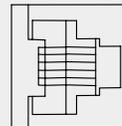
Power Budget for the DL205 with H2-WPLC1-xx

Managing your Power Resource

When determining which I/O modules you will be using in the DL205 WinPLC system, it is important to remember that there is a limited amount of power available from the power supply. We have provided a table showing the power available from the various DL205 base power supplies and a table showing the maximum power consumed by the WinPLC and each of the I/O modules supported by the WinPLC. Following these two tables is an example of a completed power budgeting worksheet and then a blank worksheet you can use for your own calculations.

If the I/O modules you choose exceed the maximum power available from the smaller DL205 base power supplies, you will need to use a D2-09B9-slot base. This base supplies more power than the other bases, as you can see in the table below.

WARNING: It is extremely important to calculate the power budget. If you exceed the power budget, the system may operate in an unpredictable manner which may result in a risk of personal injury or equipment damage.

WinPLC Power Specifications

The following table shows the amount of electrical current available at the two voltages supplied from the DL205 base. Use these values when calculating the power budget for your system.

The Auxiliary 24V power source mentioned in the table is available at the base terminal strip. You can connect to external devices or DL205 I/O modules that require 24VDC, but be sure not to exceed the maximum current supplied.

Available Electrical Current		
Bases	*5V Current Supplied*	*Auxiliary 24VDC Current Supplied*
D2-03B	1550 mA	200 mA
D2-04B	1550 mA	200 mA
D2-06B	1550 mA	200 mA
D2-09B	2600 mA	300 mA
D2-03BDC-1	1550 mA	None
D2-04BDC-1	1550 mA	None
D2-06BDC-1	1550 mA	None
D2-09BDC-1	2600 mA	None
D2-03BDC-2	1550 mA	200 mA
D2-04BDC-2	1550 mA	200 mA
D2-06BDC-2	1550 mA	200 mA
D2-09BDC-2	2600 mA	300 mA

DL205 Module Power Requirements

The chart below shows the maximum amount of electrical current required to power each of the DL205 WinPLC or I/O modules. Use these values when calculating the power budget for your system. The Power Budget for the DL205 with H2–WPLC1–xx

Device	5V Current Req. (mA)	24V Aux. Current Req. (mA)
CPUs		
H2-WPLC-xx	680	0
H2-EBC	530	0
H2-EBC-F	670	0
DC Input Modules		
D2-08ND3	50	0
D2-16ND3-2	100	0
D2-32ND3	25	0
AC Input Modules		
D2-08NA-1	50	0
D2-08NA-2	100	0
D2-16NA	100	0
Input Simulator Module		
F2-08SIM	50	0
DC Output Modules		
D2-04TD1	60	20
D2-08TD1	100	0
D2-16TD1-2	200	80
D2-16TD2-2	200	0
D2-32TD1	350	0
AC Output Modules		
D2-08TA	250	0
D2-12TA	350	0

Device	5V Current Req. (mA)	24VDC Aux. Current Req. (mA)
Relay Output Modules		
D2-04TRS	250	0
D2-08TR	250	0
F2-08TR F2-08RRS	670	0
D2-12TR	450	0
Combination In/Out Module		
D2-08CDR	200	80
Analog Modules		
F2-04AD-1	50	80
F2-04AD-1L	50	90mA @12V
F2-04AD-2	60	80
F2-04AD-2L	60	90mA @12V
F2-08AD-1	50	80
F2-08AD-2	50	80
F2-02DA-1	40	60
F2-02DA-1L	40	70mA @12V
F2-02DA-2	40	60
F2-02DA-2L	40	70mA @12V
F2-02DAS-1	100	50
F2-02DAS-2	100	60
F2-08DA-2	60	90
F2-4AD2DA	60	80
F2-04RTD	90	0
F2-04THM	110	60

Power Budget Calculation Example

The following example shows how to calculate the power budget for the DL205 system.

Base # __1__	Device Type	5 VDC (mA)	External Power 24 VDC (mA)
Available Base Power			
Base	D2-09B	2,600	300
Power Required			
CPU SLOT	H2-WPLC-xx	480	0
SLOT 0	D2-16ND3-2	100	0
SLOT 1	D2-16ND3-2	100	0
SLOT 2	D2-16NA	100	0
SLOT 3	F2-04AD-1	50	100
SLOT 4	F2-02DA-1	40	80
SLOT 5	D2-08TA	250	0
SLOT 6	D2-08TD1	100	0
SLOT 7	D2-08TR	250	
Other			
Operator interface	DV-1000	150	
Handheld programmer	D2-HPP	200	
Maximum Power Required		1820	180
Remaining Power Available		2600-1820=**780**	300-180=**120**

1. Using the table on the previous page, fill in the information for the base power supply, the WinPLC1-xx, I/O modules, and any other devices that will use system power including devices that use the 24 VDC output. Pay special attention to the current supplied by the base power supply. The 9-slot base has a larger current capacity than the smaller bases.

2. Add the current columns starting with the row for the **CPU slot** and work your way down to the **"Other"** category. Put the total in the row labeled **"Maximum power required"**.

3. Subtract the row labeled **"Maximum power required"** from the row labeled **"Available Base Power"**. Place the difference in the row labeled **"Remaining Power Available"**.

4. If **"Maximum Power Required"** is greater than **"Available Base Power"** in either of the two columns, the power budget will be exceeded. It will be unsafe to use this configuration, and you will need to restructure your I/O.

Power Budget Calculation Worksheet

This blank chart is provided for you to copy and use in your power budget calculations.

Base # ____	Device Type	5 VDC (mA)	External Power 24 VDC (mA)
Power Supplied			
Base			
Power Required			
CPU SLOT			
SLOT 0			
SLOT 1			
SLOT 2			
SLOT 3			
SLOT 4			
SLOT 5			
SLOT 6			
SLOT 7			
Other			
Maximum Power Required			
Remaining Power Available			

1. Using the table on the previous page, fill in the information for the base power supply, the WinPLC-xx, I/O modules, and any other devices that will use system power including devices that use the 24 VDC output. Pay special attention to the current supplied by the base power supply. The 9-slot base has a larger current capacity than the smaller bases.

2. Add the current columns starting with the row for the **CPU slot** and work your way down to the **"Other"** category. Put the total in the row labeled **"Maximum power required"**.

3. Subtract the row labeled **"Maximum power required"** from the row labeled **"Available Base Power"**. Place the difference in the row labeled **"Remaining Power Available"**.

4. If **"Maximum Power Required"** is greater than **"Available Base Power"** in either of the two columns, the power budget will be exceeded. It will be unsafe to use this configuration, and you will need to restructure your I/O.

Locating the Ethernet Address Label

Ethernet Address

A unique Ethernet Address is assigned to each module at the factory and cannot be changed. It is a twelve digit number (six pairs of hexadecimal numbers) and is printed on a label permanently attached to the WinPLC module.

Factory-assigned Ethernet Address
(MAC Address)

H2-WinPLC
00.E0.62.80.00.2B
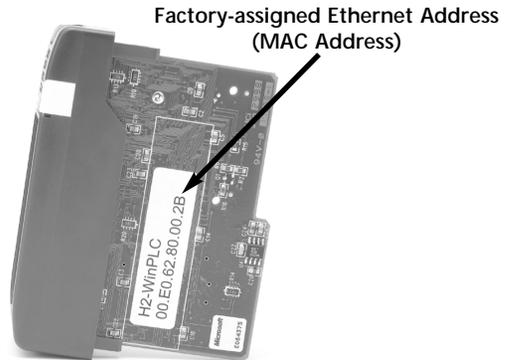
Setting Up the WinPLC

If you are using Think & Do Studio, Version 6.1 or later, use Chapter 2, Workbench Utility Operation, to help you set up the WinPLC.

If you are using Think & Do, Version 5.2 or 5.3, use Appendix A, Using The ESP Utility To Set Up The WinPLC When Using Think & Do vers. 5.2 or 5.3, to help you set up the WinPLC.

Diagnosing Network Cable Problems

 If you are experiencing communication problems, swapping cables is one of the simplest diagnostic procedures you can perform. If the network operates correctly with a different cable, you have isolated and cured the problem. If possible, use a short run of cable to test the network because problems with longer cable runs can be more difficult to diagnose and are more often intermittent.

If you are unable to swap cables, verify the proper operation of all other network components. You probably have a cable problem if you have verified that your:

- WinPLC module is working correctly.
- WinPLC module configuration is correct.
- PC-based Control program is correct.
- any hubs are working correctly.
- Windows configuration is correct.
- network adapter card is the correct type, and it is working correctly.

It is a good maintenance practice to test network cables periodically and maintain a permanent record of cable characteristics. A number of cable test instruments are available to test 10BaseT networks. These instruments will check the electrical characteristics of your cabling, including:

- Continuity — This is a check to make sure the communication pairs are wired correctly, and that the wires are continuous from end to end.
- Attenuation — This refers to the amount of signal loss over the cable segment at the signal frequency of interest. The 10BaseT specification allows for a maximum signal loss of 11.5 decibels (dB) for the entire link at the signal frequency used by 10Mbps Ethernet.
- Crosstalk — Crosstalk occurs when a signal in one pair of wires is electromagnetically coupled to an adjacent pair.

NOTE: Any significant difference between the cable characteristics of the transmitter and receiver can cause communication errors.

Ethernet devices continually monitor the "receive data" path for activity as a means of verifying their link is working correctly. When the network is idle, each network device (including the WinPLC module) sends a periodic link test signal to verify that the network is working. If the link test signal or other network activity is not received periodically, the LINK LED on the WinPLC module is turned off.

WORKBENCH UTILITY
OPERATION

CHAPTER
2

In This Chapter...

Note: This Chapter only applies if you are using the WinPLC with Think & Do Studio version 6.0 or later. Use Appendix A if using the WinPLC with Think & Do versions 5.2 or 5.3.

WinPLC Workbench Overview

WinPLC Workbench is a utility to configure and check out a WinPLC I/O system. It is also used to load new ROM images on the WinPLC. Use Workbench with a new WinPLC to set its IP address, thereby allowing other devices or software products to connect with the WinPLC.

Since the WinPLC may be used with various software packages and user developed applications, Workbench can be helpful in troubleshooting to verify that the WinPLC and its I/O are functioning properly.

Workbench is intended for use with the the following WinPLC products.

H2-WPLC1

H2-WPLC2

H2-WPLC1-KW

H2-WPLC2-KW

It is **not** recommended for use with these WinPLC products:

H2-WPLC1-TD

H2-WPLC2-TD
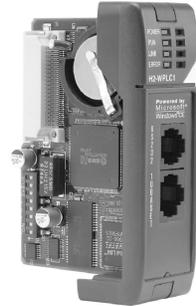
Configuring Your WinPLC

PC Setup

Copy Workbench files to a directory on your PC.

We recommend that you set up a Desktop or Start Button program menu Shortcut.

Make sure your PC has TCP/IP and IPX/SPC Protocols installed. To check, click on your computer's Start button, select Settings and then select Control Panel. Select Network and click on the Protocols tab (see screen).

Direct-connect WinPLC using a cross over cable (see Section 1).

You can connect to the WinPLC across a network; however, setting up the proper IP Address, SubNet Mask, and Gateway are beyond the scope of this manual. See your LAN Administrator for assistance with these settings.

Also, set up the WinPLC module so that it's easy to cycle the power.

IPX/SPX and TCP/IP protocols must be installed on your PC
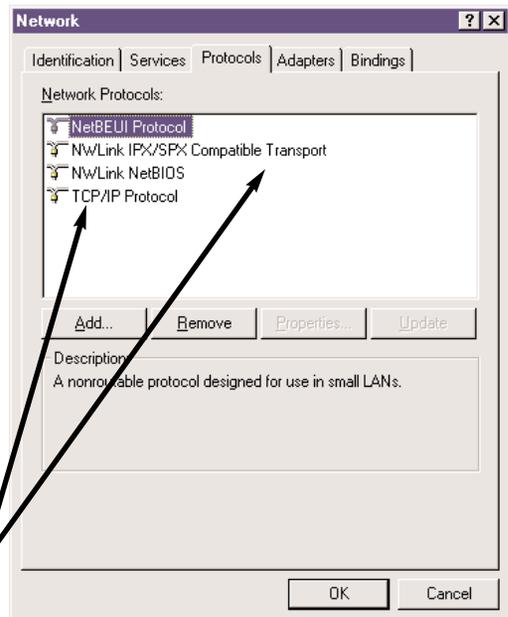
Catching the WinPLC: Using Workbench To Find Your WinPLC Using its Ethernet (MAC) Address

The "Catch" feature can find a WinPLC by its Ethernet Address (MAC Address). This address is found on the WinPLC label and is set at the factory and cannot be changed. Catch is a robust way to locate the WinPLC in order to setup the TCP/IP communications. Most Workbench features are not enabled until TCP/IP communication has been established.
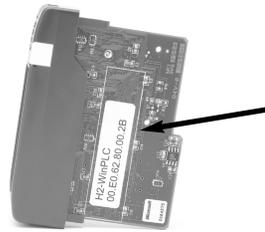
Factory-assigned Ethernet address (MAC address)

Note: Since the Catch feature uses the IPX/SPX protocol, the PC and WinPLC must be on the same LAN to work properly. Workbench must see the WinPLC while the WinPLC is in its boot-up state, which is indicated by the flashing green RUN LED.

Follow these steps.

Click on "Catch"
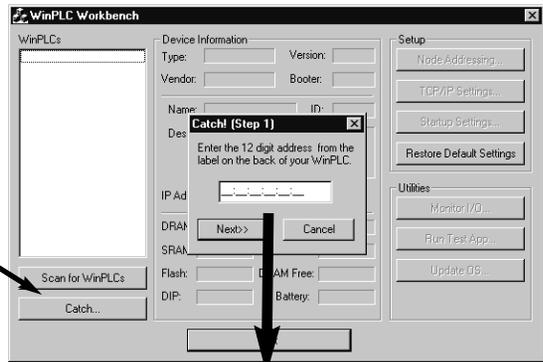
Enter 12-character Ethernet address here, click on "Next"

Catch! [Step 1]

Enter the 12 digit address from the label on the back of your WinPLC.

00:E0:62:80:05:20

Next>>   Cancel

Cycle power

Catch! [Step 2]

Please cycle power on your WinPLC.

Shutdown in 56.9 seconds...

Cancel

Catch! [Step 2]

Please cyc **Cool!** ur WinPLC.

Success!

Click on "OK"

Shutd   onds...
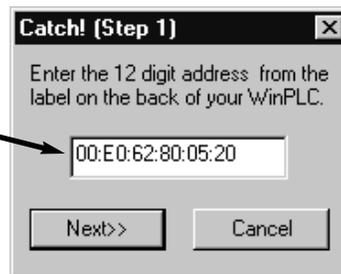
OK
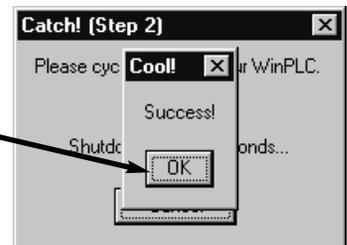
Workbench has found your WinPLC and it's Ethernet address appears in the "WinPLC" window. The green RUN LED should also be flashing. If you have problems, check to make sure you have the correct Ethernet address entered and that the IPX/SPX protocol is loaded on your PC.

WinPLC Workbench

WinPLCs
00 E0 62 80 07 E3

Selected WinPLC
Type: H2-WPLC
Name: ID: 0
Desc:

IP Addr: 10.10.10.1

Scan for WinPLCs
Catch...

Device Stats
DRAM: Disk Size:
SRAM: Disk Free:
Flash: DRAM Free:
DIP: 00000000 Battery:

Device Versions
WinCE
HAL
Booter

Installed Product Info

Vendor

Setup
Node Addressing...
TCP/IP Settings...
Startup Settings...
Restore Default Settings

Utilities
Monitor I/O...
Run Test App...
Update OS...

Exit

Ethernet Address

TCP/IP Settings

Setting TCP/IP Communications

Next, click on "TCP/IP Settings" to bring up this screen. Make sure "Enable TCP/IP Setup" is selected.

Enable TCP/IP Setup

NOTE: If the WinPLC has no IP address, Workbench displays the PC's IP address in this field.

With "Specify an IP address" selected, you can manually enter the IP address. Enter the IP address, click "OK" and cycle power to the WinPLC to activate the address.

Note: Unless you have detailed knowledge of IP protocol, we recommend that your PC and WinPLC have the same subnet mask. DNS and WINS settings are optional (see your LAN administrator).

TCP/IP Settings

☑ Enable TCP/IP Setup

○ Obtain an IP address automatically (DHCP)

⦿ Specify an IP address

IP Address: 10 . 10 . 10 . 1

Subnet Mask: 255 . 255 . 0 . 0

Gateway: 0 . 0 . 0 . 0

☐ Enable DNS   0 . 0 . 0 . 0

☐ Enable WINS   10 . 0 . 0 . 11

OK   Cancel

Scan for WinPLCs Monitor I/O Node Address Settings
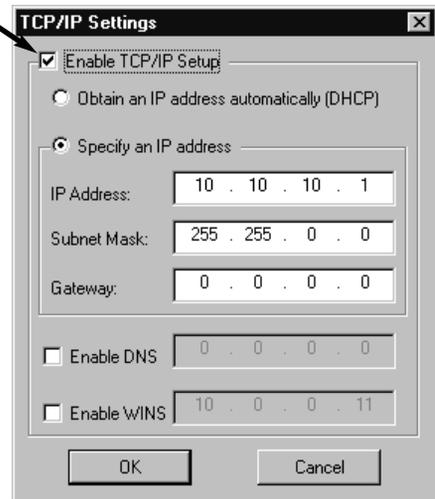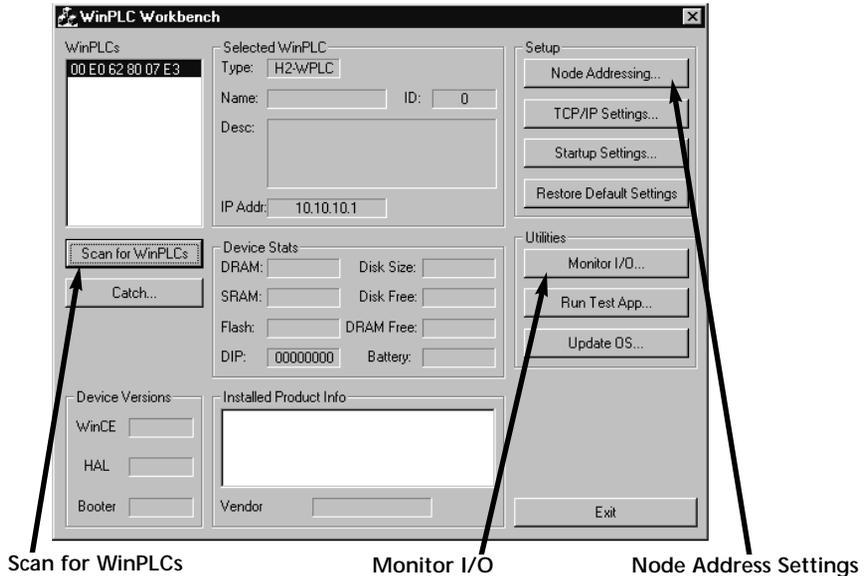
Now that that the IP address is set, Workbench should be able find the WinPLC automatically if it is run after the WinPLC is powered up and connected. If the WinPLC is connected after Workbench is running, just click on "Scan for WinPLCs".

The Workbench window now appears like above, showing information about the WinPLC module. In addition, the "Monitor I/O" utility is now activated.

From this point Workbench is using TCP/IP protocol, and with the proper IP address setting you can remotely attach to the WinPLC.

NOTE: While the Catch feature does allow you to capture the WinPLC, even without an IP address, the feature cannot be routed between LANS.

The "Node Address Setttings" selection allows you to enter descriptive information for each Win PLC module. For example, you can assign the WinPLC a module ID, name or description.

Startup Settings

Restore Default Settings
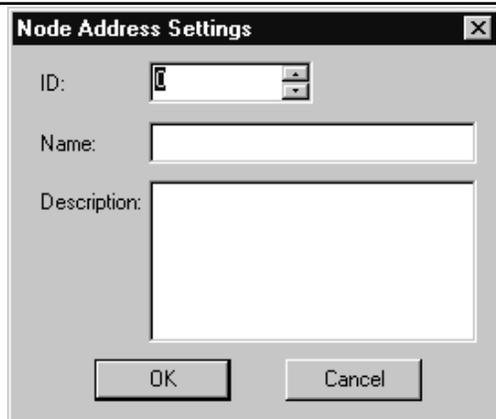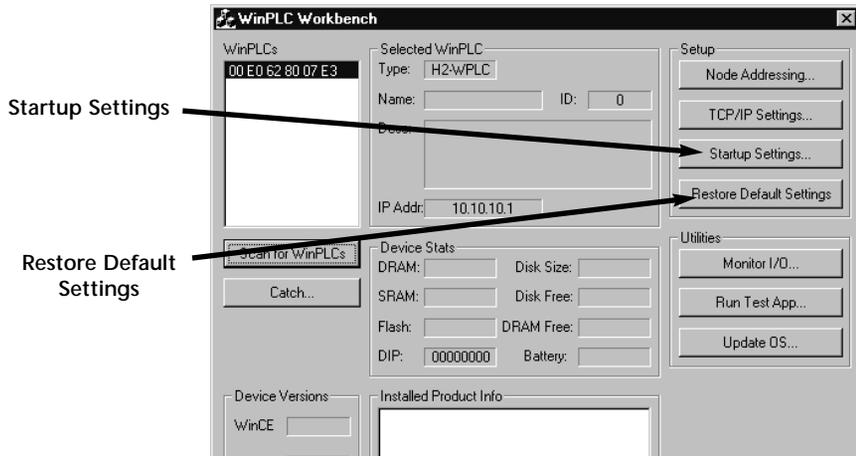
"Startup Settings" are only used by the H2-WPLC1 and H2-WPLC2 models for C and VB programming. See H24-SDK-M for more information on these settings.

Startup Settings ☒

☑ Run UserMain.exe

☑ Run UserMain.vb

☑ Enable ethernet debug output

[OK]   Cancel
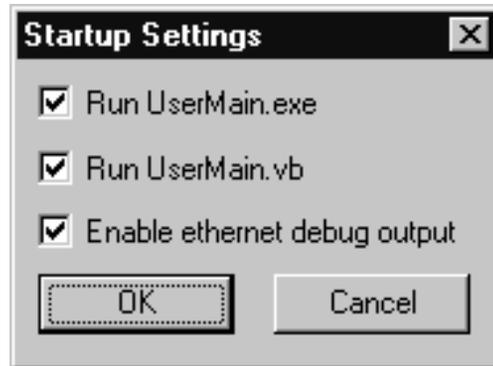
Selecting "Restore Default Settings" returns the WinPLC to its factory default settings. You must cycle power before this occurs, so if you accidentally select "Yes", you can recover by resetting the setup parameters before cycling power.

Attention! ☒

❓ You are about to re-initialize setup to factory settings!

Ok?

[Yes]   No
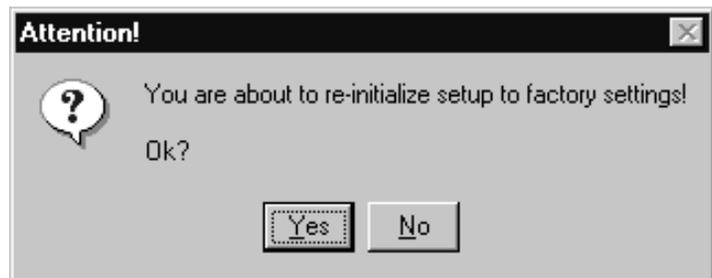
Following is a description of the utilities provided by Workbench. These programs allow you to monitor and test your I/O modules and your programming connection to the WinPLC without having to write a specific program.

Monitoring the I/O

Monitor I/O

"Monitor I/O" gives you a way to read from and write to the I/O modules in the base using your WinPLC. It allows you to see the current state of the discrete and analog inputs, toggle your discrete outputs and write values to your analog outputs.
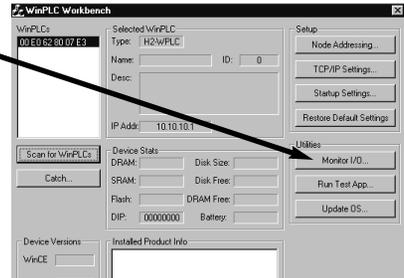
NOTE: The "Monitor I/O" utility uses TCP/IP protocol, so it will not be active until the WinPLC is assigned a valid TCP/IP address.

When you click here, Workbench scans the backplane and displays a graphical representation of the modules it finds.

Slots containing specialty I/O modules which are not currently supported by Workbench will be displayed but will be nonfunctional.

Click on a module to open a window with details about that module.

WARNING: Because this utility allows you to manipulate the actual I/O, be very careful not to cause personal injury or equipment damage.
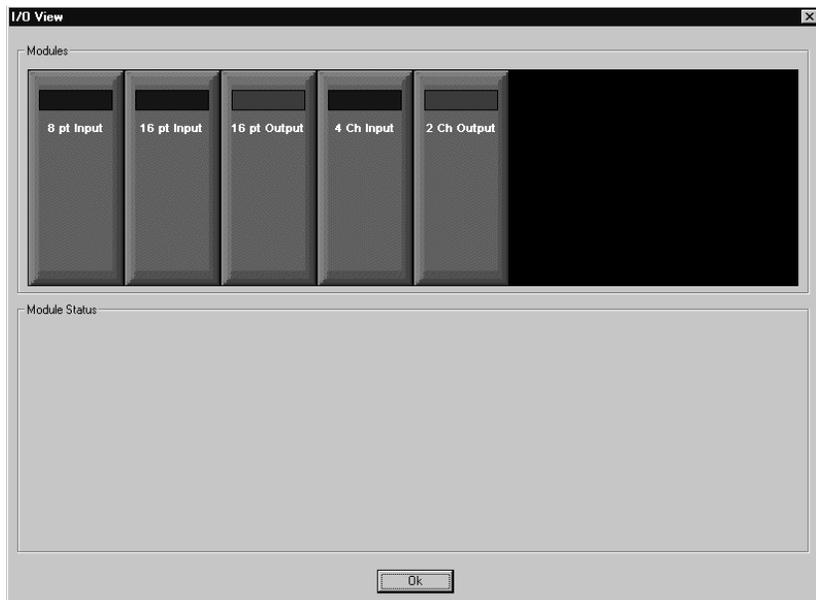
Discrete Input Modules

Below is an example where an 8 channel discrete input module has been selected. Notice that 8 blocks are displayed, each representing one channel. For discrete input modules, points that are ON will be blue, while points that are OFF will be black.

8 Channel Input Module

Blue = Input Point is ON

Black = Input Point is OFF

Discrete Output Modules

Below is an example where a 16 channel discrete output module has been selected. Notice that 16 blocks are displayed, each representing one channel. For discrete output modules, points that are ON will be red, while points that are OFF will be black. To turn ON an ouput, double-click on the black box, which brings up a window asking you to verify that you want to change the output. Make sure it is safe for you to turn the output on or off.

NOTE: Some older WinPLCs will not allow the state of ouput points to change.

16 Channel Output Module

Red = Output Point is ON

Black = Output Point is OFF

Dialog box appears to verify that you are changing an output.

Analog Input Modules

Below is an example where a 4 channel analog input module has been selected. Notice that 4 blocks are illuminated, each representing one channel and displaying some non-zero digital value representing the sensed value. The exact digital value depends on the module resolution and range. For example, a 12 bit input module displays 4095 for a full-scale input.

4 Channel Analog Input Module

Each block contains the digital value for that channel
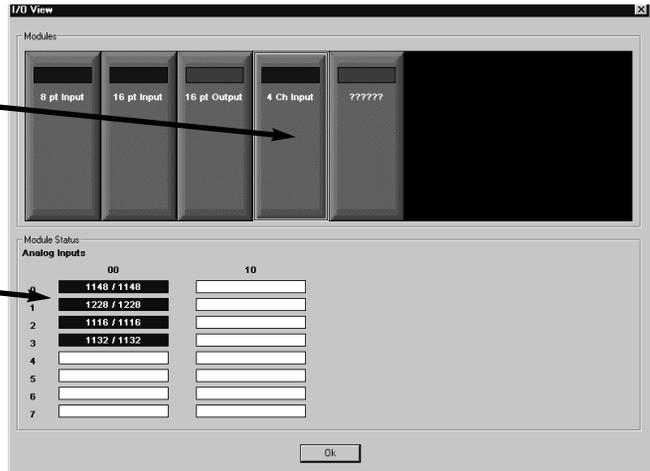
Analog Output Modules

Below is an example where a 2 channel analog output module has been selected. Notice that 2 blocks are illuminated red, each representing one channel and displaying a zero when the output is OFF. To turn ON an output, double-click its block, which brings up a screen allowing you to enter a digital value representing the portion of the full-scale output you desire. The full-scale digital value depends on the bit resolution of the module. For example, set a 10V, 12 bit voltage module to 4095 for a 10V output signal. Enter a value and click OK. A window pops up asking you to verify that you want to turn on/off an output. Make sure it is safe to do so.

NOTE: Some older WinPLCs will not allow the state of ouput points to change.

4 Channel Analog Output Module

Each red block has 0 (zero) displayed if the output point is OFF, or a digital value if it is on.

Dialog box appears to verify that you are changing an output.
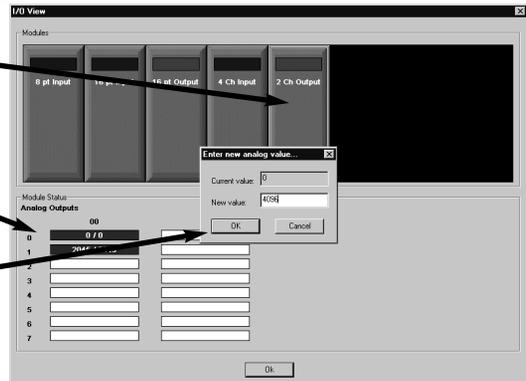
Test Applications Utility

The "Run Test App" feature is only used by the H2-WPLC1 and H2-WPLC2 models for C and VB programming. See H24-SDK-M for more information.

This utility lets you test your development PC's ability to download a program to the WinLPLC and have the WinPLC run that program. The utility decides which test application to run by looking at the operating system image in the WinPLC.
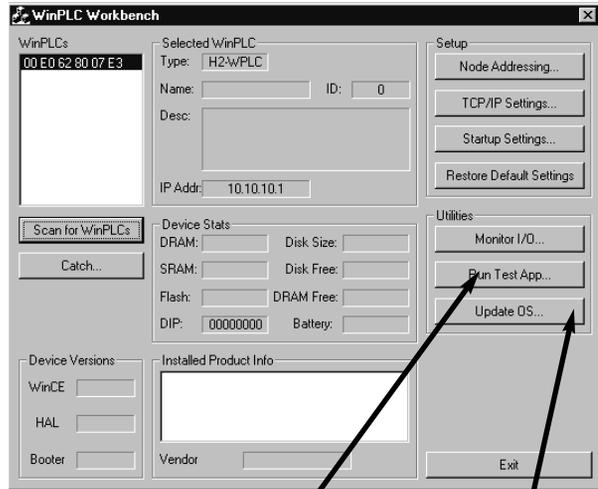
Test OS
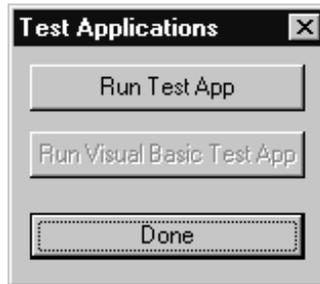
Update OS Utility

This utility should only be used if directed to by a Technical Support person to update the EEPROM image stored on your WinPLC. If the manufacturer issues new operating system images for your WinPLC, this utility can be used to do the update. Clicking on any entry in the OS Images displays the image's description, date of release and other version information. The size of the FLASH drive is determined by the amount of ROM left over after the operating system is loaded, so updating the operating system image deletes the entire FLASH drive and rebuilds it to accomodate the new operating system image. If there is anything in the FLASH drive you want to save, do so before updating the operating system.
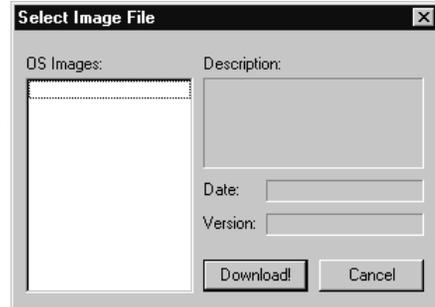
SERIAL I/O MODULE INSTALLATION & OPERATION (USING T & D STUDIO VER. 6.0 OR LATER)

CHAPTER
3

In This Chapter...

Note: This Chapter only applies if you are using the WinPLC with Think & Do Studio version 6.0 or later. Use Appendix B if using the WinPLC with Think & Do versions 5.2 or 5.3.

Only Think & Do WinPLCs (H2-WPLC1-TD and H2-WPLC2-TD) support the H2-SERIO module.

H2–SERIO Overview

The Scope of This Manual

This chapter introduces the use of the H2-SERIO module using the WinPLC with Think & Do Studio, version 6.0 or later). See Appendix B if you are using Think & Do versions 5.2 or 5.3.

This chapter will not describe in detail how to build a project or connect to a WinPLC. Depending on which version of Think & Do you are using, further information can be found in:

Chapter 2 of this manual, Workbench Utility Operation

Appendix A of this manual, Using The ESP Utility To Set Up The WinPLC

The Think & Do Studio Learning Guide, Chapter 2.

The basic steps in using this module are:

1. Install the Serial I/O module in the base.

2. Connect power to the base.

3. Bring up Think & Do Studio.

4. Select the WinPLC as the target.

5. Connect to the WinPLC.

Add Serial Ports to Your WinPLC

The Serial I/O module plugs into the DL205 I/O base and is used exclusively with the WinPLC to provide additional RS232 serial ports. The WinPLC communicates with the H2–SERIO module across the DL205 backplane.

As Many as Ten Serial Ports

The WinPLC has one built-in serial port. Now, you can add as many as nine additional serial ports for Think & Do applications requiring multiple serial devices, such as barcode scanners.

Setting Communication Parameters Using Think & Do

Use I/O View to set baud rate, parity, data bits, and stop bits for each port. Choose from 300 to 57,600 baud communication speeds. Think & Do Studio allows each port to be designated as a MODBUS slave or a generic serial device. Each port on the H2–SERIO module is capable of hardware handshaking.

RS-232 Wiring

Pin Assignments for:
H2-SERIO ports

RJ12 (6P6C) Female
Modular Connector

1	0V	Power (–) connection (GND)
2	CTS	Clear to Send
3	RXD	Receive Data (RS232C)
4	TXD	Transmit Data (RS232C)
5	RTS	Request to Send
6	0V	Signal Ground (GND)

NOTE: The serial port on-board the WinPLC has a different pinout from the H2–SERIO module. Refer to page 1–7 for the WinPLC serial port pin assignments.

H2-SERIO Specifications	
Module type	Intelligent module for use with H2–WPLC1–TD
Maximum number of modules supported by one WinPLC	3
Recommended cable	Belden 9729 or equivalent
Connector	RJ12 jack
Power consumption	230mA @ 5VDC
Operating environment	0° to 60°C (32°F to 140°F), 5% to 95% RH (non-condensing)
Manufacturer	Host Engineering

Using Think & Do to Set Serial Port Parameters

Installing the H2-SERIO

Install the H2-WPLC1-TD or H2-WPLC2-TD, and the H2–SERIO module in your DL205 base. Please refer to the guidelines elsewhere in this publication for information about installation, power wiring, and Ethernet connections. The WinPLC must be recognized on the network to proceed, so use Think & Do to establish your link to the WinPLC.

Setting the WinPLC as the Runtime Target

With Think & Do Studio ProjectCenter open, click the "Project Explorer Bar", and project information will display in the main ProjectCenter window. In the "Runtime Target" area, select "Windows CE - Think & Do WinPLC" from the drop-down list.

Project Explorer Bar

Runtime Target Selection Area
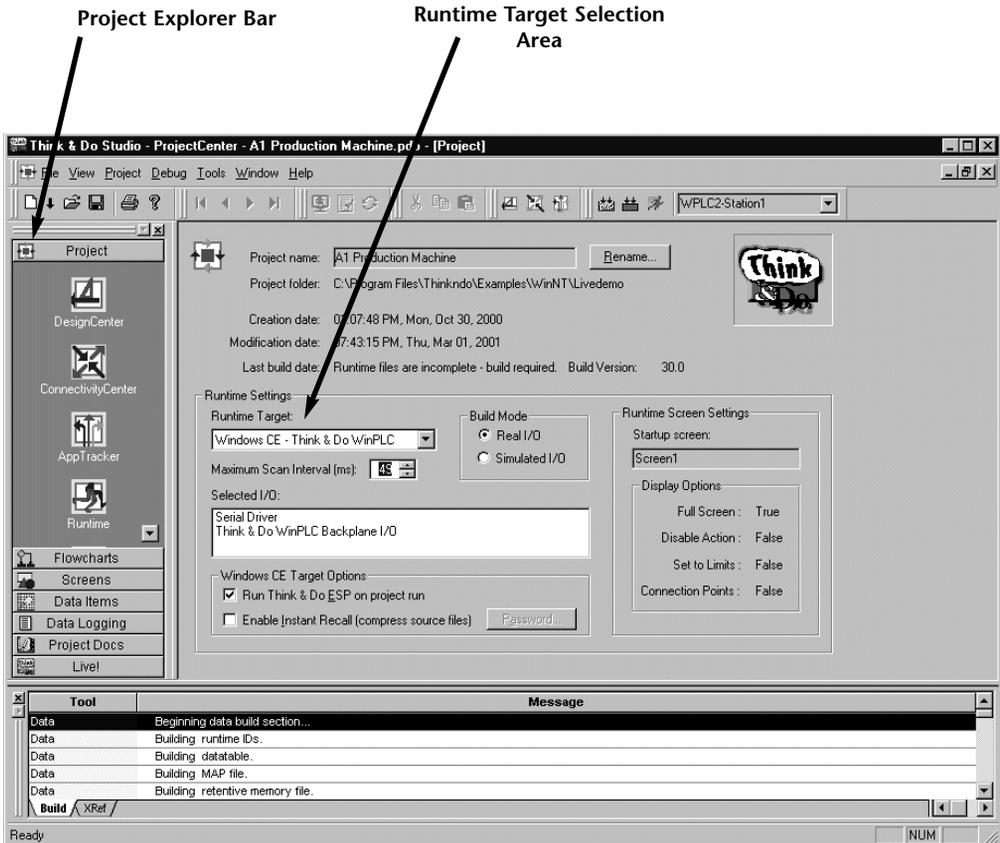
Using Think & Do ConnectivityCenter to Set Up The Serial I/O Module

ConnectivityCenter is the Think & Do Studio tool for configuring I/O devices. See the Think & Do Studio Learning Guide (Chapter 2) for more detailed information on using ConnectivityCenter.

Open up the ConnectivityCenter.

Click here to open ConnectivityCenter From ProjectCenter
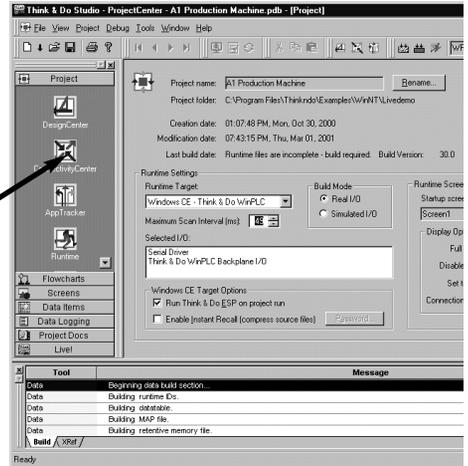
Drivers menu

This frame shows an initial ConnectivityCenter screen with no WinPLC connected.
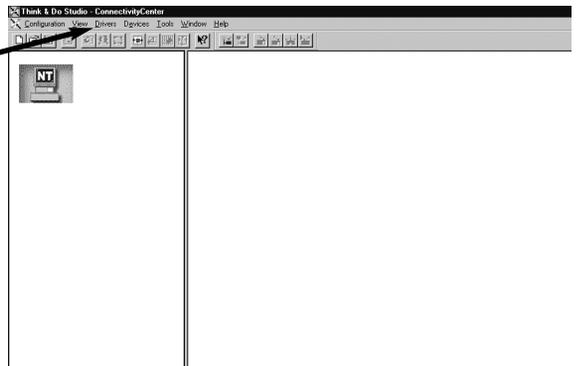
Adding the Serial I/O Module Driver

Again, see the Think & Do Studio Learning Guide for more information on adding I/O drivers.

Either click on the "Drivers" menu and select "Add", or click on the Add Driver toolbar button.

Select "Think & Do WinPLC Backplane I/O" as the target.

Add I/O Driver

Select I/O Driver :

Think & Do WinPLC Backplane I/O

OK   Cancel   Help
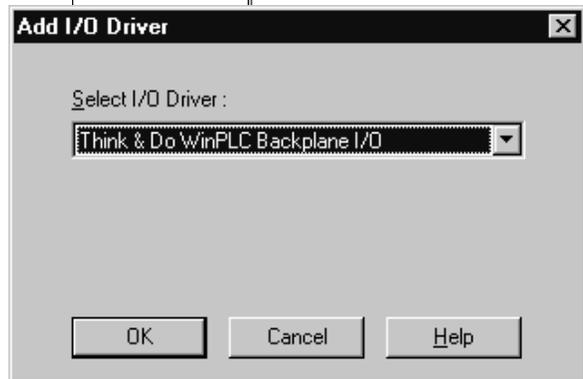
Connecting To The WinPLC

To connect to the WinPLC, click "Configuration", and select "Connect".

Think & Do recognizes the DL205 base as you have configured it. The WinPLC is displayed in the CPU slot, and the Serial I/O module is displayed where you have installed it.

Click on "Serial Driver".

Configuration

Serial Driver

You will see a port configuration box for each serial port Think & Do Studio recognizes. In our example to the right, Think & Do sees four serial ports. One is on the WinPLC and the other three are on the Serial I/O module.

Notice that the ports are numbered COM 1 through COM 4 in Think & Do. COM 1 is on the WinPLC. COM 2 through COM 4 are on the first Serial I/O module in

the base. Think & Do counts the serial ports from top to bottom (on the Serial I/O module) and from left to right in terms of slot position.

If you install additional Serial I/O modules at a later time, be aware that the order of the modules in the base determines their COM numbers. If you install a Serial I/O module between an existing Serial I/O module and the CPU, your port settings will remain the same, but the COM number will change.
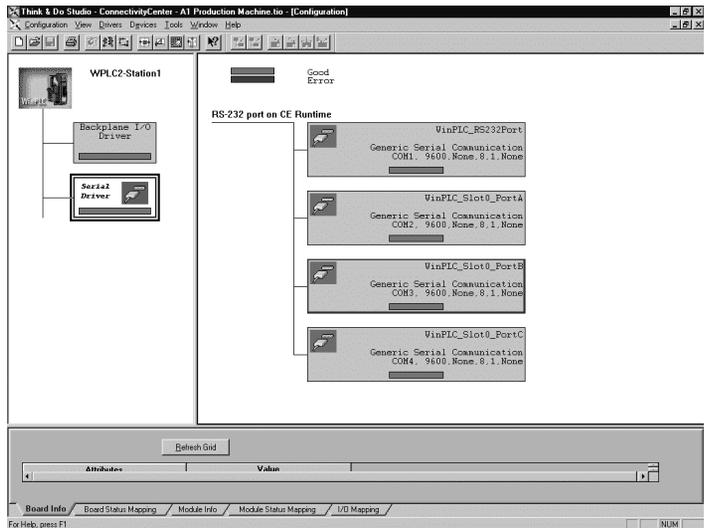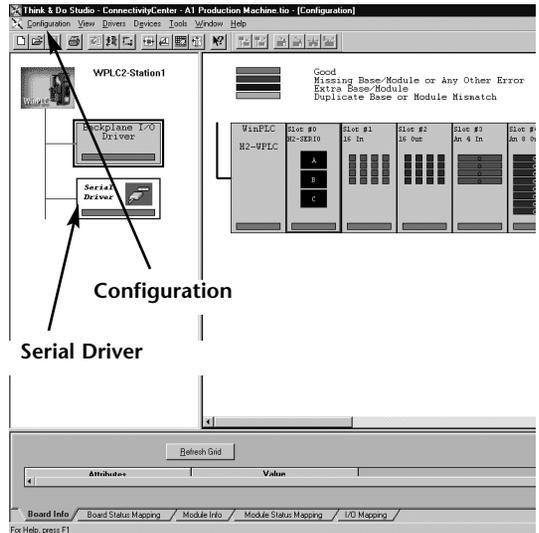
Setting Serial Port Parameters

To set the serial port parameters, click on the "Serial Driver" in the left pane of the ConnectivityCenter window. You will see a port configuration box for each serial port Think & Do recognizes. In our example to the right, Think & Do sees four serial ports. One is on the WinPLC and the other three are on the Serial I/O module.

Position curser here, and drag line up to expand lower window pane.

Module Info.

Expand the Window Pane

Position your cursor on the line that separates the upper window panes from the lower window pane. Move this line up by dragging your mouse. Click on the tab at the bottom of the lower window pane marked "Module Info." You will see a screen that looks similar to the one shown here. Pull-down menus allow you to change the serial port parameters.

Select the port whose parameters you want to change by clicking on that port in the upper right pane. Make the changes in the lower pane, and save the changes using the Ctrl + S keys.

Using The ESP Utility To Set Up The WinPLC When When Using Think & Do ver. 5.2 or 5.3

Appendix A

In This Appendix...

Note: This Appendix only applies if you are using the WinPLC with Think & Do versions 5.2 or 5.3. Use Chapter 2 if using the WinPLC with Think & Do Studio version 6.0 or later.

Using the Think & Do ESP Utility to Set Up the WinPLC

Check Think & Do Version First

You will need Version 5.2 (or later) of Think & Do, to recognize the H2–SERIO module. To determine whether you have the right version, open the Project Binder. As the Project Binder opens, you may notice a screen that tells you which Version of Think & Do you are opening. That screen disappears as the Project Binder opens.

After the Project Binder is open, you can click on "Help," and the bottom menu option, "About Project Binder," will tell you which Version you are using.
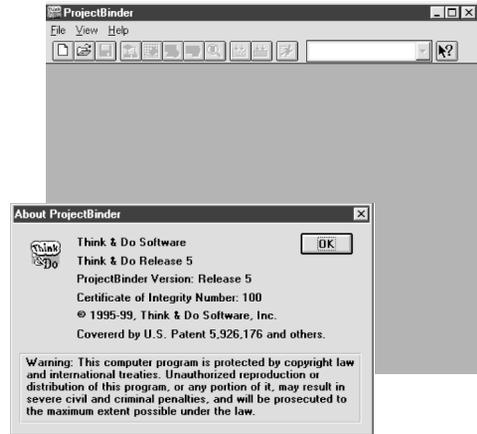
After you load Think &Do, Version 5.2 or 5.3, you will notice a Think & Do ESP icon on your desktop. If you double click this icon, you will start a utility that helps you establish network parameters for the WinPLC.

Click on the "Think & Do Station" tab, then click on the "Select CE Station" button to open the "TargetPicker".
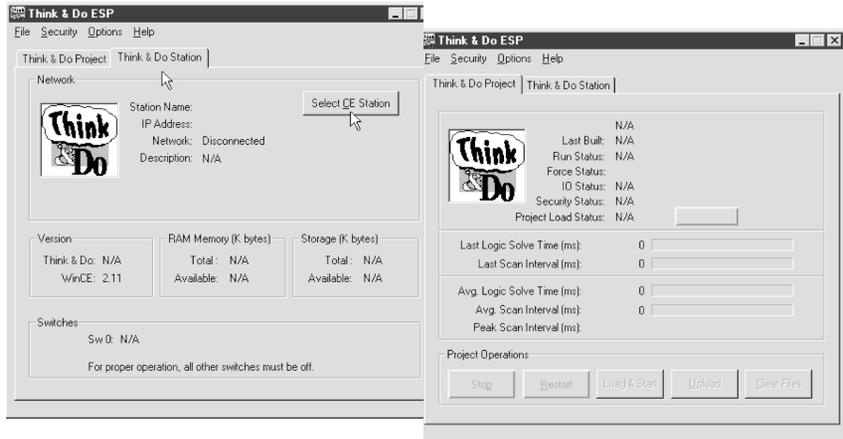
TargetPicker

A "TargetPicker" message box opens to notify you that no CE targets are currently visible on the network.

Acknowledge this message by clicking OK, and the "Think &Do ESP CE Station Selection" window will open. If you have not already done so, install the WinPLC and connect power to the DL205 base. See pages 1-4 through- 1-7 for important wiring and installation information.

NOTE: The following link procedure assumes that you are directly connected from your Think & Do Development System computer to your WinPLC. For more information about making this connection, consult the Think &Do Software Learning Guide. If your WinPLC is connected via your office or plant network, please consult your Network Administrator for appropriate network settings.

Click the "Reset using IPX" button on the Station Selection window. This will allow Think & Do to link to the WinPLC target using its Ethernet address (MAC address). The IPX protocol must be loaded on your Think & Do Development System Computer. For more information, consult the Think & Do Software Learning Guide.
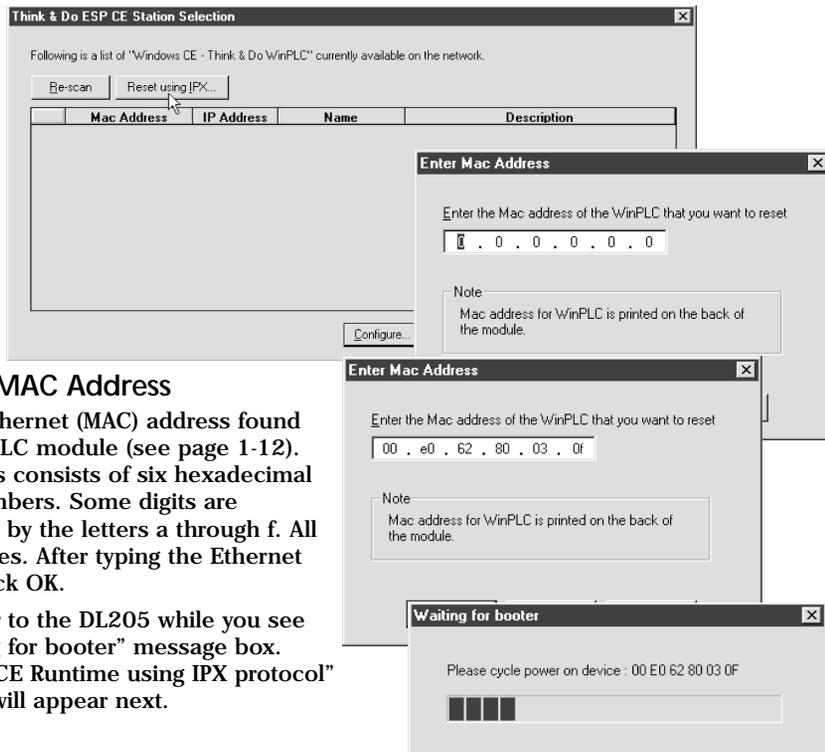
Ethernet or MAC Address

Enter the Ethernet (MAC) address found on the WinPLC module (see page 1-12). This address consists of six hexadecimal pairs of numbers. Some digits are represented by the letters a through f. All 0's are zeroes. After typing the Ethernet address, click OK.

Cycle power to the DL205 while you see the "Waiting for booter" message box. The "Reset CE Runtime using IPX protocol" dialog box will appear next.

WinPLC Name is Required

The "Reset CE Runtime using IPX protocol" window requires you to name the WinPLC module. You can use up to 15 alphanumeric characters.

If the name you select does not conform to the length or character usage requirements, you will see the TargetPicker error message shown below

Reset CE Runtime using IPX protocol

Name & Description | IP Address

Ethernet Address : `00 E0 62 80 03 0F`

Name : ` `

Description :

TargetPicker

⚠ The computer name is invalid. The name can contain 15 alphanumeric and dash character. The first and last must be alphanumeric.

`OK`
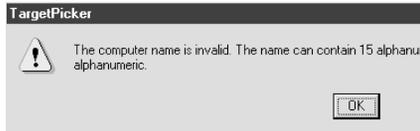
You can also assign an optional description to the WinPLC in the field provided.

Reset CE Runtime using IPX protocol

Name & Description | IP Address

Ethernet Address : `00 E0 62 80 03 0F`

Name : `ADC-Federation`

Description :

IP Address is Required

Now, click on the "IP Address"tab. Assign an IP Address and Subnet Mask that are compatible with the IP Address and Subnet Mask of your Think & Do Development System computer.

When you have completed the IP Address and Subnet Mask (and default Gateway, if necessary), click OK.

Reset CE Runtime using IPX protocol

Name & Description | IP Address

Note
Any changes to the IP address settings will be effective when you cycle power on the CE Runtime.

○ Obtain an IP address from a DHCP server

● Specify an IP address

IP Address : `192 . 168 . 080 . 004`

Subnet Mask : `255 . 255 . 0 . 0`

Default Gateway : `0 . 0 . 0 . 0`

`OK`   `Cancel`   `Apply`
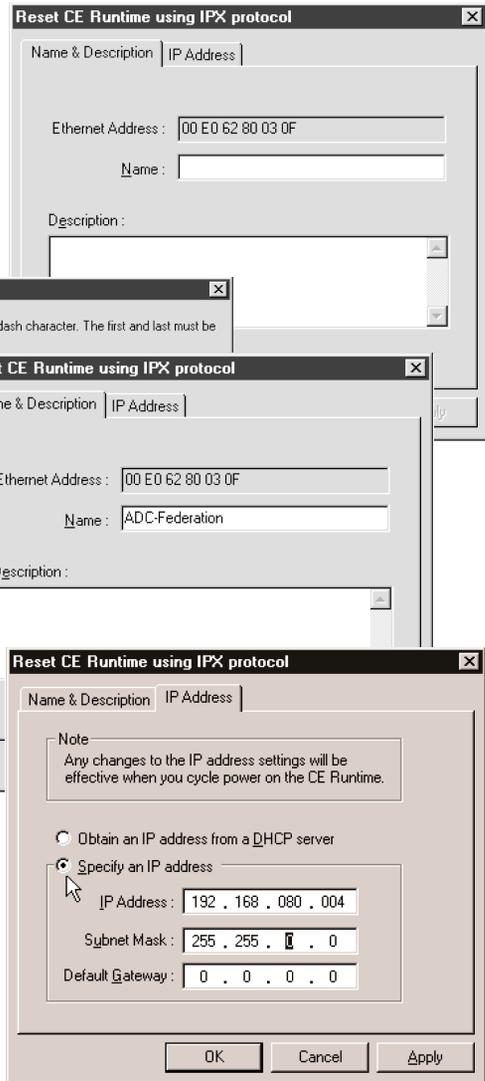
Cycle Power After Assigning IP Address

A TargetPicker message box will pop up to let you know you must cycle power to make the new IP address effective.
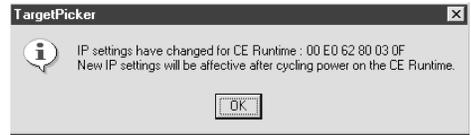
After you click OK and cycle power to the DL205, the "Think & Do ESP CE Station Selection" window will reappear (as shown below). Click on the button labeled Re-scan, and you should see the WinPLC module listed by its MAC address, IP address, Name, and Description.

If you do not see your WinPLC module listed, check to be sure the power is on to the DL205. If the power is on, recheck your IP addresses on the WinPLC and your Think & Do Development System computer for compatibility. Also, make sure you have loaded the IP protocol on your Development System computer and that you are using the appropriate connecting cable (straight-through or crossover).
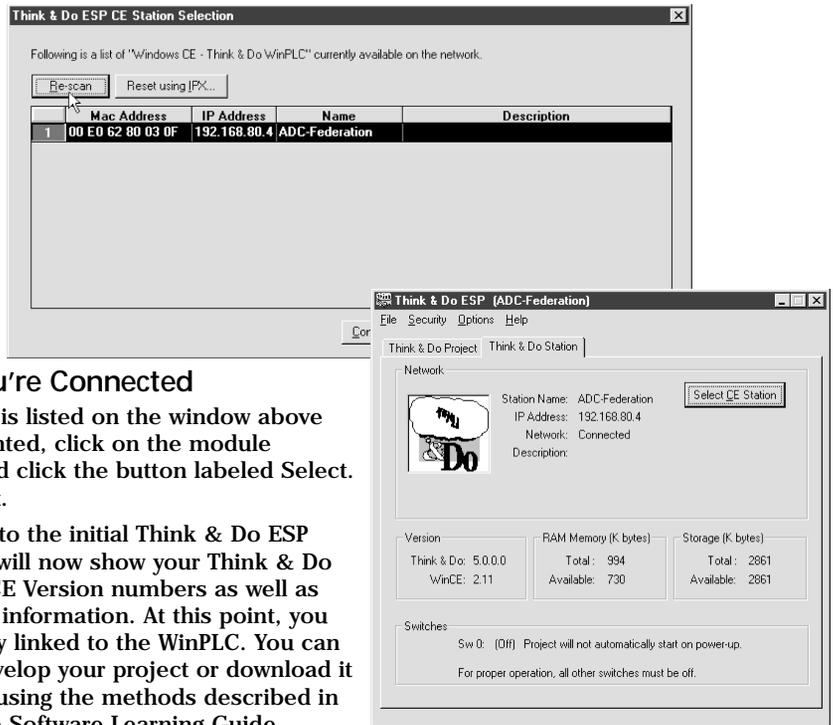
Select, Exit, You're Connected

If your module is listed on the window above but not highlighted, click on the module information and click the button labeled Select. Then, click Exit.

You will return to the initial Think & Do ESP window which will now show your Think & Do and Windows CE Version numbers as well as memory usage information. At this point, you are successfully linked to the WinPLC. You can continue to develop your project or download it to the WinPLC using the methods described in the Think & Do Software Learning Guide.

SERIAL I/O MODULE INSTALLATION / OPERATION WHEN USING T&D VER. 5.2 OR 5.3
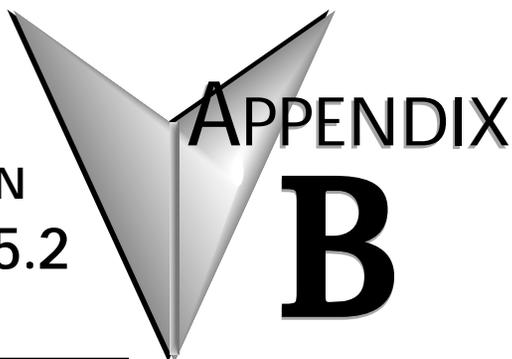
APPENDIX
B

In This Appendix...

Note: This Appendix only applies if you are using the Serial I/O Module with Think & Do versions 5.2 or 5.3. Use Chapter 3 if using the Serial I/O Module with Think & Do Studio version 6.0 or later.

Only Think & Do WinPLCs (H2-WPLC1-TD and H2-WPLC2-TD) support the H2-SERIO module.

H2-SERIO Overview

Add Serial Ports to Your WinPLC

The Serial I/O module plugs into the DL205 I/O base and is used exclusively with the WinPLC to provide additional RS232 serial ports. The WinPLC communicates with the H2–SERIO module across the DL205 backplane.

As Many as Ten Serial Ports

The WinPLC has one built-in serial port. Now, you can add as many as nine additional serial ports for Think & Do applications requiring multiple serial devices, such as barcode scanners.

Setting Communication Parameters Using Think & Do

Use I/O View to set baud rate, parity, data bits, and stop bits for each port. Choose from 300 to 57,600 baud communication speeds. Think & Do allows each port to be designated as a MODBUS slave or a generic serial device. Each port on the H2–SERIO module is capable of hardware handshaking.

RS-232 Wiring

Pin Assignments for: H2-SERIO ports

1	0V	Power (–) connection (GND)
2	CTS	Clear to Send
3	RXD	Receive Data (RS232C)
4	TXD	Transmit Data (RS232C)
5	RTS	Request to Send
6	0V	Signal Ground (GND)

RJ12 (6P6C) Female Modular Connector

NOTE: The serial port on-board the WinPLC has a different pinout from the H2–SERIO module. Refer to page 1–7 for the WinPLC serial port pin assignments.

H2-SERIO Specifications	
Module type	Intelligent module for use with H2–WPLC1–TD
Maximum number of modules supported by one WinPLC	3
Recommended cable	Belden 9729 or equivalent
Connector	RJ12 jack
Power consumption	230mA @ 5VDC
Operating environment	0° to 60°C (32°F to 140°F), 5% to 95% RH (non-condensing)
Manufacturer	Host Engineering

Using Think & Do to Set Serial Port Parameters

Check Think & Do Version First

You will need Version 5.2 of Think & Do, to recognize the H2–SERIO module. To determine whether you have the right version, open the Project Binder. As the Project Binder opens, you may notice a screen that tells you which Version of Think & Do you are opening. That screen disappears as the Project Binder opens.

After the Project Binder is open, you can click on "Help," and the bottom menu option, "About Project Binder," will tell you which Version you are using.
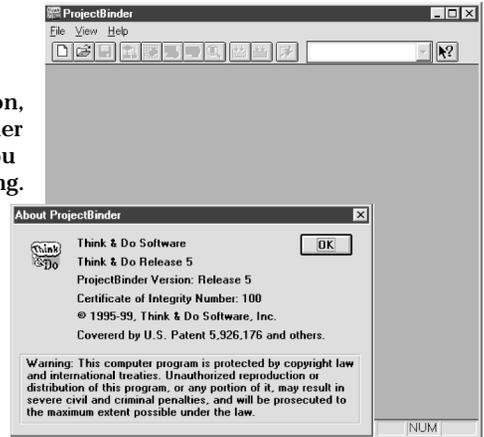
New Project Using H2-SERIO Module

Start a new project by clicking on the blank document button. A dialog box will pop up asking you to "Choose Runtime Target." Select "Windows CE – Think & Do WinPLC."

You will see a new Untitled Project open. Next, click on the "Tools" menu and select I/O View.
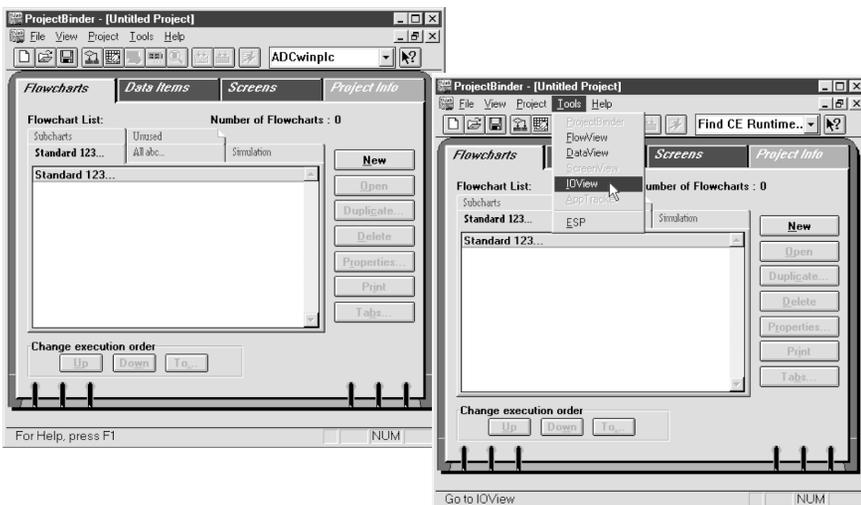
Notice in I/O View that the drivers for the DL205 backplane and the WinPLC serial port are already loaded. You will see them graphically represented in the left pane of the I/O View window.
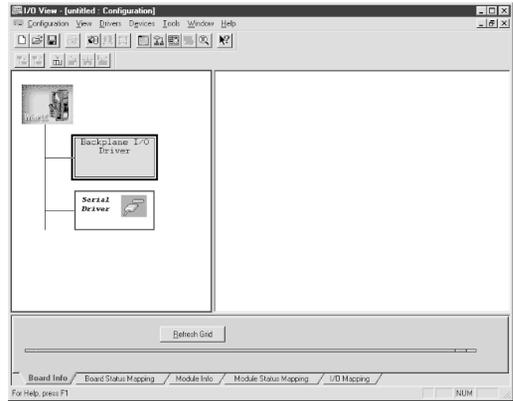
Connecting to the WinPLC

Prior to the next step, you will need to install the H2–WPLC1–TD and the H2–SERIO module in your DL205 base. Please refer to the guidelines elsewhere in this publication for information about installation, power wiring, and Ethernet connections. The WinPLC must be recognized on the network to proceed. Use "Think & Do ESP" to establish your link to the WinPLC, as described on pages 1–12 through 1–15.
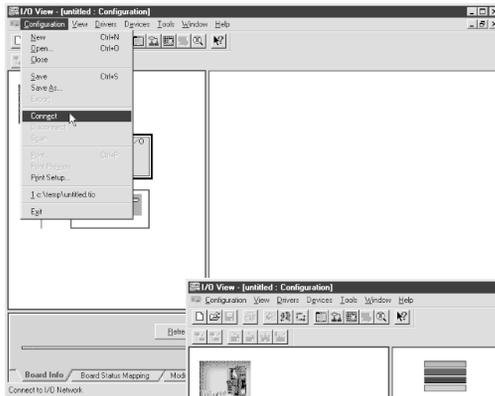
The next step is to click on "Configuration" and select "Connect."

Think & Do recognizes the DL205 base as you have configured it. The WinPLC is displayed in the CPU-slot, and the Serial I/O module is displayed in the slot where you have installed it.
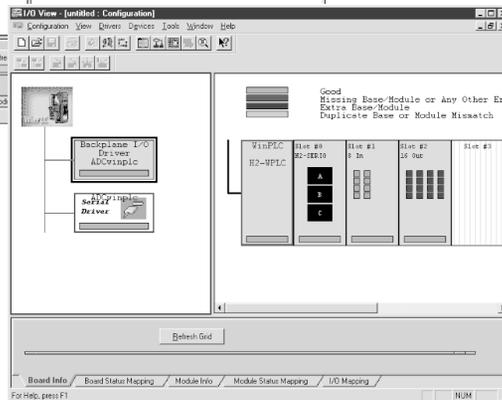
Click on the Serial Driver in the left pane of the I/O View window. You will see a port configuration box for each serial port Think & Do recognizes. In our example to the right, Think & Do sees four serial ports. One is on the WinPLC and the other three are on the Serial I/O module.

Notice that the ports are numbered COM 1 through COM 4 in Think & Do. COM 1 is on the WinPLC. COM 2 through COM 4 are on the first Serial I/O module in the base. Think & Do counts the serial ports from top to bottom (on the Serial I/O module) and from left to right in terms of slot position.

If you install additional Serial I/O modules at a later time, be aware that the module's slot position determines its COM number. If you install a Serial I/O module between an existing Serial I/O module and the CPU, your port settings will remain the same, but the COM number will change.
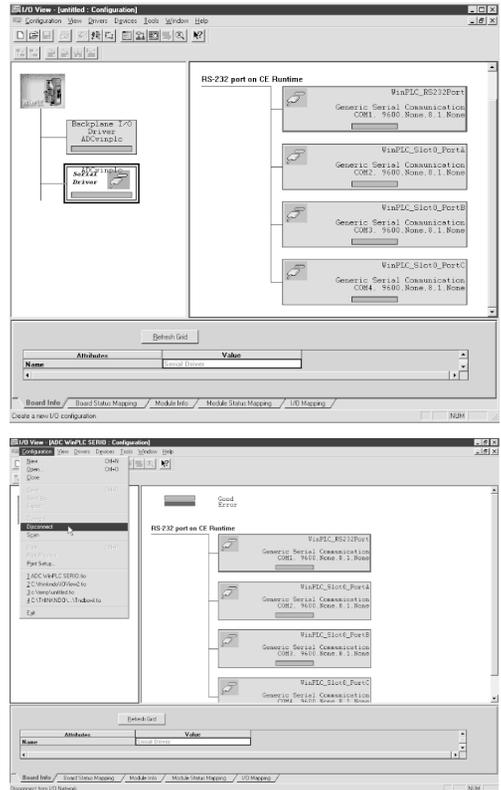
NOTE: You must be disconnected from the WinPLC and the I/O base in order to change the serial port parameters on the H2–SERIO module. To disconnect, you have two choices. You can click on Configuration/Disconnect as shown above, or you can physically disconnect the WinPLC by removing power or by removing the Ethernet cable.

Now, click on "Configuration" and select Disconnect. Think & Do will ask if you want to save the configuration. If you want to re-use this I/O Configuration later, click yes. If you click yes, you will see the "Save I/O Configuration As" screen. Name the configuration and click save.
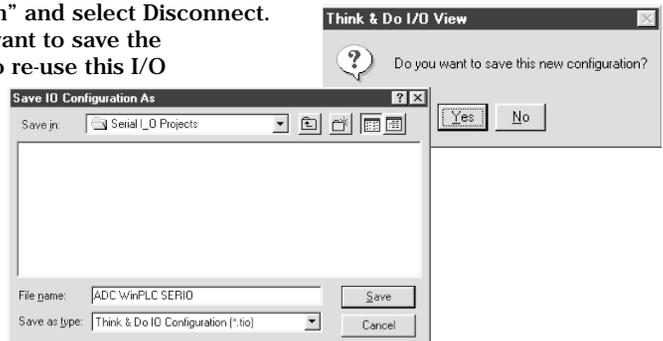
Setting Serial Port Parameters

To set the serial port parameters, click on the Serial Driver in the left pane of the I/O View window. You will see a port configuration box for each serial port Think & Do recognizes. In our example to the right, Think & Do sees four serial ports. One is on the WinPLC and the other three are on the Serial I/O module.

Expand the Window Pane

Position your cursor on the line that separates the upper window panes from the lower window pane. Move this line up by dragging your mouse. Click on the tab at the bottom of the lower window pane marked Module Info. You will see a screen that looks similar to the one shown here. Pull-down menus allow you to change the serial port parameters.

Select the port whose parameters you want to change by clicking on that port in the upper right pane. Make the changes in the lower pane, and save the changes using the Ctrl + S keys.