SIEMENS

SIMATIC TI505

SINEC H1
Communication Processor

User Manual

Order Number: PPX:505–8126–2
Manual Assembly Number: 2586546–0087
Second Edition

Preface

About this Manual

This manual describes the SINEC® H1 Communication Processor (CP) module (PPX:505–CP1434TF) for the SIMATIC® TI505™ programmable controller system. This manual also describes the H1 Configurator software package, which is used to create configuration files for the H1 CP module.

The SINEC H1 CP module provides an interface between the SIMATIC® S5™ product family and the SIMATIC TI505 family of programmable controllers over a common hardware network.

The following topics are covered in this manual:

- Module features.
- Hardware installation.
- H1 network communications overview.
- Software installation and configuration.
- Programming examples.
- Troubleshooting information.

Enhancements in Release 2

Release 2 of the CP1434TF configurator and the H1 CP module has the following enhancements:

- Default installation directory.
- Configure a selected CP1434TF module over the H1 network by using the features of the configurator (Microsoft® Windows™ version only).
- Upload configuration files in addition to downloading them.
- Configuration file overwrite warning message.
- Previously downloaded configuration file becomes backup on overwrite.
- The automatic continuous debug sample rate is user adjustable (Windows version only).
- Print a configuration file to a printer or disk.
- TSAP entry compatible with COM143.
- Copy a configuration between individual TF Services, Peer Services, Job Definitions, or TF Variables (Windows version only).
- Swap source and destination TSAPs and Ethernet addresses on copy between Peer Services (Windows version only).

- TF Alternate Access allows read/write access to individual elements of TF array and structure variables.
- Report By Exception is supported (used only by SIMATIC® PCS™).
- The controller clock can be updated from the H1 network time base.
- Use of Insert and Delete allow easier use of Main and TF Variable windows.

Related Manuals

Additional manuals you may need to read include the following:

- *SIMATIC TI505 Programming Reference Manual* (Order no. PPX:505–8104–x).
- *CP 1413 Installation Application Note (Order no. 2591729–0004).*
- *SINEC TF–Net1413/MS-DOS®* Windows™ *Operating Manual.*
- The user manual for your release of TISOFT™ programming software.
- *SINEC CP 143 with COM 143 Manual*, Volumes 1 and 2 (Order no. 6GK1970-1AB43-0AA1).
- *SINEC TF User Interface User Guide*, Version: 12/91, (Order no. 6GK1971-1AB00-0AA1).
- *SIMATIC® TI575™ Task Code User Manual* (Order no. PPX:575–8104–x).
- *COML 1413 TF for Windows Configuration Guide.*
- The system manual(s) for your controller(s).

Conventions

The following conventions are used in this manual:

- Click means to place the mouse cursor on an object and quickly press and release the mouse button. In most cases only the left mouse button is used.
- Double click means to place the mouse cursor on an object and quickly press and release the left mouse button twice.
- Menu items may also be selected by pressing Alt and the underlined character of the menu item.
- Pressing Esc is the same as selecting Cancel in a window.

Agency Approvals

Agency approvals for the SINEC H1 CP module are the following:

- Underwriters Laboratory, Inc UL Listed (Industrial Control Equipment)
- CSA Certified (Process Control Equipment)
- FM (Class I, Div 2, Hazardous Locations)

Technical Assistance

For technical assistance, contact your Siemens Industrial Automation, Inc. distributor or sales office. If you need assistance in contacting your U.S. distributor or sales office, call 1–800–964-4114.

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Product Overview

1.1 Features of the Module

Faceplate Features

The faceplate of the SINEC H1 CP module includes the following features:

- MOD GOOD and MOD READY status LEDs.
- A recessed RESET button.
- An RS-232/423 Serial Port for loading communication parameters from the CP1434 H1 Configurator program on your personal computer.
- An Ethernet AUI (Attachment Unit Interface) port that links up to the H1 network through a transceiver unit. This 15-pin port conforms to the ANSI/IEEE Std 802.3 Local Area Network standards (International Standard ISO/IEC 8802-3).

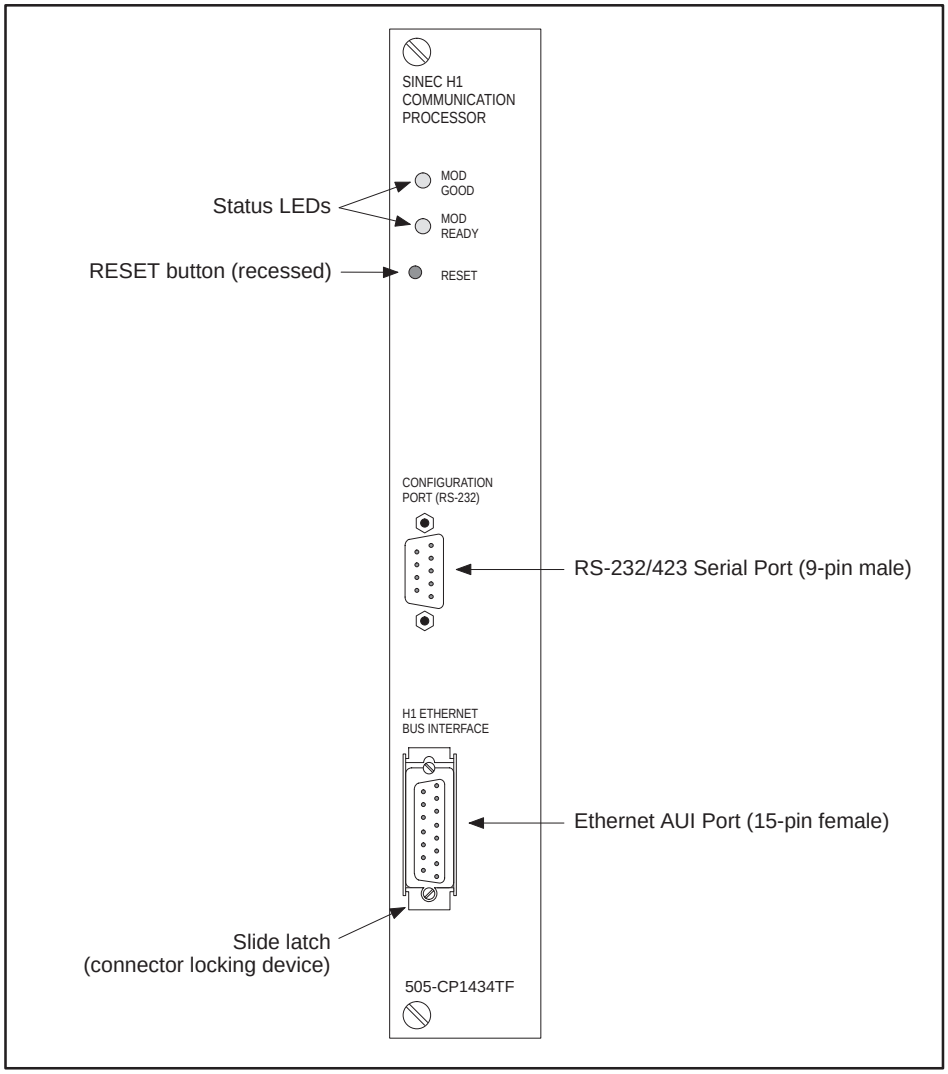


Figure 1-1 SINEC H1 CP Module Features

Memory Storage

The module's non-volatile flash memory stores your configuration parameters. You create configuration parameters by executing the CP1434 H1 Configurator software package, included with this module, on an IBM® PC-compatible computer. With a cable connecting the computer to the RS-232/423 serial port on the H1 CP module, you transfer the configuration file into flash memory on the module (see Figure 1-2). You do not need to remove the module from the base or handle integrated circuits on the board to reprogram the flash memory.

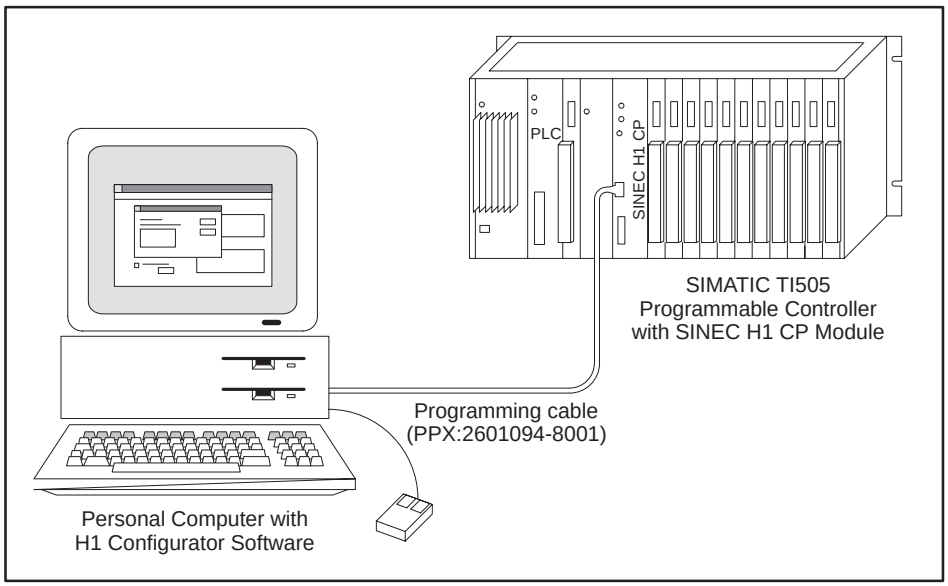


Figure 1-2 Personal Computer Connected to SINEC H1 CP Module

DC-to-DC Converter

The SINEC H1 CP module also includes a DC-to-DC converter that, when enabled, provides the following functions:

- It supplies +12 V to the Ethernet communication port that powers the Media Attachment Unit (MAU) transceiver.
- It provides the power to program the flash memory with the configuration file produced with the H1 Configurator software package.

System Compatibility

The SINEC H1 CP module is housed in a double-wide Series 505™ module that installs in any Series 505 input/output base. The module supports all SIMATIC TI505 controllers. The SIMATIC® TI525™ and SIMATIC® TI535™ controllers are supported by the local base only.

The H1 CP module can communicate over the H1 Ethernet network with other SIMATIC TI505 controllers, SIMATIC TI575 control systems, SIMATIC S5 controllers with CP143 modules, CP1413 Ethernet boards for PCs, and other 3rd-party units supporting H1 protocol.

1.2 Functional Description

Summary of Communication Features

The SINEC H1 CP module uses two OSI services (layers), Peer Services (Layer 4) and TF Services (Layer 7), to provide communications between nodes on an H1 programmable controller network. Table 1-1 summarizes the communication features for each service that the SINEC H1 CP module supports on an H1 network.

Table 1-1 H1 CP Module Features

Peer Services	TF Services
Up to 64K bytes of data for a single job	Up to 31 TF application associations
Up to 40 transport connections	Variable access with read/write services
Communication with S5 controllers	Named variable (e.g., “PumpPressure”)
Read peer data transfer	Name-encoded variable (e.g., V10N300)
Write peer data transfer	Unconstrained addressing
Send/Receive peer data transfer	Task code access
	Read/Write from/to arrays and structures by alternate access

These features are described in more detail in later chapters of this manual.

Communication Functions

The SINEC H1 CP module supports a wide variety of communication functions on a programmable controller network. These functions include the following:

- Plant management information flow.
- Process management information flow.
- Floor control information flow.
- I/O systems.
- Operator interfaces.

System Configurations

The use of a common network technology makes it possible for multiple logical communication functions and their protocols to co-exist on the same wire. With the appropriate application layer protocols, it also allows for multiple programmable logic controller (PLC) configurations without extensive hardware or software retrofits.

The following sections outline the possible system configurations that can exist on a common hardware network.

1.3 Programmable Controller System Configuration

Figure 1-3 shows a system configuration consisting of programmable controllers only.

Each controller, with an H1 CP module installed, can initiate and exchange information with any other controller in the same installation. The controllers can be any mix of the SIMATIC TI505 and SIMATIC S5 families. You configure the H1 CP module at the Configuration Port with the appropriate peer data transfer commands, the addressing information, and the data areas to be transferred using the appropriate Configurator software. You can use Relay Ladder Logic (RLL) to control the initiation of the data transfer and to process the returned data.

You can add or remove programmable controllers from the system without reconfiguring each H1 CP module on the network. All the H1 CP modules use the standard H1 protocol and are compatible, although all modules do not support all services.

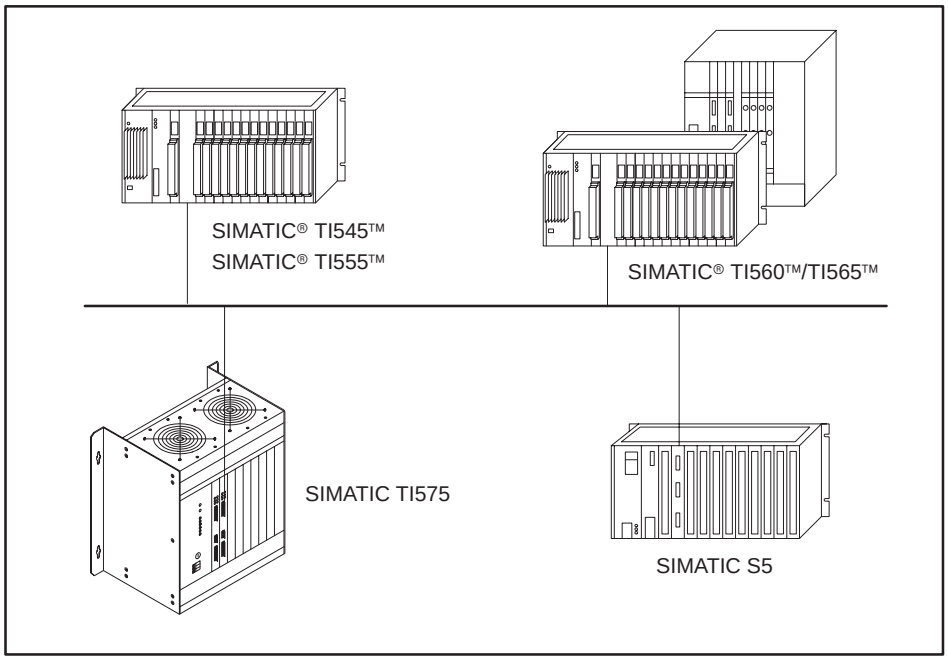


Figure 1-3 Programmable Controller System

1.4 Host System Configuration

By adding one or more host systems, you can increase the functionality of your controller system configuration, as shown in Figure 1-4. A host system can be any information-processing equipment that is not a programmable controller, such as operator interfaces, Supervisory and Data Acquisition (SCADA) systems, and general purpose computers. Adding host equipment does not disrupt the existing information exchanges between controllers.

The host or hosts in such a system must use the same H1 protocol as the programmable controllers. Note that devices using other protocols can coexist on the same physical Ethernet as devices using the H1 protocol without interfering with each other.

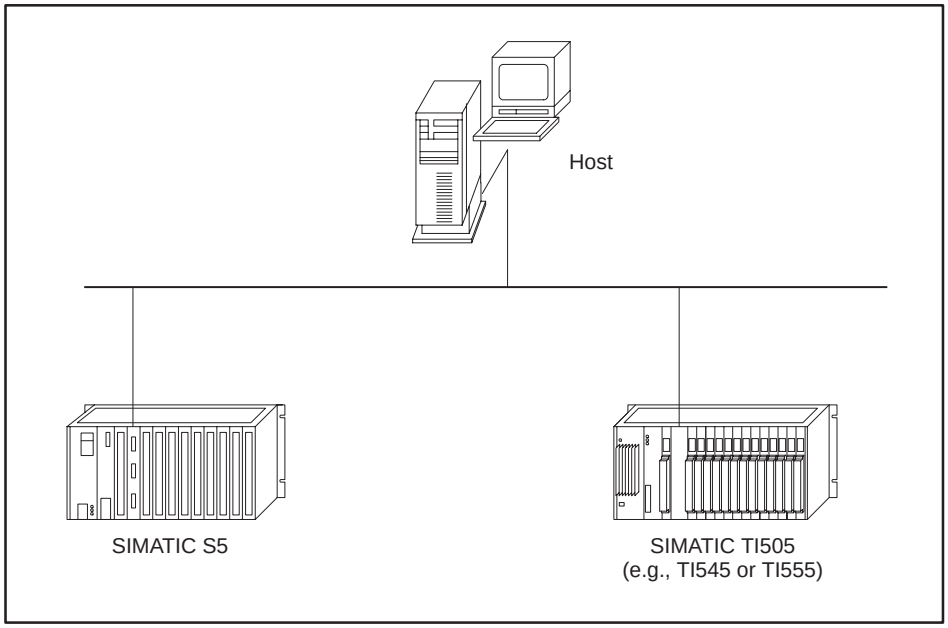


Figure 1-4 Controller System with Host

1.5 Multiple Physical Networks

You can use multiple H1 CP modules in a controller system as shown in Figure 1-5. When the information exchange requirements exceed the capabilities of a single network, you can use multiple networks for large system configurations and maintain adequate performance for each logical communication function. A PC with a CP1413 module installed allows the CP1434TF Configurator to communicate over the network.

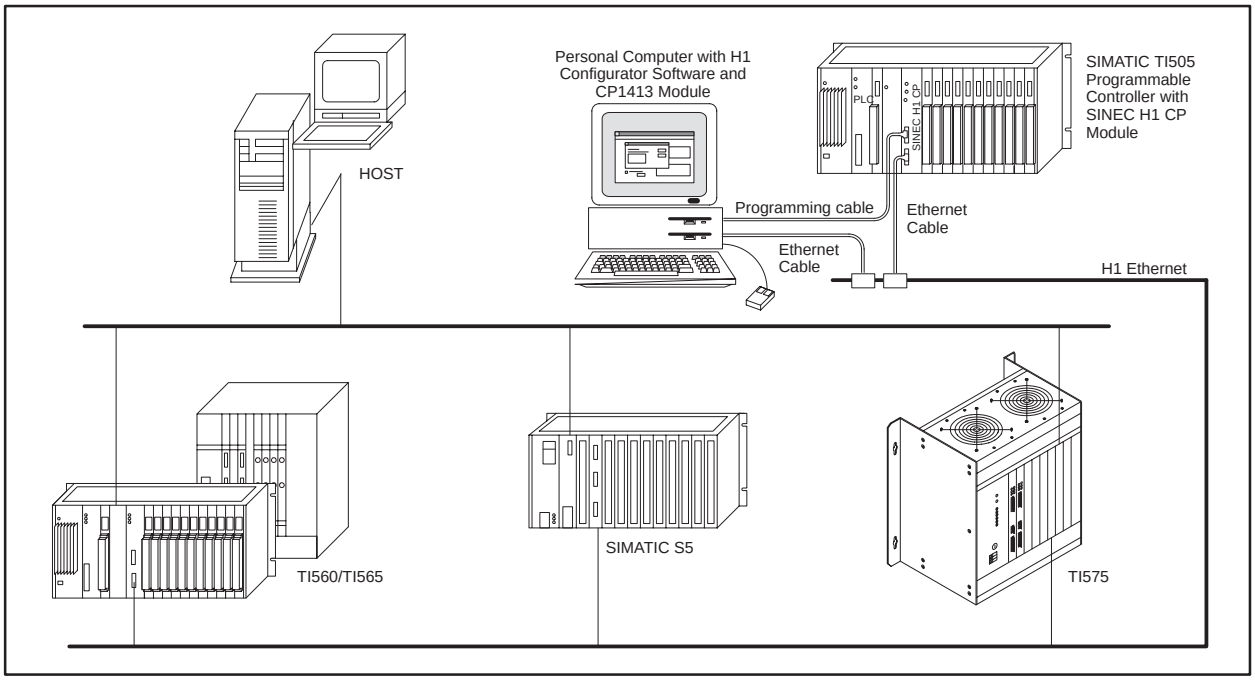


Figure 1-5 H1 Network with Remote Configurator

Chapter 2

Installing the Module

2.1 Overview of Installation

Flow of Tasks

Follow the flow of tasks shown in Figure 2-1 when installing this module.

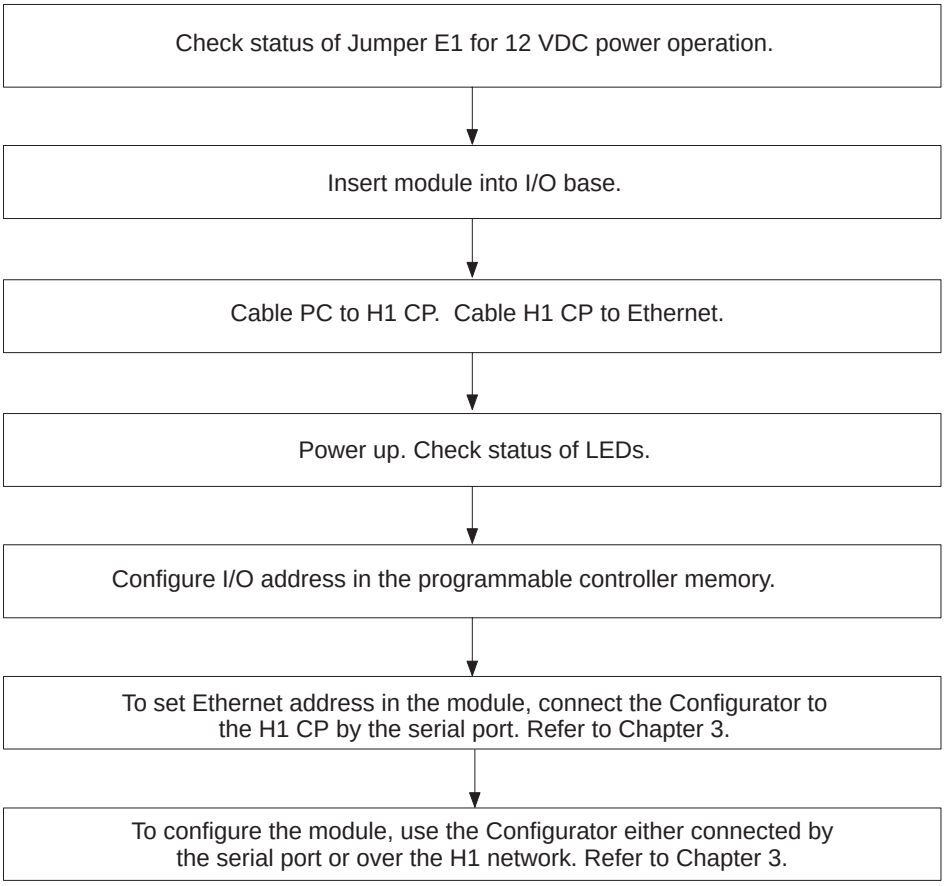


Figure 2-1 Flowchart of Installation

Handling the Module

Integrated circuits are susceptible to damage by the discharge of static electricity. Follow the suggestions listed below to reduce the probability of damage when you handle the H1 CP:

- Move the H1 CP in an anti-static container or in anti-static material.
- Ensure that the work area has a conductive pad with a lead connecting it to a common ground. Ensure that you and the module are at the same ground potential.
- Ground yourself by touching the conductive pad and/or by wearing a grounded wrist strap.

Visual Inspection

If the H1 CP is visibly damaged, contact your vendor for replacement.

2.2 Setting the Jumper

DC-to-DC Converter Functions

A jumper labeled E1 is located between the heat sink and the Series 505 base connector. The jumper is used to enable or disable the DC-to-DC converter. Since the module is shipped with the jumper installed, the DC-to-DC converter is enabled by default. (See Figure 2-2.)

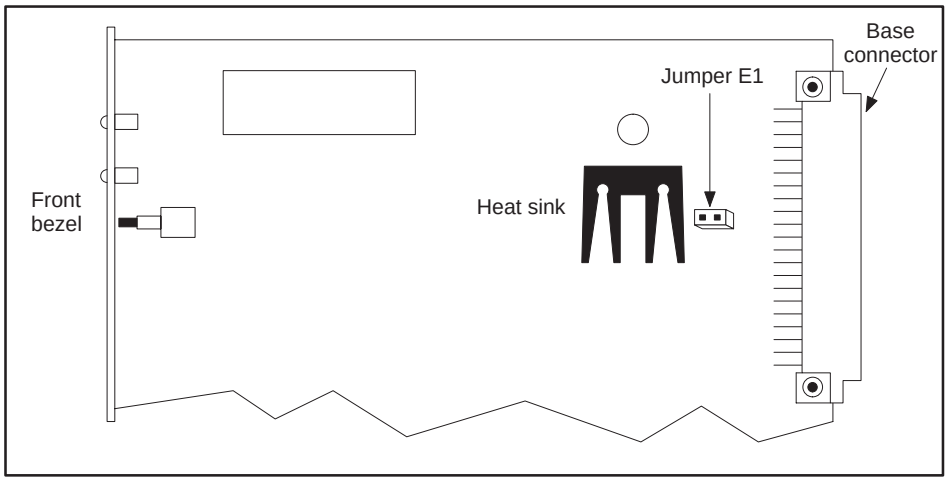


Figure 2-2 Location of Jumper E1 for DC–DC Converter

The DC-to-DC converter, when enabled, provides the following functions:

- It supplies +12 V to the Ethernet port that powers the Media Attachment Unit (MAU) transceiver.
- It provides the power to program the flash memory with the configuration file produced by the H1 Configurator software package.

NOTE: With the converter disabled, you cannot load a new configuration file into the module's flash memory. With the converter disabled, you must use a transceiver with an external power supply. This is easily accomplished by a standard fan-out unit such as the Siemens Industrial Automation SINEC SSV 75S, PPX: 6ES5 755-7AA11.

Special Applications

Due to the power consumption of the H1 CP module with the DC-to-DC converter enabled, a single I/O base can provide power for no more than two CP modules. For applications requiring three or more H1 CP modules in a single base, refer to Appendix NO TAG.

2.3 Inserting the Module into the Base

⚠WARNING

Energized parts could result in death or serious injury to personnel and/or damage to equipment.

Remove power from the I/O base before inserting or removing modules.

Follow appropriate safety precautions when FM–Approved programmable controllers are installed in National Electrical Code Class 1 Division 2 Hazardous Locations.

Inserting the Module

The SINEC H1 CP module is a double-wide module. Insert it into any two adjacent I/O slots in any Series 505 I/O base. Insert the module as shown in Figure 2-3. Note the minimum torque required for the bezel screws to provide specified electromagnetic shielding.

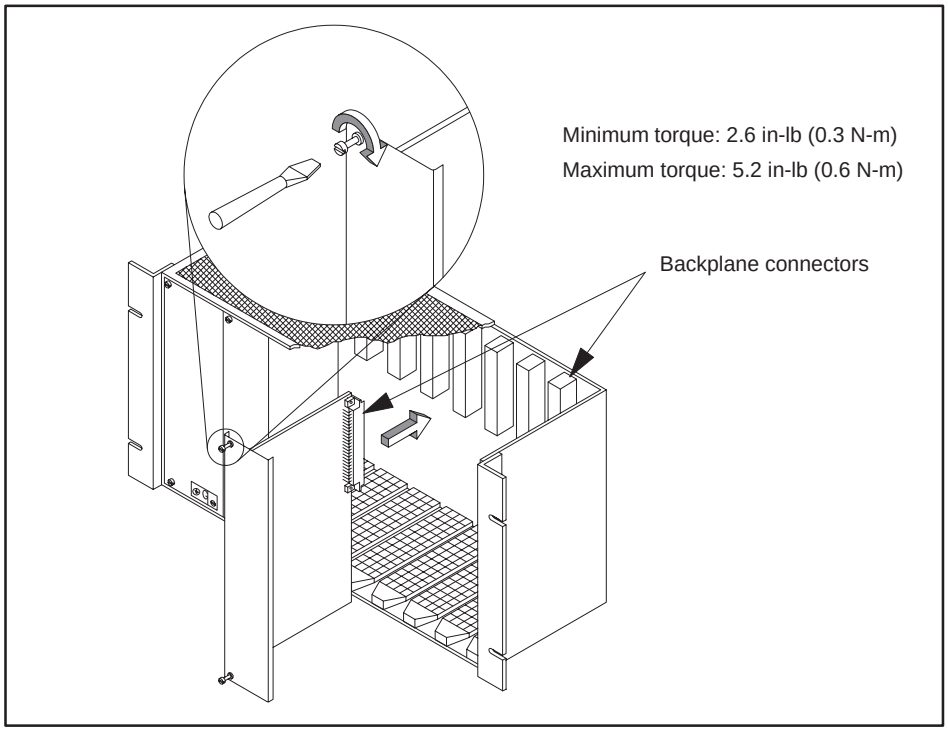


Figure 2-3 Inserting the Module into the I/O Base

2.4 Cabling your PC to the H1 CP by the Serial Port

Cable Requirements

Before you can program your H1 CP module with configuration files, you need to connect your PC to the H1 CP module with a standard 9-pin RS-232/423 serial cable that conforms to the minimum pin-outs shown in Figure 2-4. A standard cable that conforms to the minimum requirements is available through your Siemens Industrial Automation, Inc. distributor; ask for the TI545 Programming Cable, order number PPX:2601094–8001.

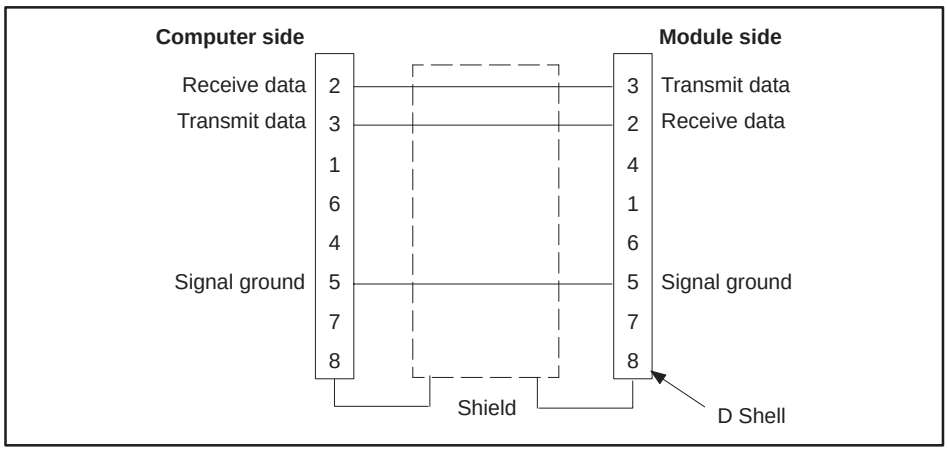


Figure 2-4 RS-232 Serial Port Cable Pin-outs

Connecting the Serial Cable

Connect one end of the cable to the appropriate 9-pin RS-232/423 serial port on your computer and the other end to the 9-pin CONFIGURATION PORT (RS-232) on the front of the H1 CP module, as shown in Figure 2-5. If your computer does not have a 9-pin port, use a 25-to-9-pin converter.

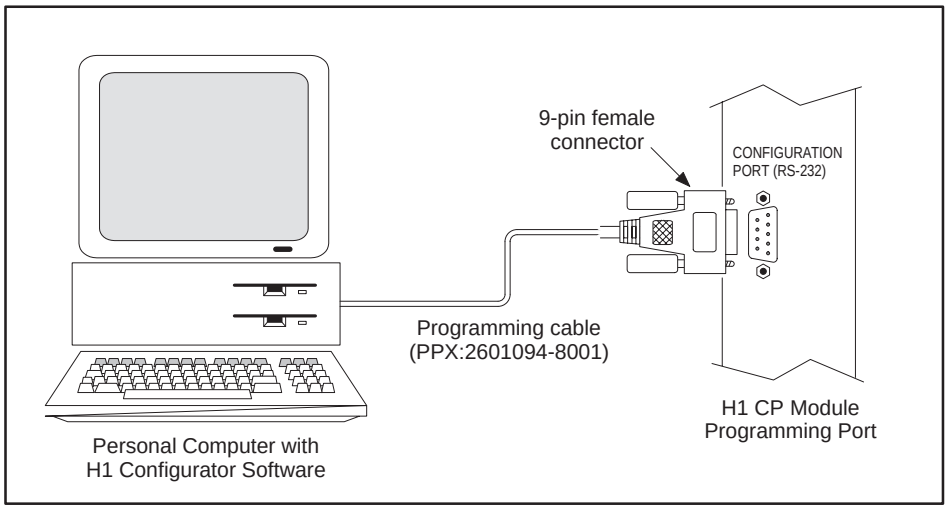


Figure 2-5 Connecting your Computer to the H1 CP

2.5 Cabling your H1 CP to the Ethernet Port

Cable Requirements

To use the functions of an H1 CP module over the Ethernet, you need to connect the H1 CP module to the Ethernet transceiver by using a standard 15-pin Ethernet Attachment Unit Interface (AUI) cable that conforms to the 802.3 Standard. Figure 2-6 shows the minimum pin-outs required.

NOTE: Figure 2–6 is provided as a reference only and is not intended as a cable construction guide.

A standard cable that conforms to the 802.3 Standard is available through your Siemens Industrial Automation, Inc distributor; ask for Ethernet cable, order number PPX:6ES5727–1xxxx (xxxx = precut length).

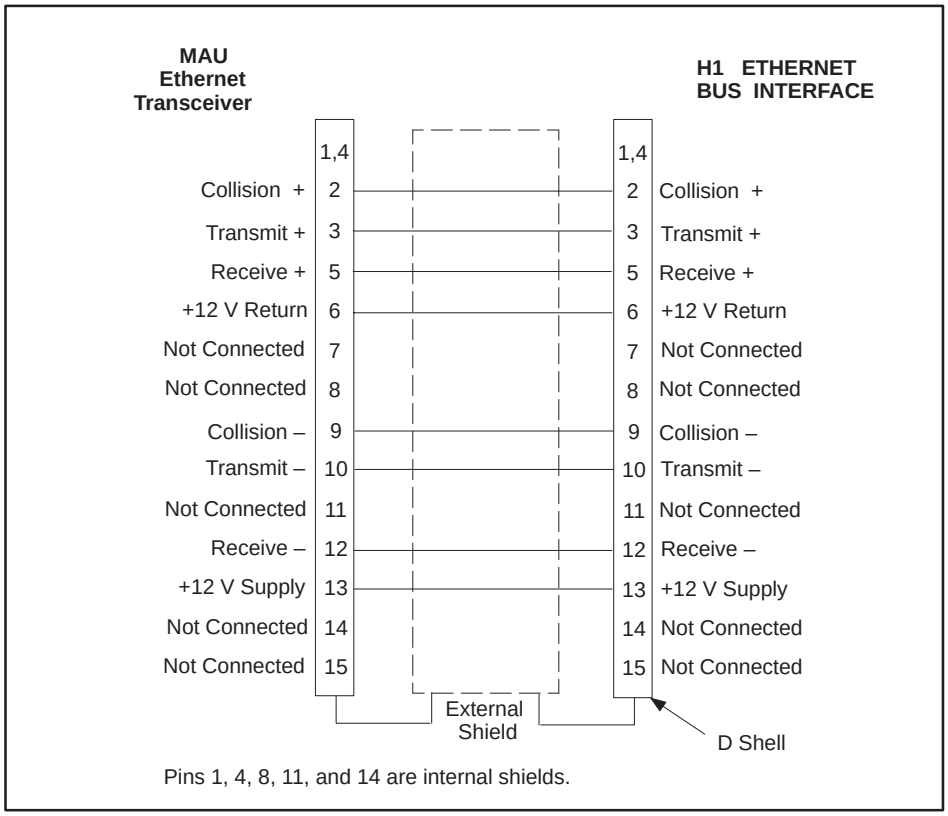


Figure 2-6 Ethernet Port Cable Pin-outs

Connecting the Ethernet Cable

Connect one end of the cable to the appropriate 15-pin H1 ETHERNET BUS INTERFACE connector on the H1 CP and the other end to the Ethernet transceiver, as shown in Figure 2-7.

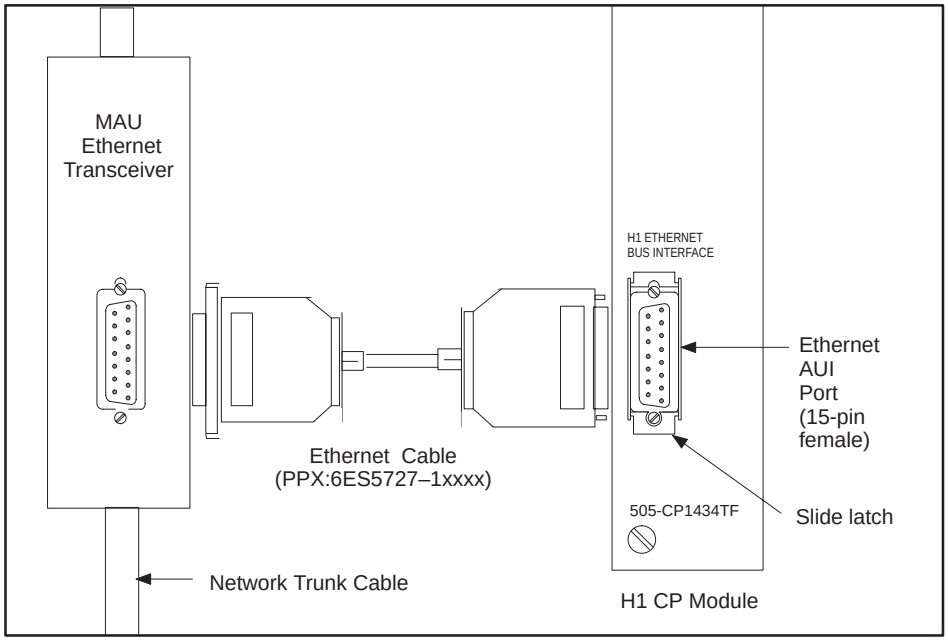


Figure 2-7 Connecting the H1 CP to the Ethernet Network

NOTE: To use the CP1434TF configurator to communicate with an H1 CP over the H1 network requires that a CP1413 module is installed in your PC and cabled to the Ethernet. Refer to Chapter NO TAG in this manual for an installation overview, and to *SINEC TF–Net1413/MS-DOS, Windows Operating Manual* for detailed hardware and software installation instructions to connect the CP1413 to the Ethernet, if you require the network features of the configurator.

2.6 Powering Up the I/O Base

Supplying Power to the I/O Base

Refer to the system manual for your controller for information on installing and wiring the power supply for your I/O base. Follow all installation guidelines and safety considerations described in your system manual before powering up the system.

After installing the H1 CP module, power up the I/O base and observe the status of the LEDs on the front of the module.

LED Status after Power-Up

When you power up the base, the module executes a diagnostic check. The module initialization process generally takes 10 to 15 seconds. The status of the LED indicators show the results listed in Table 2-1.

NOTE: When you install the module for the first time and power up the base, the MOD GOOD LED indicator comes on, then the MOD READY LED indicator starts flashing. This is normal because you have not yet loaded your configuration file into the flash memory of the module.

Table 2-1 shows how the combination of both LEDs indicates the status of the module or the configurator software. Refer also to the Troubleshooting Chart (NO TAG) in Appendix NO TAG for additional information on the status LEDs.

Table 2-1 LED Status Indicator Diagnostic Chart

MOD GOOD LED	MOD READY LED	Description
Off	Off	Base is powered down, or hardware has just been reset and power-up diagnostics are in progress.
Flashing	Off	A hardware failure was detected during power-up diagnostics.
Flashing	On	Failure in DC-to-DC converter during power-up diagnostics.
Off	Flashing	Software in memory is not executable.
On	Off	Module initialization is in progress.
On	Flashing	Power-up state after first installation before module is configured; initialization failed due to invalid or missing configuration.
On	On	Module ready for operation.

2.7 Configuring I/O Memory in the Programmable Logic Controller

After installing the H1 CP module in the I/O base, you must register the I/O starting address in your programmable logic controller memory. The module does not automatically register its I/O address in the programmable controller.

NOTE: Even though the module may appear to be operating correctly, it does not communicate with the programmable logic controller unless it is configured in the I/O map.

To configure the I/O map and verify the controller-to-module communications, connect a programmable controller programming device (e.g., TISOFT) to the programmable controller. For more information on configuring the I/O, refer to your TISOFT manual. Apply power to the base and follow these steps:

1. Ensure that the H1 CP successfully completes power-up initialization.

2. In TISOFT, access the Configure I/O function menu.

3. Select the appropriate channel and base number.

4. Execute the Read Base function.

   The module appears as 4 WX inputs and 4 WY outputs, as shown in Figure 2-8, slot 2. It uses 8 I/O address locations.

5. You need to assign the starting I/O address and write the completed I/O configuration to the programmable controller memory, using the Write PLC function. In the example for slot 2, the starting address is set for 0017. Refer also to the note on page NO TAG for important addressing information.

NOTE: Because discretes and words do not share the same IR addresses, the slot 02 entry in Figure 2-8 could be address 0001.

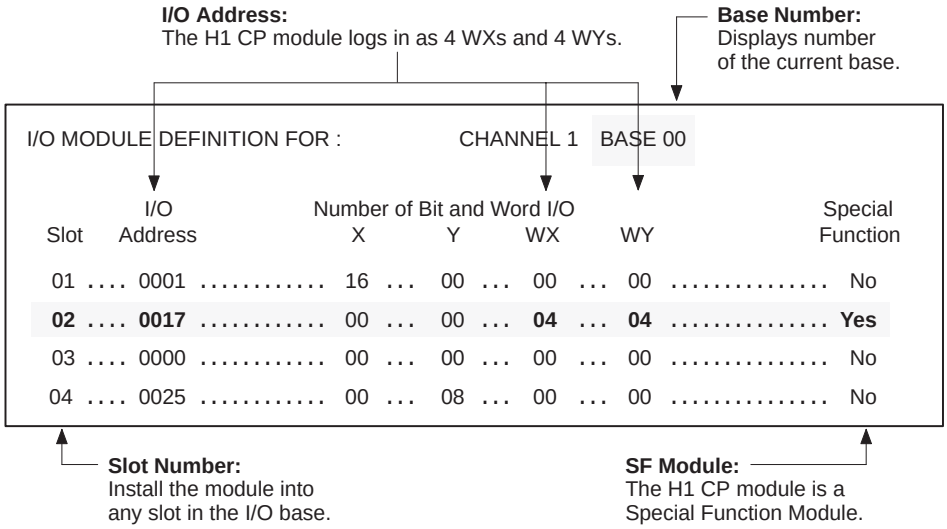


Figure 2-8 Sample I/O Module Definition Chart

Chapter 3

Installing the Software

3.1 Installing the H1 Configurator Software

Overview

The CP1434 H1 Configurator software package is available in two formats: one format runs in the Microsoft Windows operating system environment, and the other runs in the standard MS-DOS environment. Additional copies of the Configurator software disks and this manual are available by ordering PPX:505-CONF1434-2; to order the manual only request PPX:505–8126–2.

Operating System Requirements

The operating system on your personal computer must meet the following hardware and memory requirements:

Windows Requirements	MS-DOS Requirements
• Windows 3.1 • 286 or greater, with sufficient RAM to support Windows • 1 megabyte free hard disk space	• MS-DOS 3.0 or later • PC/XT™ or greater • 500K free hard disk space • 500K RAM available for largest executable

Using a mouse makes it easier and more efficient to navigate through the software program. Consult your Microsoft Windows or your MS-DOS user manual for complete information on how to use the operating system environment and mouse.

NOTE: Some of the configurator functions (Continuous Debug, Configuring Over the Network, and Copy between Configurator Files) are not supported in the DOS version.

Release 2.0 Compatibility with Release 1.0

Configurations downloaded into a CP module by a Release 1.0 configurator can be uploaded by a Release 2.0 configurator, although Peer Service Job Definitions may be incorrectly uploaded. Siemens recommends that you upgrade the CP module firmware to Release 2.0 and then download the original configuration from the disk file using Release 2.0. This guarantees that all information uploaded will be accurate.

Installing the H1 Configurator Software in Windows

With MS-DOS and Windows already installed on your computer, follow these steps to install the CP1434 H1 Configurator software to your Windows environment, using the automatic installation routine. (Refer also to Figure 3-1 for quick reference.)

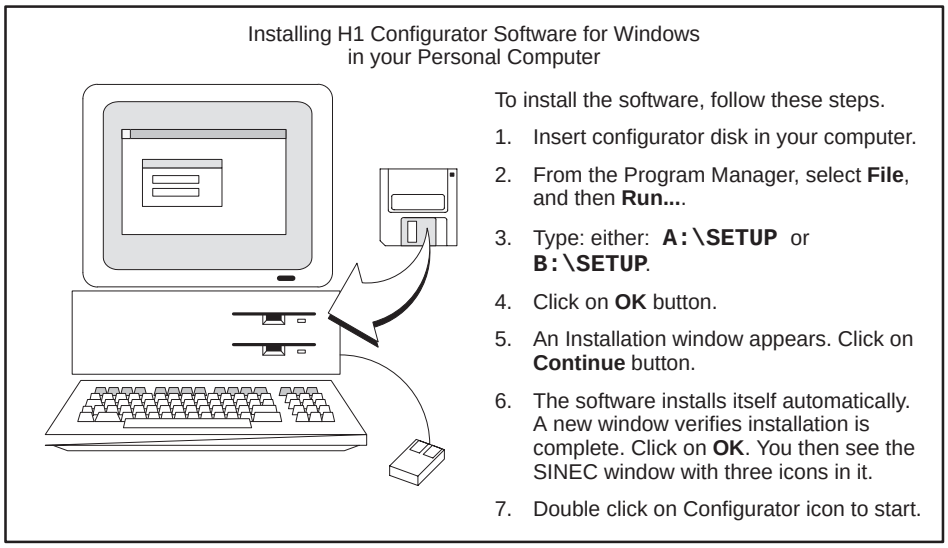


Figure 3-1 Installing the Software in Windows

Use the following procedure to install the H1 Configurator software into a Windows environment:

1. Insert the Windows H1 Configurator disk (3-½ or 5-¼″) in your disk drive.

2. Select **File** at the top of the Program Manager window, then **Run**.

3. At the text box, type either: **A:\Setup** or **B:\Setup**, depending on the drive you are using.

4. Click on the **OK** button with the mouse cursor, or press Enter.

5. An Installation window appears showing **Install to: C:\505H1**. To accept this default, click on the **Continue** button with the mouse cursor, or press Enter. If you prefer, you can specify a different directory path in this window.

6. The software installs automatically, then displays a window to verify that the installation is complete. Click on the **OK** button. The SINEC group window appears with the H1 Configurator icon in it.

7. To start the program, double click on the H1 Configurator icon.

If you are using program manager replacement software such as Norton Desktop™ or Dashboard™ for Windows, use the following manual installation procedure.

1. In the DOS environment, insert the Windows H1 Configurator disk, and type either:

   `A:\H1copy c:\505H1` Enter or

   `B:\H1copy c:\505H1` Enter, depending on the drive you are using. (You may specify a different destination directory name other than c:\505 H1.)

2. Start Microsoft Windows: **`win`** Enter

3. From the Program Manager, select **File**, and then **New**. Create a new Program Group by clicking on the **OK** button.

4. In the Program Group Properties dialog box, type: **SINEC** in the Description field, and leave the Group File field blank. Click on **OK**. You now see a new **SINEC** group window.

5. From the Program Manager, again select **File**, and then **New...**. This time create a new Program Item by clicking on **OK**.

6. In the Program Item Properties dialog box, type the following items:

Description:	**`505–CP1434TF H1 Configurator`**
Command Line:	**`H1.EXE`**
Working Directory:	**`c:\505H1`**

7. Save this new Program Item by clicking on **OK**. You now see the H1 Configurator icon in the SINEC group window.

8. To start the program, double click the left mouse on the H1 Configurator icon.

Installing the H1 Configurator Software in MS-DOS

With MS-DOS already installed on your computer, follow these steps to install the MS-DOS version of the CP1434 H1 Configurator software to your MS-DOS environment. If you plan to use a mouse, first ensure that the MS-DOS mouse driver is loaded before installing the configurator.

1. Insert the appropriate MS-DOS H1 Configurator disk (3.5" or 5.25"). At the DOS prompt, type either:

   A:\Setup c:\505H1 Enter or

   B:\Setup c:\505H1 Enter, depending on the drive you are using. (You may specify a different destination directory name other than c:\505 H1.)

2. After installation is complete, change to the new directory by typing at the command line:

   CD 505H1 Enter

3. To start the Configurator program, at the command line, type:

   H1DOS Enter or

   H1DOS /M Enter, to improve display readability on monochrome or led displays. Using the DOS command "MODE MONO" before running H1DOS (without the /M) has the same effect. See the DOS manual for details on the "MODE MONO" command.

Refer to Figure 3-2 for summary.

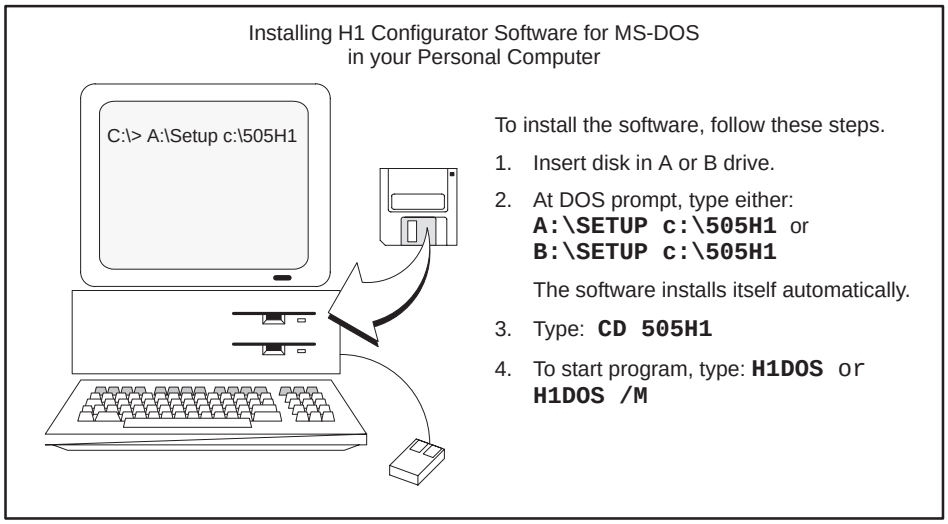


Figure 3-2 Installing the Software for MS-DOS Environment

3.2 Connecting your PC to the H1 CP by the H1 Network

Configuring the CP1413 Module

In order to configure H1 CP nodes on Ethernet, the H1 CP Configurator requires that both the CP1413 module (6GK1-141-3AE01) and the associated software (6GK1-701-1AE01-0AE0) are installed in your PC and cabled to the Ethernet network. Figure 3-3 summarizes the tasks required to configure the CP1413 module. The listed tasks must be completed before the H1 CP Configurator can communicate over Ethernet. The *SINEC TF–Net1413/MSDOS, Windows Operating Manual* provides detailed hardware and software installation instructions to accomplish the CP1413 configuration tasks. Also refer to *1413 Application Notes* for detailed cabling and software installation instructions.

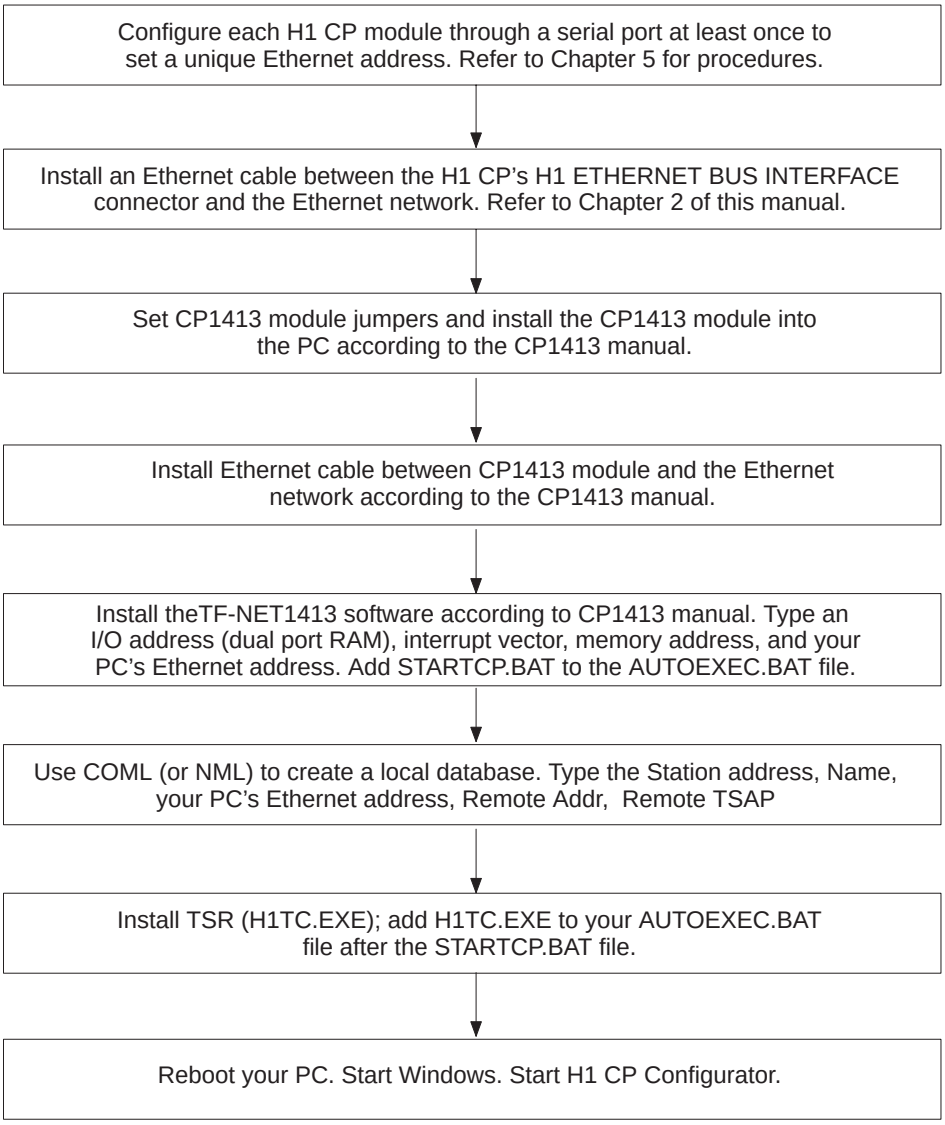


Figure 3-3 Flow of CP1413 Configuration Tasks

The tasks listed in Figure 3-3 are explained in more detail in the following summarized procedure:

1. To set a unique Ethernet address, download a configuration file to each H1 CP module, at least once, through a serial port connected to your PC. Refer to Chapter 5.

2. Start the Configurator and specify the local Ethernet address of the CP. Refer to Chapter 5. Only the local Ethernet address needs to be specified here; other items can be entered through H1 later, if desired.

3. Download the configuration file to H1 CP module. Refer to Chapter 5. This downloads a default database to the H1 CP that contains a hidden TF application ID of CP1434TF and a partially unspecified TF service with a local TSAP of CP1434TF.

NOTE: If you omit the default data base download, you must configure this service through a serial port. This may be required if you have an existing release 1.0 database and do not wish to overwrite it.

Perform the following steps as detailed in *SINEC TF–Net1413/MS-DOS, Windows Operating Manual* to install the CP1413 module:

4. Configure the hardware jumpers on the CP1413 module.

5. Install the CP1413 into the PC.

6. Connect the Ethernet cable between the CP1413 module and the Ethernet network.

7. Install the TF-NET 1413 software. Type the address and size for dual port RAM and local Ethernet address. Select the AT Bus Interrupt number.

8. Use COML or NML to create a user's local database that includes your local PC Ethernet address and TSAP of all the H1 CPs that you want to communicate with. See Figure 3-4. Refer to *COML 1413 TF for Windows Configuration Guide* for additional information.

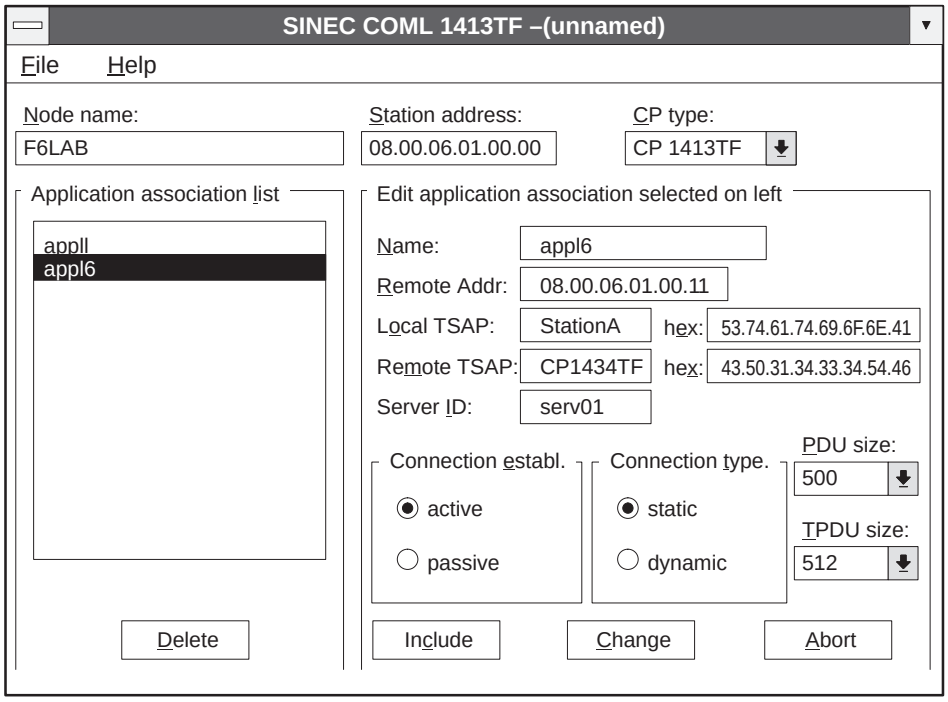


Figure 3-4 COML Main Screen

9. Install the CP1413TF according the installation instructions in the manual.

10. Each time the system is booted, you must run the STARTCP.BAT file. In your AUTOEXEC.BAT file, include a line with STARTCP.BAT.

11. In your AUTOEXEC.BAT file, include a line with H1TC 0x82. Run H1TC.EXE after the CP1413 STARTCP.BAT has run and before the Windows operating system starts.

12. Either reboot the PC, or type **`autoexec`** and press Enter; this installs the LDB to the CP1413 module.

13. Start Windows and run the Configurator. The configurator lists your Application Associations when you invoke **H1 Network Node Selection** from the **Port** menu but does not list the hidden CP1434TF association.

NOTE: If the configurator does not run, go to Appendix B, Error Codes and Troubleshooting for help.

Chapter 4

Communication Overview

4.1 Network Overview

Introduction

Network communications using the H1 system can be looked at from both the physical view and the logical view.

The physical view shows a collection of nodes all connected to a common network pathway, the network cable media, as shown in Figure 4-1. This view emphasizes the actual physical layout of the network cables and associated devices that enable the nodes to communicate with each other.

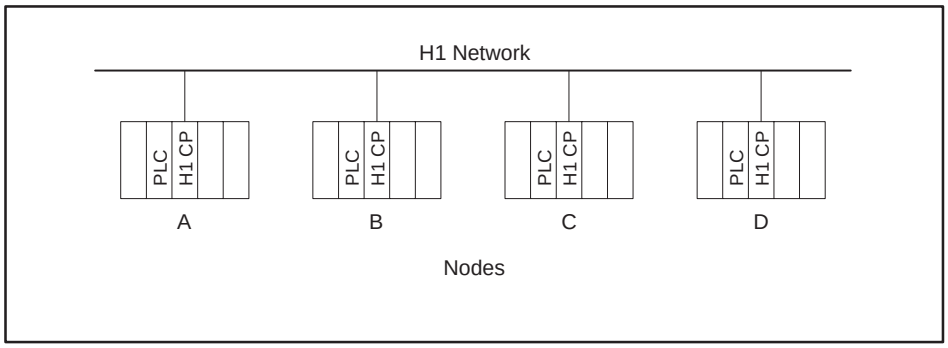


Figure 4-1 Simplified Physical View of a Network

The logical view, on the other hand, does not show the physical connections of the network cables. Instead, it shows how the nodes are configured to communicate with each other. In other words, it shows the actual lines of communication open between links. This is illustrated in Figure 4-2.

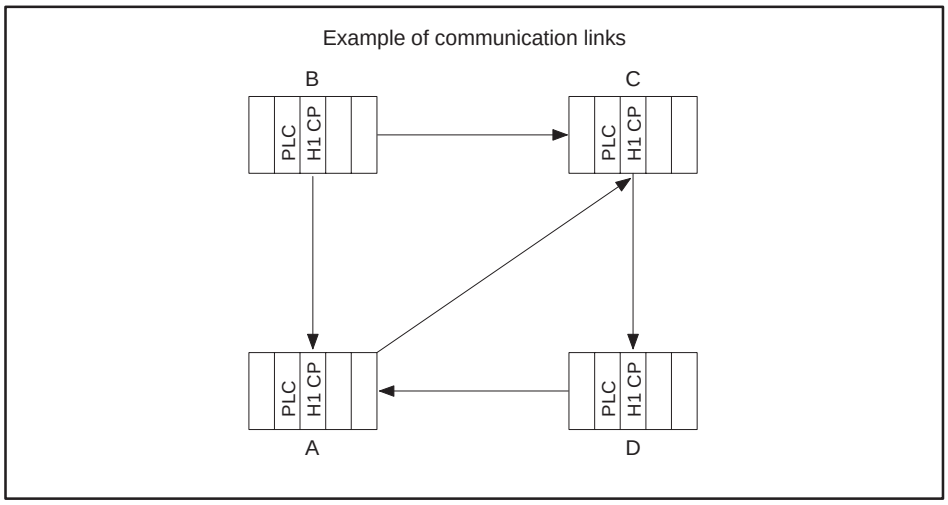


Figure 4-2 Logical View of a Network with Communication Links

Point-to-Point Communication Links

To create a line of communication from one node to another, a Transport Service Access Point (TSAP) is assigned as a means of identifying the origin and destination of each link in the network. This allows multiple communication links to be established between nodes on the network, as shown in Figure 4-3. Each H1 CP module can provide up to 40 TSAPs.

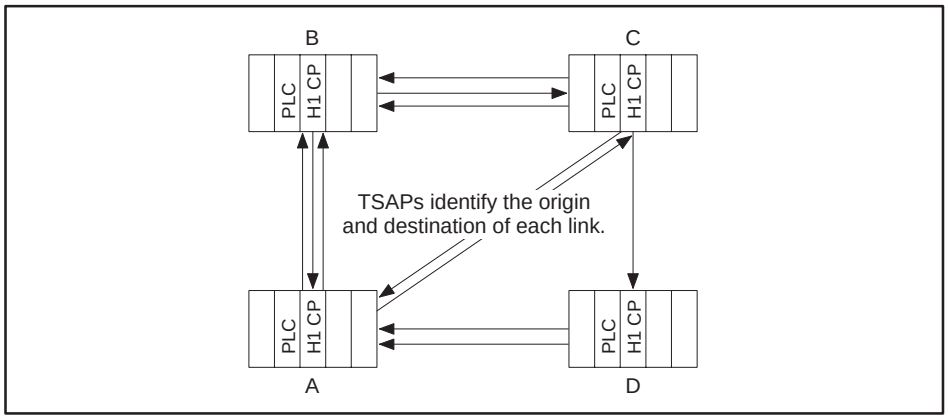


Figure 4-3 Multiple Communication Links between Nodes

Communication Services

The H1 CP module provides two types of communication services, each based on the ANSI/IEEE Std 802.3 (ISO/IEC 8802-3) standard for information processing systems. Each type of communication service uses its own specific protocol. These services are described below:

- Peer Data Transfer Services are based on layer 4 (transport layer), and are typically used for the fast and efficient exchange of data from one controller node to another.
- Technology Function (TF) Services are based on layer 7 (application layer), and are generally used between a supervisory system and the programmable controller nodes from which it is gathering or writing data. (See Figure 4-4.)

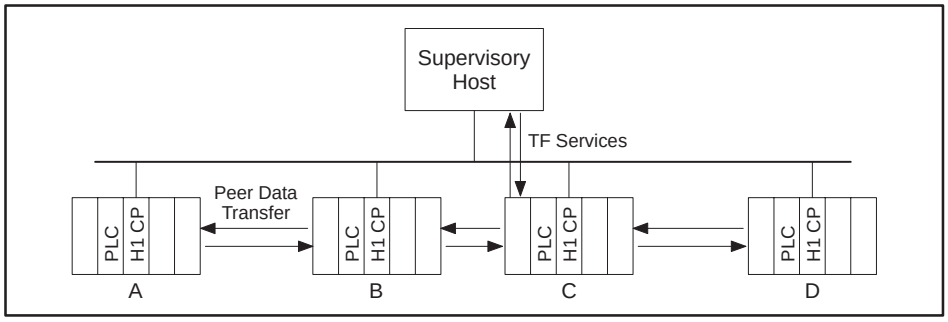


Figure 4-4 Communication Services

Functional Modes of Operation

When a programmable controller with an H1 CP module communicates in the Peer Data Transfer mode, it can function as either a client or a server: it can initiate requests for data as well as respond to requests for data. When it communicates using the TF Service mode, it functions as a server only: it can respond to requests for data, but it cannot initiate the request. (See Table 4-1.)

Table 4-1 Operating Modes of the H1 CP Module

H1 CP Module Operating Mode	TF Service	Peer Service
Client (the active or initiating partner)		✓
Server (the passive partner)	✓	✓

Terminology

The following terms are commonly used for these communication links:

- Association — a logical link between two H1 nodes across which layer 7 TF communication can take place. This link is typically between a supervisory host and a programmable logic controller system.
- Connection — a logical link between two H1 nodes across which layer 4 peer data transfer can take place. Also referred to as Transport Layer Connection. This link is typically between two programmable logic controllers on a system network.

With Peer Service connections, one programmable logic controller station is designated as the Active station, while the other programmable logic controller station is designated as the Passive station.

- Active — the active station requires user Relay Ladder Logic (RLL) code to initiate or enable the connection and the transfer of data (job).
- Passive — the passive station does not require user code (RLL) to initiate the transfer of data. Instead, it is configured to be permanently ready to accept requests for data exchange.

4.2 TF Services

TF Service Overview

TF (Technology Function) Services are usually used between a supervisory host and a programmable logic controller for data acquisition and control, as shown in Figure 4-5. In a typical H1 network, one or more hosts can be connected to one or more programmable logic controllers using H1 CP modules. Generally, a supervisory host system must have the ability both to read and to write data in its associated programmable logic controllers.

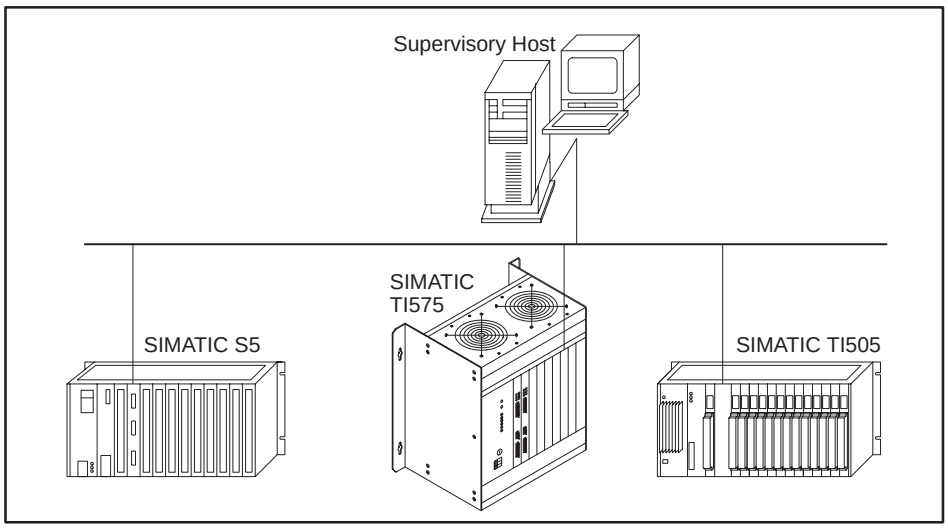


Figure 4-5 Supervisory Host with Programmable Logic Controller Network

TF Services Supported

NO TAG provides a list of TF Services supported by the H1 CP module. A host system can transmit requests for these services through an Application Association. The services used most often are TF Read and TF Write.

TF Addressing Methods

The H1 CP module supports three methods that the host can use to address the data contained within the attached programmable logic controller.

- Name-Encoded Addressing — The H1 CP module supports a set of predefined, coded names that the host can use to address data elements contained in the programmable logic controller. No user action is required at the programmable logic controller or H1 Configurator for the host to make use of name-encoded addressing. These names are formatted according to rules described in Appendix A.

- Named Variables — You can define names, related to your application when you use the H1 Configurator, such as “PumpPressure,” “MachineStatus,” “PartCount,” etc. When you define a named variable, you specify the programmable logic controller data associated with that name.

- Unconstrained addressing — A user-written host program may issue a TF Read or TF Write request with addresses that are specified in a binary format. No user action is required at the programmable logic controller or H1 Configurator for the host to make use of unconstrained addressing. Refer to Appendix A for details.

4.3 Peer Services

Peer Service Overview

To create a peer connection, you must configure the H1 CP module at each programmable logic controller station, and add the appropriate Relay Ladder Logic (RLL) code to the active programmable logic controller (or both programmable logic controllers in the case of a Send/Receive exchange) in order to trigger the "job," (transfer of data).

The following Job Types are available for Peer Service data transfer:

- Send
- Receive
- Write Active
- Write Passive
- Read Active
- Read Passive

Communication between the Programmable Logic Controller and the H1 CP Module

Each H1 CP module is registered in the I/O memory map of its controller as using 4 word inputs (WXs) and 4 word outputs (WYs). You must assign the starting I/O address, as described on page 2-9, in order for the programmable logic controller to be able to communicate with the H1 CP module.

Each bit in the first three words corresponds to a Job. For example, bit 1 in WY5 is the Job Start Bit for Job1, while bit 1 in WX1 is the Job Active Bit for that same Job1, as shown in Figure 4-6.

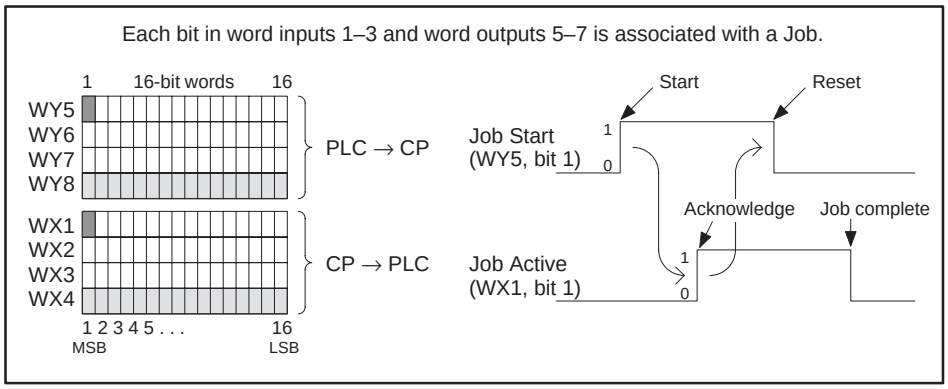


Figure 4-6 Handshaking Communication between PLC and H1 CP

These bits are used to "handshake" (synchronize) communication between the programmable logic controller program and the CP module.

- Job Start Bit — A user-selected bit in one of the available output words (WY) assigned to the H1 CP module that is used in the RLL program to trigger a data transfer job. The H1 CP module must see a 0 to 1 transition on the Job Start Bit to begin a data transfer job.

- Job Active Bit — A corresponding bit in the input word (WX) set by the H1 CP module to signal that a requested data transfer job is in progress. When this bit goes back to zero, the programmable logic controller knows that the job has been completed and can then initiate another job by setting the corresponding WY bit to one.

Bits in words WY5, WY6, and WY7 are available as the Job Start Bits. Any of up to 40 of the 48 bits in WY5, WY6, and WY7 can be used as the Job Start Bit for a job as needed. The corresponding bit in WX1, WX2, or WX3 (the Job Active Bit) signals a job in progress.

NOTE: The designations WX1, 2, 3, 4 and WY5, 6, 7, 8, shown in the H1 Configurator software, are relative to the actual starting address you assign in TISOFT (or equivalent) for the slot where the CP module is installed. For example, if you assign 9 as the starting address, then to the programmable logic controller, WX1, 2, 3, 4, and WY5, 6, 7, 8 are actually WX9, 10, 11, 12 and WY13, 14, 15, 16. Of course, if you configure the starting address as 1, the actual addresses match the relative addresses shown in the Configurator. (See page 2-9.)

The handshaking, or synchronizing, of a Peer Service job such as the one shown in Figure 4-6 can be summarized as follows:

1. With the WY bit set to 0, the programmable logic controller must wait for the corresponding WX bit to become 0.

2. The programmable logic controller sets WY bit from 0 to 1 to trigger the service.

3. The CP module sees the rising edge on the WY bit, sets the corresponding WX bit to 1, and starts the job.

NOTE: The CP module must see the transition of the WY job start bit. Either a reset of the CP, or a power cycle of the entire programmable logic controller base, may result in the programmable logic controller ladder setting a WY job start bit prior to the CP module recovery. When this condition occurs, the CP module will not execute the job.

A Ladder logic timer (TMR or TMRF) may be implemented where the timer is enabled when the WY job start bit is set. The timer is reset, in response to the WX job active bit. If the WX job active bit never responds to a WY job start bit, the timer is allowed to timeout and clears the current WY job active bit.

The next execution of the ladder logic starts the WY job start bit under normal operating conditions. To allow ample CP module startup time, set the timer preset value to 30 seconds. Normal CP module startup requires approximately 25 seconds.

4. The programmable logic controller sees the WX bit go to 1, and then resets WY bit to 0.

5. The CP completes the job, stores the job status in programmable logic controller V memory, and, when it sees WY bit reset to 0, it resets the WX bit to 0. (The CP also resets the WX bit to 0, regardless of the WY state, if the Send, Write Active, or Read Active job times out.)

6. The programmable logic controller sees WX return to 0, indicating job is complete; it can check the status word for errors: if none, programmable logic controller knows data was sent or may use any received data.

7. The programmable logic controller can start the job again, whenever it is ready, by repeating the sequence from step 2.

Data Flow in Peer Service Connections

Figure 4-7 shows examples of the three basic types of jobs that can be executed using the Peer Services: Send/Receive, Write, and Read.

In these examples, data flows from PLC A on the left to PLC B on the right. The job types shown have been configured in the H1 CP module by the H1 Configurator software.

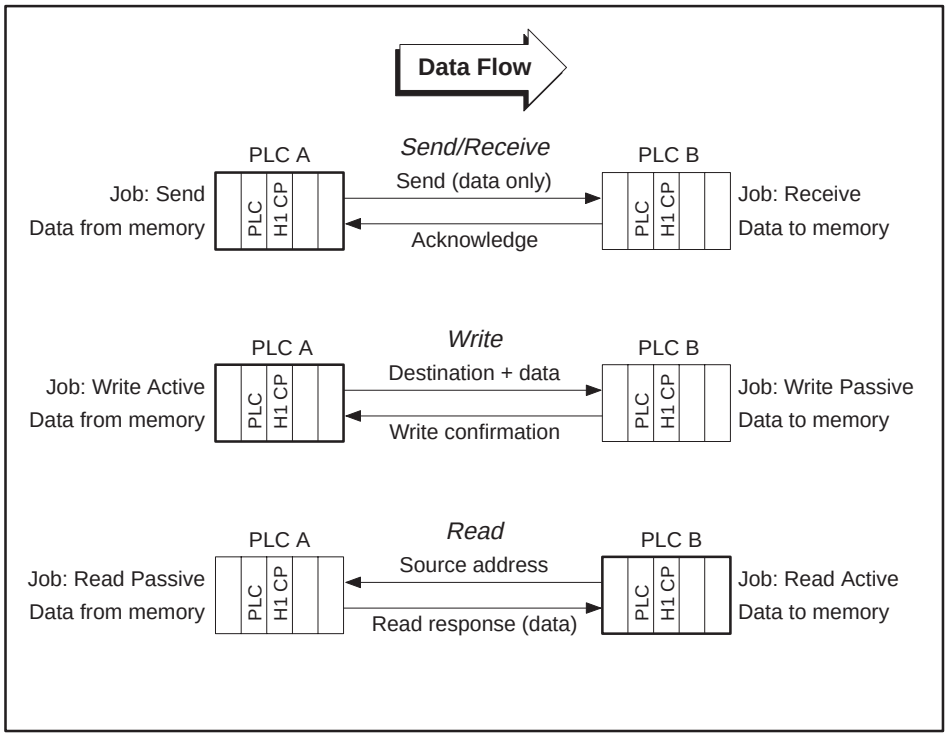


Figure 4-7 Examples of Peer Data Transfer

Each type of data transfer accomplishes its task differently. Choose the one that matches your specific application requirements. The three types of data transfer are described in the following paragraphs.

Send/Receive Peer Data Transfer

Send/Receive peer data transfers consist of the following characteristics:

- Both programmable logic controllers must agree to the transaction before any data transfer can take place. No data is transferred until the receiving station signals that it is ready to receive data. This creates a form of interlocking that may be required by certain applications.
- One station has control of the source of the data being transferred (with a Send job type) while the other station defines the destination of the data being transferred (with a Receive job). Both programmable logic controller stations require RLL code to enable the transfer of data.
- Up to 8 memory blocks of data can be sent with each transfer. The blocks can contain data from up to eight different programmable logic controller data types.

Write Peer Data Transfer

Write peer data transfers consist of the following characteristics:

- One programmable logic controller station controls the transfer of data and sends the destination address to the passive station. The passive station receives the transmitted data.
- The passive station does not require RLL programming to participate in the exchange of data.
- The data transfer can be issued in a random access manner; that is, the active station can write the data it wants without having to predefine the data type, address, and length at the passive programmable logic controller.

When configuring a Write data transfer connection, you must pair a Write Active job type with a Write Passive job type. The active station, initiates the request, and is configured with a Write Active; the other station, waits for the request, and is configured with a Write Passive.

Read Peer Data Transfer

Read peer data transfers consist of the following characteristics:

- One programmable logic controller station controls the transfer of data and sends the source address to the passive station which responds with the requested data.
- The passive station does not require RLL programming to participate in the exchange of data.
- The request for data can be issued in a random access manner; that is, the active programmable logic controller can request the data it wants without having to predefine the data type, address, and length at the passive programmable logic controller.

When configuring a Read data transfer connection, you must pair a Read Active job type with a Read Passive job type. The active station,which initiates the request, is configured with a Read Active, while the other station, that waits for the request, is configured with a Read Passive.

Establishing Connections

Connections are always initiated by the active station for the Send, Read and Write job types. All connection requirements must be clearly specified on the active station.

In order to define a connection for each active job, you must specify the remote network (Ethernet) address and the remote TSAP for the corresponding passive job. You also assign a unique local network address and local TSAP to identify the active station.

Levels of Specification for the Passive Station

The passive station, on the other hand, as the receiving end of the request for a connection, allows several levels of discrimination in accepting or rejecting a connection request. These levels of specification are described below.

- Fully Specified — You must enter the exact network address and TSAP of the remote active partner. Only a connection request containing both this remote network address and TSAP is accepted. In addition, to be accepted, the connection request must contain a local TSAP that matches the passive station's TSAP. In other words, both the network addresses and the TSAPs must match.

- Partially Specified — You must enter the TSAP of the remote active partner. Only a connection request containing this TSAP is accepted. In addition, to be accepted, the connection request must contain a TSAP that matches the passive station's local TSAP. For this level, you set the remote network address to all zeros. In effect, this means the passive station accepts a connection request from any remote active partner that contains the matching TSAPs.

- Unspecified — The only match required for this connection is the passive station's local TSAP. For this level, you set both the remote network address and the remote TSAP to all zeros. As a result, the passive station accepts a connection request from any remote active partner that contains the matching local TSAP.

- Totally Unspecified — When you set the remote network address, the remote TSAP, and the local TSAP to all zeros, then the remote network address, the remote TSAP, and the local TSAP contained in the connection request from the remote active partner are ignored. The passive station accepts a connection request from any remote active partner, as long as no other jobs residing on the module contain a higher level of specification. The Configurator software allows you to configure only one totally unspecified passive job in a CP module.

NOTE: In all the cases above, the connection request from the active station contains the remote Ethernet address that corresponds to the passive job.

The levels of specification possible for a Read Passive, Write Passive, or Receive job are summarized in Figure 4-8.

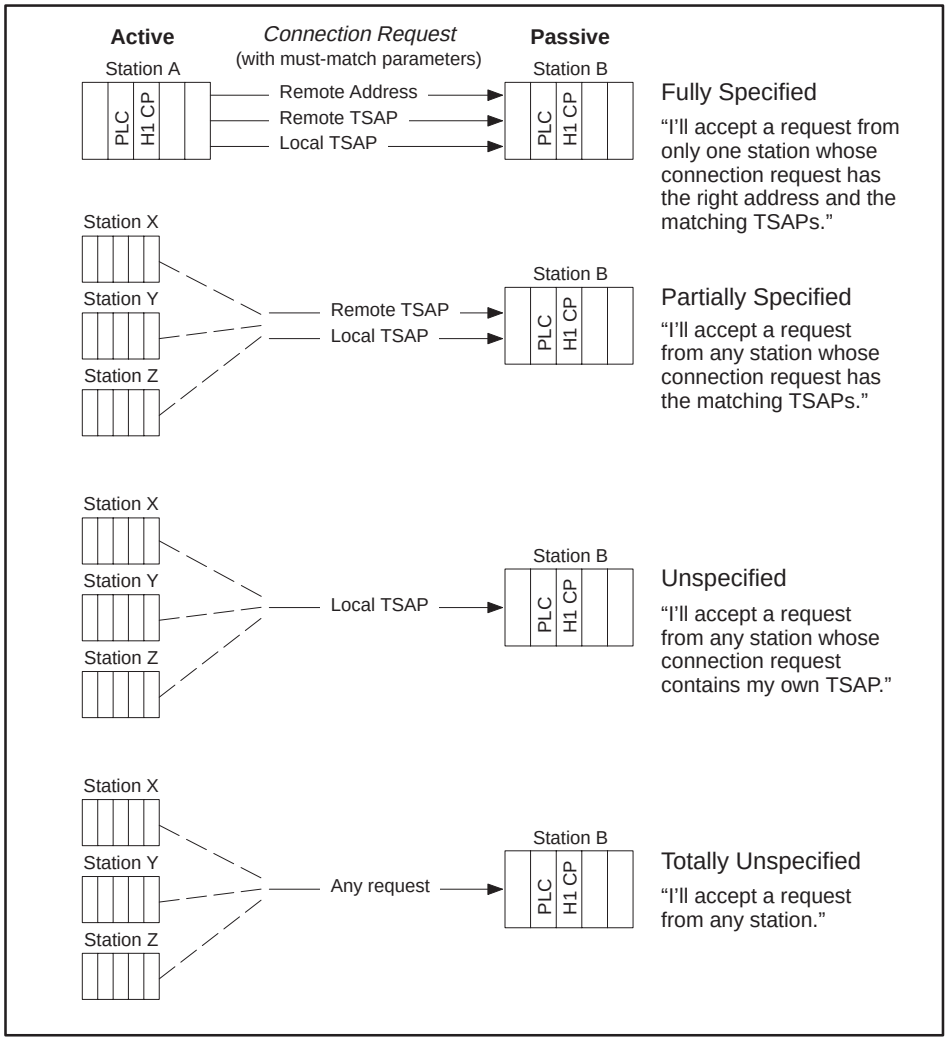


Figure 4-8 Levels of Specification for the Passive Partner

NOTE: The Peer Service TSAP editor conforms to the rules used by the S5 COM143 Local Link editor. Refer to Section NO TAG for additional information.

Static/Dynamic Link Connections

Send/Receive Peer Services allow you to specify either a Static or a Dynamic connection.

Static:

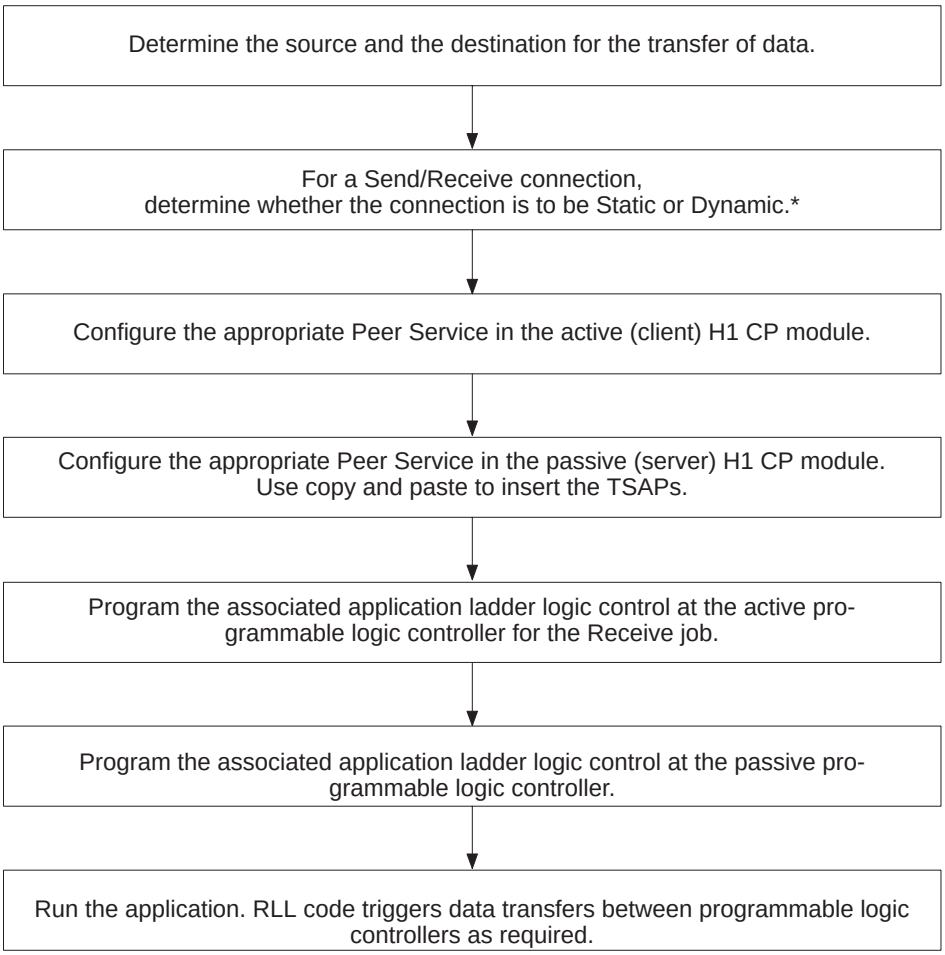
The active partner initiates the link connection. The connection remains in effect permanently and memory resources are unavailable for other connections.

Dynamic:

The active partner initiates the link connection every time a job is invoked. When the job is complete, the link is terminated and any resources are available for other jobs. Dynamic connections are valid only for Send/Receive jobs.

Summary of Peer Service Configuration Tasks

Figure 4-9 shows a summary of the tasks required to create a Peer Service data exchange connection between two programmable logic controller systems.



*Static means the connection is maintained as long as the client and server are operational; Dynamic means the connection is made and broken with each successful data transfer.

Figure 4-9 Flow of Configuration Tasks for Peer Service Data Transfer

Chapter 5

Creating and Editing Configuration Files

5.1 Getting Started

Starting the H1 Configurator Software

To use all of the commands described in this chapter, you must have installed the hardware and loaded the software, as described in Chapter 3 of this manual. From your Windows screen, double click on the Configurator icon to enter the CP1434TF H1 Configurator software.

For the DOS version, type **H1DOS** and press Enter at the C:\505H1 prompt. The DOS screens look similar to the Windows screens shown in this manual, although some of the Release 2 features (Continuous Debug, Configuring Over the Network, and Copy between H1 CPs) are not supported.

Main Window Menu Bar

When you start up the CP1434TF H1 Configurator software, the menu bar shown in Figure 5-1 gives you five pull-down menu options. Clicking on a menu option selects it and displays a pull-down menu with available commands. The menus are summarized here, and explained in detail in this section.

- The **File** menu allows you to manage files. This is where you create new or edit existing configuration files, save files, save reports, print reports, or exit the configurator.
- The **Transfer** menu allows you to download the currently open configuration file to an H1 CP module, or upload the configuration file from an H1 CP module.
- The **Debug** menu shows you the status of your system. It shows system status, TF services, Peer services, and the port or node selection.
- The **Port** menu allows you to select a serial port or a network node, that you can download to or upload from.
- The **Help** menu provides on-line help in using the H1 Configurator.

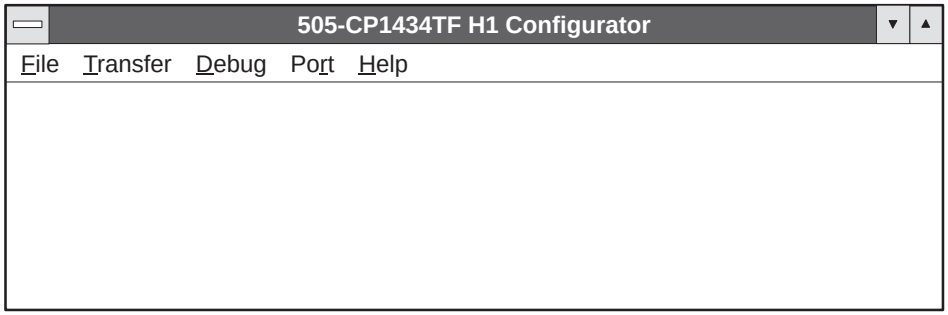


Figure 5-1 H1 Configurator Menu Bar

Selecting the File Menu Commands

Selecting **File** allows you to either create a new configuration file or to edit an existing configuration file. Click on the **File** menu. The menu shown in Figure 5-2 appears on the screen with **New** highlighted as the default.

- **New** allows you to open and build a new configuration file.
- **Open** allows you to open and edit an existing file. The configuration file actually consists of two files: FILENAME.H1 and FILENAME.LDB.
- **Save** allows you to save the file you are currently working on to disk. After saving, the file remains open so you can continue working on it.
- **Save As** allows you to type a new filename, save all your data entries and leave it open so you can continue to work on it. It also allows you to rename an open file. The previous file is closed and any unsaved changes made to it are saved in the new file, not the old file.
- **Print Report** allows you to print the currently loaded configuration file, to the selected printer, formatted as shown in Figure 5-23.
- **Report to File** allows you to save the current configuration file, in the ASCII format shown in Figure 5-23 (without headers and footers), to a file that you name or to a default filename.
- **Printer Setup** allows you to select a specific or default printer.
- **Option Setup** lets you define headers and footers for the printed report. Headers and footers are not included in the **Report to File** function.
- **Exit** closes the configuration file you are working on and exits the H1 Configurator, returning to the Windows environment. A pop-up menu appears before exiting, allowing you to save or to discard any changes you have made to the file.

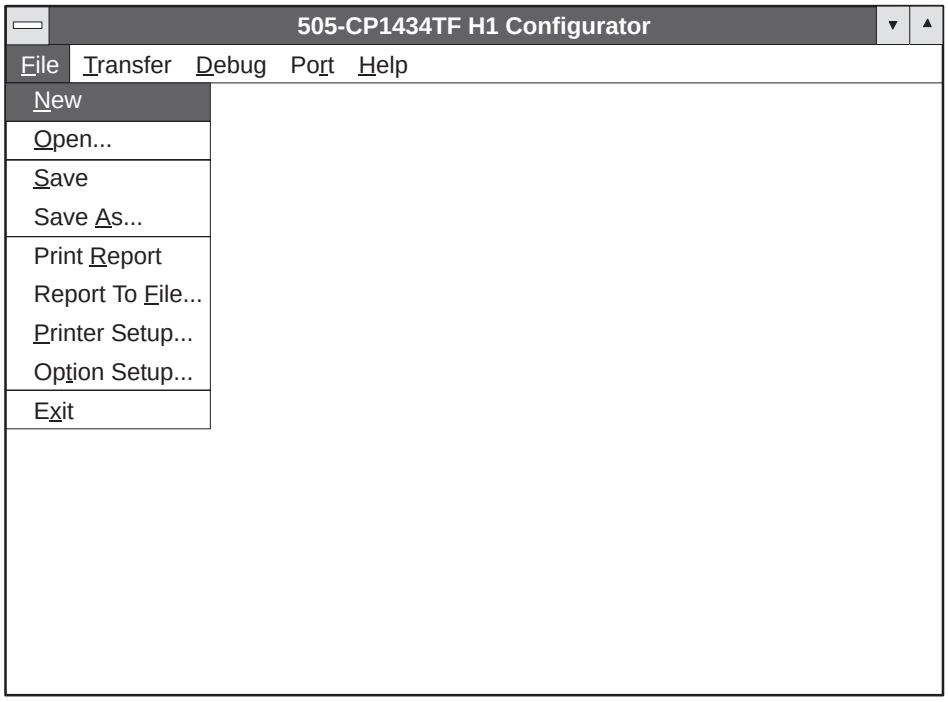


Figure 5-2 File Menu Commands

5.2 Creating a New Configuration File

Main Configuration Screen

When you select **New** on the **File** menu, the screen shown in Figure 5-3 appears. This is the main configuration screen where you begin to create or to edit configuration files. You must first assign an Ethernet address that is unique for the local station. This screen gives you access to TF Services, Peer Services, and TF Variables as described below.

- **Local Ethernet Address** — consists of 12 hexadecimal digits; you must specify a unique address for each node on the H1 network.
- **Time Information** — allows you to specify the interval to update the controller clock.
- **TF Services** — is a list box that allows you to create or edit TF (Technology Function) associations; a maximum of 31 associations can be defined. With the use of custom profiles, more than 31 associations can be entered although the overall resource allocation is reduced.
- **Peer Services** — is a list box that allows you to create or edit peer-to-peer connections; a maximum of 40 connections can be defined.
- **TF Variables*** — is a list box that allows you to define and name data element variables as specified in the Data Element List in Appendix NO TAG.

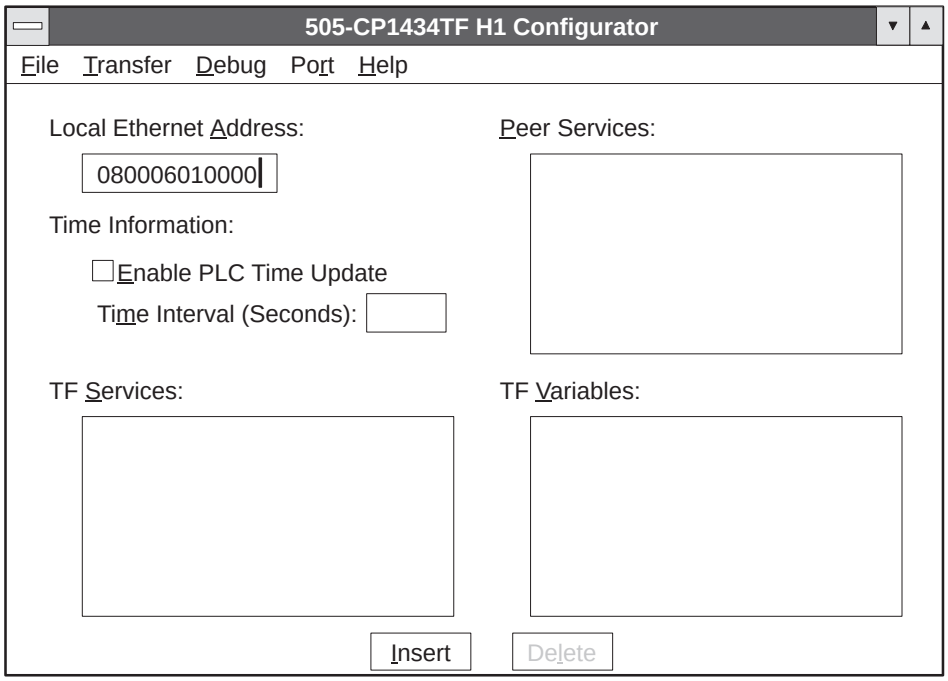


Figure 5-3 Main Configuration Screen

*The TF Variables allowed by the Configurator are, to be more precise, VMD-specific variables. Other types of TF variables are not supported by the Configurator.

NOTE: Pressing Esc is the same as selecting **Cancel,** which closes the TF Services, Peer Services, or TF Variables window you are working in and discards any changes you have made to the file. A pop-up warning appears allowing you to **Cancel** the Esc function or to proceed with it. See Figure 5-4.

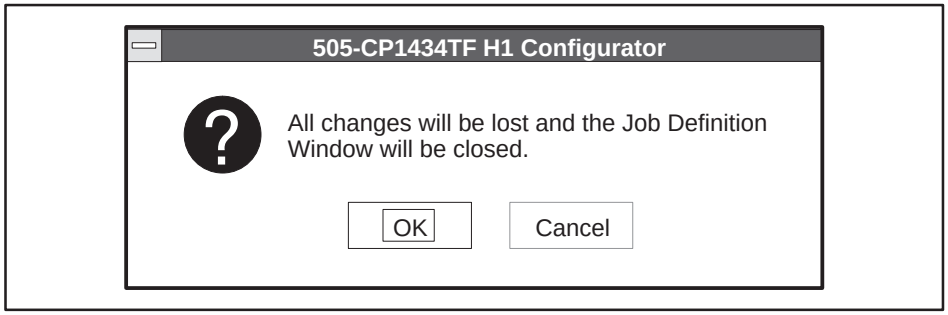


Figure 5-4 Esc Warning Message

Setting the Local Ethernet Address

The first field on the main configuration screen contains a default Local Ethernet Address: 080006010000. The Ethernet address is composed of the four elements as shown in Figure 5-5.

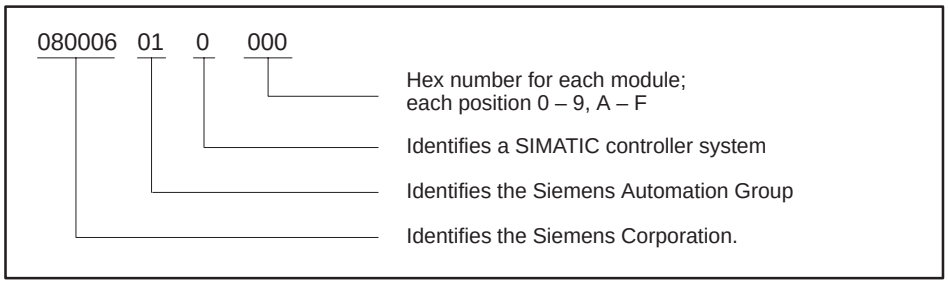


Figure 5-5 Local Ethernet Address Format

The following constraints apply to the Local Ethernet Address: it must contain exactly 12 hexadecimal digits; it cannot be equal to any Remote Ethernet Address; the address cannot be all zeros (i.e., 000000000000 is an invalid address).

To enter edit mode, click on the address field to the right of the numbers. Press Backspace to delete as many characters as you need, then type the number you want to assign as the local address. You may only need to change the right-most three or four digits.

Specifying Time Information

Time Information, to update the controller clock, can be sent to the controller at intervals you specify. Time comes from a time standard connected to the H1 network which periodically broadcasts the time-of-day.

- **Enable PLC Time Update** check box enables the time update function from the CP1434TF to the controller.
- **Time Interval [Seconds]:** text box allows you to specify the interval (0 to 3600 seconds) that the CP updates the controller clock. The default is 60 seconds.

Either one of the following devices can source the time-of-day to support this service:

- The SINEC real-time transmitter PPX:66K1 921–0Ab01–0AA0.
- Any S5 CP143 configured as a Clock Master.

Controllers supporting this service include:

- TI545–1102 with release 3.0 software or later.
- Any TI555 with release 3.0 software or later.
- Any TI575 with release 3.0 software or later.

Refer to the *SIMATIC TI505 Programming Reference Manual* for a description of the STW226 for these controllers.

Moving the time-of-day data from the CP1434TF to the controller causes a minor scan extension and can cause clock jitter in the controller. The frequency at which the controller time-of-day clock is updated can be adjusted by selecting the desired time interval (up to once an hour).

NOTE: If a time-of-day source is not installed on the H1 Network, or the time-of-day source goes off line, the CP1434TF continues to send the time-of-day data to the controller along with the status and validity of the time-of-day data.

List Box Operations

You can move between list boxes in one of two ways: by clicking on the box, or by pressing Alt and an Underlined letter. Two operations, insert and delete, can be performed on each of the three list boxes. The **Insert** and **Delete** command buttons, at the bottom of the screen, are described below.

To select a list box entry for viewing or for editing, either double click on the entry, or press Return or press Enter.

- **Insert** brings up another dialog box in which you enter the data required to create a new service or variable. If using a keyboard, press Insert or Alt I to insert a service or variable.
- **Delete** can be used to delete any existing service or variable in the list box you have selected by highlighting. An **"Are You Sure?"** message prompts you to confirm or to cancel the delete operation. If using a keyboard, press Delete or Alt L to delete the service or variable.

Defining a TF Service

To define a TF Service, click on the TF Services list box and click on the **Insert** button at the bottom of the Main Configuration screen. Figure 5-6 shows the TF Service dialog box that appears. You can create up to 31 TF Service associations.

NOTE: All TF associations are of the static, passive type.

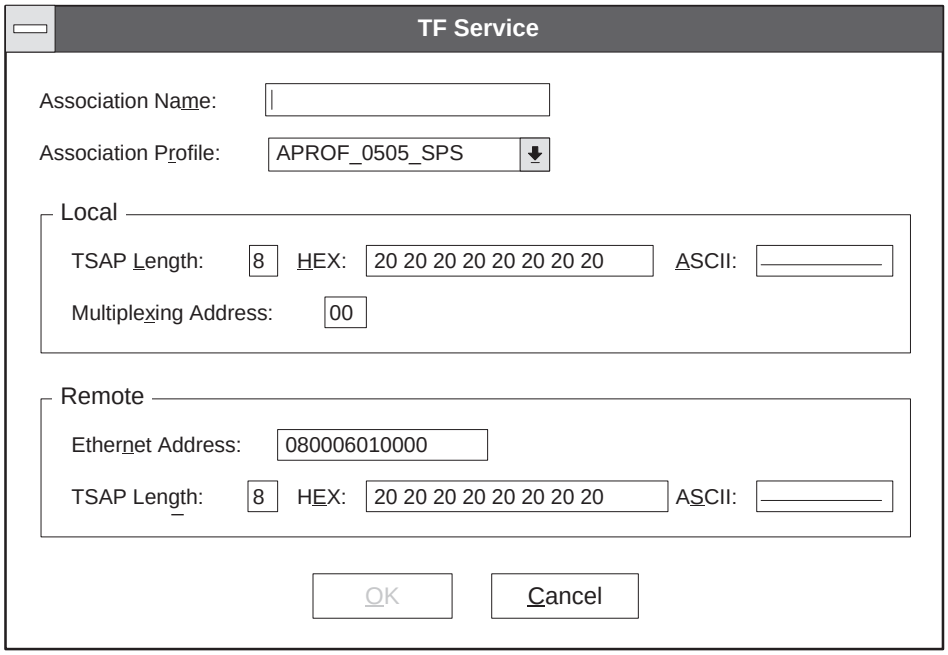


Figure 5-6 TF Service Dialog Box

Editing Data Fields in the TF Service Dialog Box

When the TF Service dialog box opens, the data-entry (or editing) cursor appears as a blinking vertical line in the **Association Name** field. You can type a name in this field immediately; you do not have to click on or select the field.

After typing the association name, click on the field you want to edit. For data fields containing default values, position the cursor to the right of the characters you want to change, then press Backspace to delete as many characters as you need to change.

If you press Backspace while data is highlighted, the whole field is erased. To avoid erasing all the characters, move the mouse cursor to that field and click the left button to activate the editing cursor. The field reverts to normal video and Backspace deletes one character at a time.

The data fields in the TF Service dialog box are described as follows:

- **Association Name:** A unique name, up to 16 case-sensitive characters long, that you assign to reference this association throughout the software. The field is tied to the **OK** button; that is, the field must contain at least one character before the **OK** button becomes active.

  The association name is tied to the local and remote Ethernet addresses and TSAPs and uniquely defines a layer 7 connection.

- **Association Profile:** This drop-down list box displays one of the pre-defined association profiles. When you click on the field, a menu lists the profiles available. Use either the mouse cursor or ↓ ↑ to select a profile different from the default. Refer to Appendix A for more information on the contents of these profiles.

- **TSAP Length:** (local and remote): This field specifies the maximum number of characters allowable in the HEX and ASCII fields for each TSAP (Transport Service Access Point). The default is 8, but you can enter any value from 1 to 8. For connections to non-SIMATIC nodes you may have to specify shorter lengths.

- **HEX:** representation of TSAP (local and remote): This field contains two-digit hexadecimal numbers separated by spaces. The number of hex pairs in this field corresponds to the value specified in the TSAP Length field. The character pairs in this field represent the hex equivalent of the characters entered in the ASCII field. Any value from 0x00 to 0xFF may be entered in the HEX field. Initially, unused character pairs show their actual values of 20 (blank) in this field. After you edit the ASCII field, unused characters are represented by 5F (underbars).

NOTE: The Peer Service TSAP editor conforms to the rules used by the S5 COM143 Local Link editor. Refer to Section NO TAG for additional information.

- **ASCII:** representation of TSAP (local and remote): The number of characters allowed in this field corresponds to the value in the TSAP Length field, up to the maximum of 8. After you type any printable character(s) in this field and exit to another field, the characters in the HEX field are automatically updated to reflect the representation of the ASCII characters. Unused characters (when TSAP length is greater than characters entered) are filled with 5Fs in the HEX field. Unprintable characters entered in the HEX field are represented by underbars in the ASCII field.

  TSAPs must be unique in the node. Both local and remote TSAPs may have the same name, as long as the name is unique to the node.

- **Multiplexing Address:** The multiplexing address field contains a hexadecimal number from 00 to FF. If two TF Services have the same Local TSAP, Remote TSAP, and Remote Ethernet Address, then the multiplex addresses of those two services must be both different and non-zero for the two services to be multiplexed. The default for this field is 00. This feature allows two or more TF Services to share TSAPs and the associated buffer resources.

- **Remote Ethernet Address:** — The remote Ethernet address consists of 12 hexadecimal digits. This field lets you specify the address of the station with which you want to establish an association. It cannot be the same as the local Ethernet address and must be unique on the entire network. Refer to Figure 5-5 for the Ethernet address format.

When all fields have been defined as required for the association, click on the **OK** button at the bottom of the window. If any values are invalid, an error message appears to inform you of the type of error found. Click on the **OK** button in the message window, correct the error, and try the **OK** button again. When all data entries are valid, you return to the main configuration screen with the Association name now in the TF Services list box.

Defining a Peer Service

To define a Peer Service, click on the Peer Services list box and then click on the **Insert** button at the bottom of the Main Configuration screen. You can create up to 40 Peer Service connections. Figure 5-7 shows the dialog box that appears.

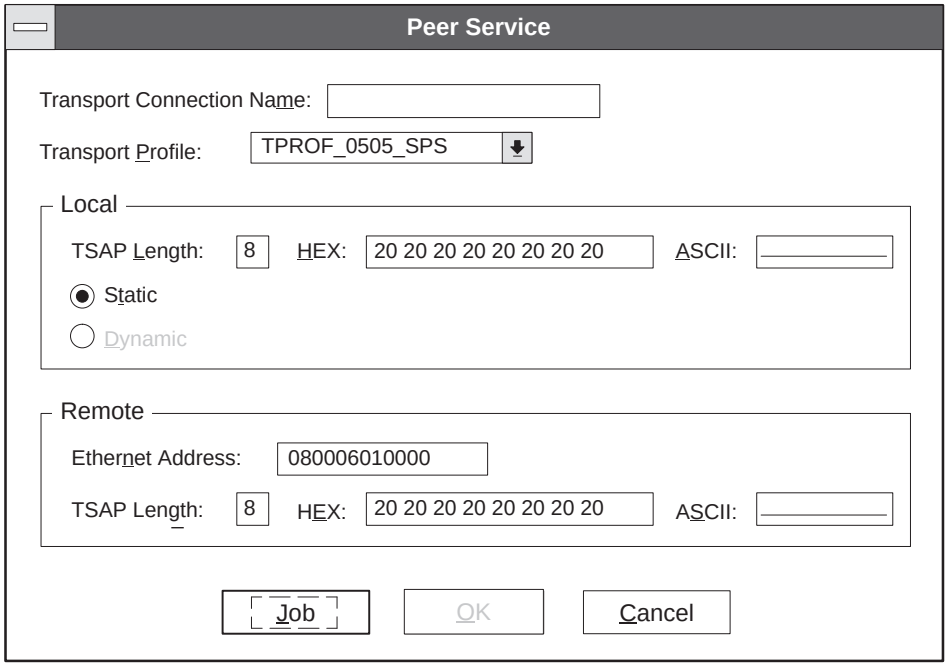


Figure 5-7 Peer Services Dialog Box

Editing Data Fields in the Peer Services Dialog Box

When the Peer Service dialog box opens, the data-entry (or editing) cursor appears as a blinking vertical line in the **Transport Connection Name** field. You can begin typing a name in this field immediately; you do not have to select the field.

After typing the connection name, click on the field you want to edit. For data fields containing default values, position the cursor to the right of the characters you want to change, then press **Backspace** to delete as many characters as you need to change.

Alternatively, you can press **Tab** to move from one field to the next, including the **OK** and **Cancel** buttons at the bottom at the dialog box. When you use **Tab**, the fields containing default data become highlighted (reverse video). If you press **Backspace** while data is highlighted, the whole field is erased. To avoid erasing all the characters, move the mouse cursor to that field and click the left button to activate the editing cursor. The field reverts to normal video and **Backspace** functions as usual, one character at a time.

The data fields in the Peer Service dialog box are described as follows:

- **Transport Connection Name:** This is a unique name, of up to 16 case-sensitive characters, that identifies this connection throughout the software. This is only used by the configurator.
- **Transport Profile:** This drop-down list box displays one of seven pre-defined transport profiles. If you click on the field, a menu lists the profiles available. Use either the mouse cursor or ↓ ↑ to select a profile different from the default. Refer to Appendix A for more information on the contents of these profiles.
- **TSAP Length:** (local and remote): This field specifies the maximum number of characters allowable in the HEX and ASCII fields for each TSAP (Transport Service Access Point). The default is 8, but you can enter any value from 1 to 8. For connections to non-SIMATIC nodes it may be necessary to specify shorter lengths.
- **HEX:** representation of TSAP (local and remote): This field contains two-digit hexadecimal numbers separated by spaces. The number of hex pairs in this field corresponds to the value specified in the TSAP Length field. The character pairs in this field represent the hex equivalent of the characters entered in the ASCII field. Any value from 0x00 to 0xFF may be entered in the HEX field. Note that initially, unused character pairs show their actual values of 20 (blank) in this field. After you edit the ASCII field, unused characters are represented by 5F (underbars).

NOTE: The Peer Service TSAP editor conforms to the rules used by the S5 COM143 Local Link editor. Refer to Section NO TAG for additional information.

- **ASCII:** representation of TSAP (local and remote): The number of characters allowed in this field corresponds to the value in the TSAP Length field, up to the maximum of 8. After you type any printable character in this field and exit to another field, the characters in the HEX field are automatically updated to reflect the representation of the ASCII characters. Unused characters (when TSAP length is greater than characters entered) are filled with 5Fs in the HEX field. Unprintable or invisible characters are represented by underbars in the ASCII field.

- **Static/Dynamic:** This pair of option buttons allows you to specify either a Static or Dynamic transport connection. The default choice, Static, keeps communication lines open all the time, making data transfer generally more efficient. With a Dynamic connection, the lines are opened only on demand. This is less efficient, but allows more connections to be created by overcoming possible memory constraints. Refer also to Chapter 4 for more information of Static/Dynamic connections.

NOTE: The Dynamic option is valid for Send/Receive connections only.

- **Remote Ethernet Address** — The remote Ethernet address consists of 12 hexadecimal digits. This field allows you to specify the address of the station with which you want to establish a connection. It cannot be the same as the local Ethernet address. Refer to Figure 5-5 for the Ethernet address format.

NOTE: The **OK** button in this dialog box becomes active only after you have completed the **Job Definition**. To complete the definition of a Peer service connection, you must access the **Job Definition** dialog box and fill in the required data fields, as described in the following section.

Defining the Peer Service Job Definition

At the bottom of the Peer Service dialog box is a push button labeled **Job**. You must define a peer job for each transport connection. Click on the **Job** push button (or press Return) to bring up the **Job Definition** dialog box shown in Figure 5-8.

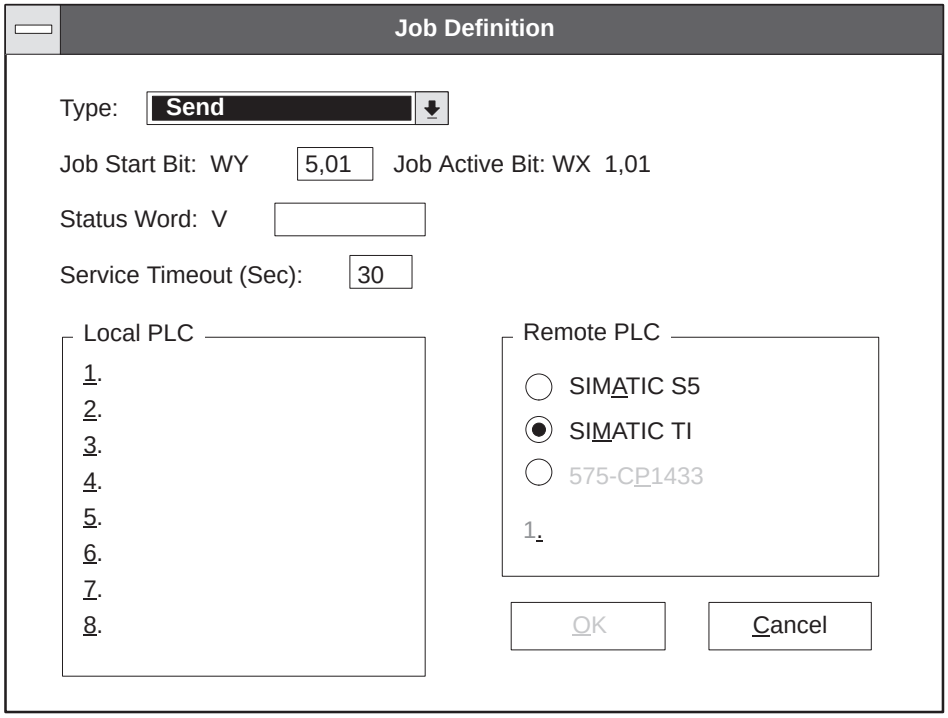


Figure 5-8 Job Definition Dialog Box

The data fields in the Job Definition dialog box are described below.

- **Type:** Six types of jobs (see also Chapter 4) are available in this list box as follows:

Send	Write Active	Read Active
Receive	Write Passive	Read Passive

  Place the mouse cursor on the **Type** box and then press and hold the mouse button to open the **Type** list box. Slide the cursor down the menu until your selection is highlighted. Select this choice by releasing the button. You can also use ↓ or ↑.

Depending on the job **Type** you select, the remaining fields in the dialog box may or may not be applicable. When data fields are not required for the job **Type** you have selected, they appear dimmed and are disabled. You must select a job **Type** before entering data in this screen; if you enter data, then change the job **Type**, similar job types default to the previously entered data. All fields revert to their default values when you select the **Job Definition** window.

NOTE: In the DOS version, disabled fields are not dimmed; however, they do not respond to input. Press Tab to move to the next available active field.

- **Job Start Bit:** The Job Start Bit is used in your ladder logic program to trigger the peer job. The Job Start Bit consists of a WY word number in the range of 5 to 7 (relative) and a bit location in the range of 1 to 16. The values in this field must be unique for each Job. If the Job Start Bit values are valid, the Job Active Bit field is updated automatically.

- **Status Word:** The Status Word is a V-memory location used to store a value that represents the status of the completed peer job. You must specify a Status Word for Send, Receive, and Read/Write Active jobs.

- **Service Timeout (Sec):** In this field, you can specify a time-out value within the range of 0 to 655 seconds. This value indicates how long the active job waits for a transfer to complete before it aborts the transfer and sets the WX bit to zero. A value of 0 disables the time-out.

- **Local PLC:** For certain peer service jobs, one or more local SIMATIC TI505 controller memory blocks must be specified. Memory blocks represent the locations of either incoming or outgoing data, depending on the job type, as listed in Table 5-1.

  Each memory block is defined by a mnemonic, the starting address, and the number of locations. For example, V 100, 10 represents data in variable (V) memory starting at address 100, and is 10 words long.

Table 5-1 Local Memory Locations

Job Type	Local PLC Memory Locations
Send, Write Active	Source address of data to be sent
Receive, Read Active	Destination address of data received

- **Remote PLC:** Use the option buttons in this field to select the type of controller at the remote station. For Read or Write Active jobs, one remote controller memory block must be specified. Depending on the job type, the memory block represents the following direction of data transfer as listed in Table 5-2.

  The memory block is defined by a mnemonic, the starting address, and the number of locations. For example, V 100, 10 represents data in variable (V) memory starting at address 100, and is 10 words long. (Refer to NO TAG for SIMATIC S5 memory block types.)

Table 5-2 Remote Memory Locations

Job Type	Remote PLC Memory Locations
Write Active	Destination address for data being sent
Read Active	Source address of data to be read

When all fields have been defined as required for the connection, click on the **OK** button at the bottom of the window. If any values are invalid, an error message appears to inform you of the type of error found. Click on the **OK** button in the message window, correct the error, and try the **OK** button again. When all data entries are valid, you return to the Peer Service dialog box. Click on the **OK** button to return to the main configuration screen.

Defining a TF Variable

At the main configuration screen, shown in Figure 5-3, you can select the **TF Variables** dialog box to define Variables used with TF Service associations.

Each TF Variable that you create specifies a bundle of data that is either sent to the client or is written to the server when requested, including Name, controller Memory type, controller Address, and Data Type. You must assign a name for each variable; a meaningful name makes it easier for the user to understand its content.

The amount of data that can be transferred using the TF Read and Write Service is limited by the sizes selected by the Application Profile. If errors occur when you access large amounts of data, either reduce the size of the variable, or reduce the number of variables in a single request to correct the problem.

To define a TF Variable, click on the TF Variable list box and click on the **Insert** button at the bottom of the Main Configuration screen. Figure 5-9 shows the dialog box that appears.

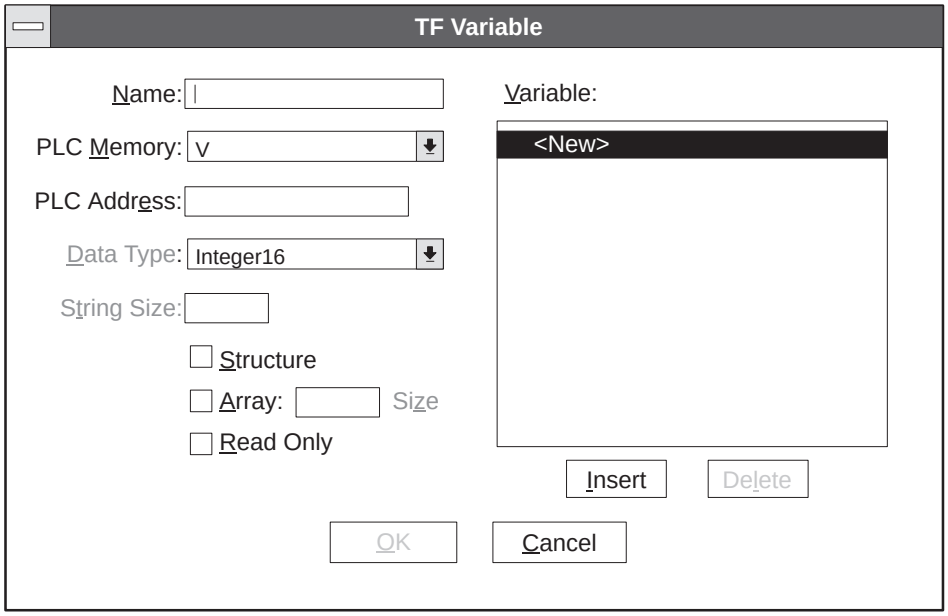


Figure 5-9 TF Variable Dialog Box

The data fields in the TF Variable dialog box are described below.

- **Name:** Type the name of the variable in this text box. You can use any of the full set of ASCII characters listed in Appendix A except ~. The editing cursor is active in the text box by default when the dialog box first opens.

- **PLC Memory:** This drop-down list box provides a list of all predefined controller memory types. Use this field to specify the TI505 controller memory type of the variable. The window is not large enough to show all of the choices. Click on ▼ to scroll though the list.

  For structures, the **PLC Memory** field is disabled (grayed) while you insert the internal structure items. To change the structure's controller Memory type, click on the structure's name to re-enable the **PLC Memory** list box so that the memory selection can be changed.

- **PLC Address:** The format requires the starting controller numeric memory address of the variable. Press Tab to access this text box, or click on it with the mouse.

NOTE: DCP memory types require a step number to be entered with the address. For example, to input DCP 10 S 8, select **Data Type:** Unsigned 16, **PLC Memory** type**:** DCP, and in the **PLC Address** field type: 10 S 8.

- **Data Type:** This drop-down list box provides a list of predefined data types. The **PLC Memory** type selection causes the **Data Type** list box to be selected automatically. For structures, the **Data Type** list box is disabled (grayed) except for internal structure elements.

  The window is not large enough to show all of the choices. Click on the ▼ to scroll through the list. The list box defaults to Integer 16.

- **String Size:** This text box allows you to specify a size for string types only. The **String Size** text box remains disabled (grayed) until you select a Visible String, Octet String, or Bit String Data Type.

- **Structure** or **Array:** After entering the variable name, press Tab to access the **Structure** or **Array** check boxes. You can select **Structure, Array**, or both by clicking on the appropriate check box(es). When **Array** is selected, you must also specify the array size in the **Size** text box. You can nest up to two levels with the following combinations:

  - An Array of Structures
  - A Structure of Arrays
  - A Structure of Structure(s)

  The structure may contain different data types. However, as you enter different data types, the **PLC Memory** type box does not change, but remains as defined at the beginning of the structure. The structure you define appears in the **Variable** field when you click on **Insert**.

NOTE: You can change the **PLC Memory** type for a structure by placing the cursor on the structure's name in the **Variable** field, and then selecting a different **PLC Memory** type.

- **Read Only:** Click on this check box to define the TF variable as read only.
- **Variable** field: This list box shows the representation of all variables as you build them in the other sections of the dialog box. When you have completed a variable, click on **Insert** to set the variable into the list box. You can click on a specific variable name to display the variable's values.

  Use the ↓ ↑ to position the highlight bar on a particular entry of a multi-item list, such as a structure. Any previously inserted item may be modified and inserted again to update the data item.

  To delete a variable, select the variable (or part of a structure type) displayed in the list box and click on the **Delete** button. To clear all data in the Variable list box, click on **<New>** in the Variable list box.

When all fields have been defined as required for the variable, click on the **OK** button at the bottom of the window. If any values are invalid, an error message appears to inform you of the type of error found. Click on the **OK** button in the message window, correct the error, and try the **OK** button again. When all data entries are valid, you return to the main configuration screen. The TF variable you defined appears in the Main Configuration Screen's TF Variable list box.

For more detailed information on TF Variable data types, addressing conventions, services supported, and requirements for building special types of variables, refer to Appendix NO TAG.

The configurator assists you in defining variables by enabling only those fields that are required, and disabling (graying) all others. After you select or type in each required field, the cursor is positioned into the next required field.

For all items contained in a structure, the **PLC Memory, PLC Address,** and **Read Only** selections are disabled (grayed) unless the highlight bar is positioned on the structure's name.

5.3 Copying Between Multiple Configurator Files

Copying Between Multiple Configuration Sessions

You can copy configurations between two CP modules without having to remember addresses, TSAPs, etc. However, you can only copy between similar type windows (e.g., from a TF Service to TF Service). If you attempt to copy between different type windows (e.g., from a TF Service to a Peer Service), an error message results. The copy function is not supported in the DOS version of the configurator.

You can copy between the following H1 CP Configurator windows:

- TF Service to TF Service
- TF Variable to TF Variable
- Peer Service to Peer Service (does not include Job Definition)
- Peer Job Definition to Peer Job Definition

Copy is useful when you want to create a new configuration file by opening a similar configuration file, opening a second instance of the configurator, copying the first file's data, making changes to it, and saving the configuration file with the copied data under a new filename. In addition, you have the convenient option of automatically switching TSAPs and Ethernet addresses between **Peer Service** windows when copying a configuration file.

Only one source application can be selected at the same time. If you select more than one source, an error message is displayed. For example, if you select the Variable window in one configurator application as source, then open a second configurator application and then select a second Variable window as source, an error message is displayed. However, multiple destinations may be selected, one after the other.

NOTE: Source refers to the data that will be duplicated. **Destination** refers to the window where the copied source data will be placed after the copy has taken place.

To copy TSAPs from one **Peer Service** window to a second **Peer Service** window and to switch the local and remote TSAPs from from one configurator to another, follow the procedure below:

1. Double click on the Configurator Icon under the Windows Program Manager.

2. After selecting **File→Open,** double click on the filename (in the file open list box) you want to copy from.

3. In the **Peer Service** list box, double click on the peer service you want to copy from.

4. In the **Peer Service** window, click the right mouse button. Click the left mouse button on the pop-up menu and then click on **Copy**. The Copy pop-up menu in Figure 5-10 appears. If you do not have a mouse, press F10 and then the space bar; the command bar Copy menu shown in Figure 5-11 appears.

   If you have a mouse, you can also click on the command bar to invoke the menu shown in Figure 5-11.

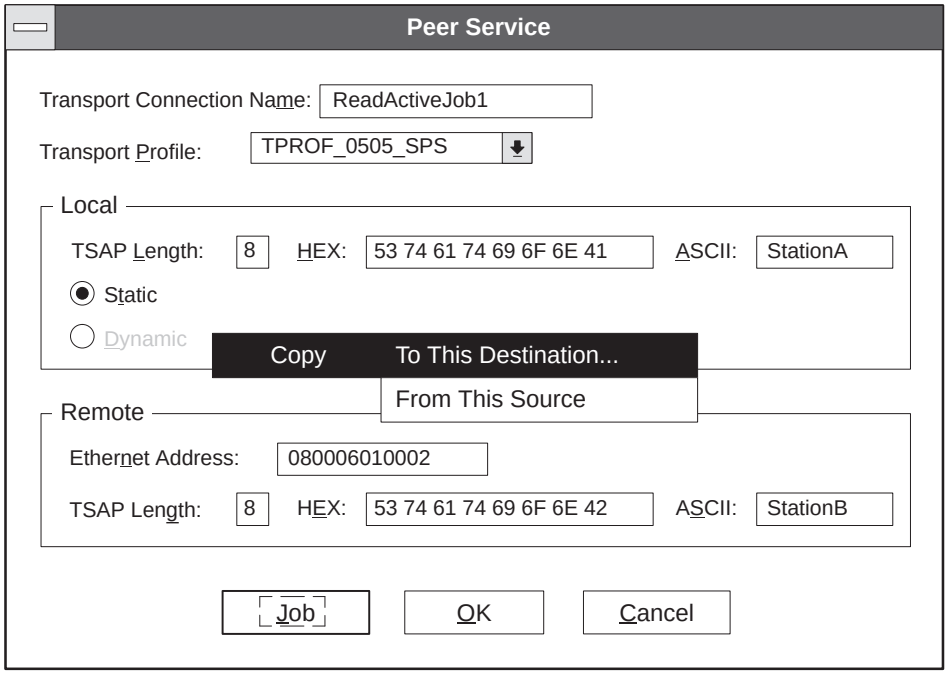


Figure 5-10 Copy Pop-Up Menu

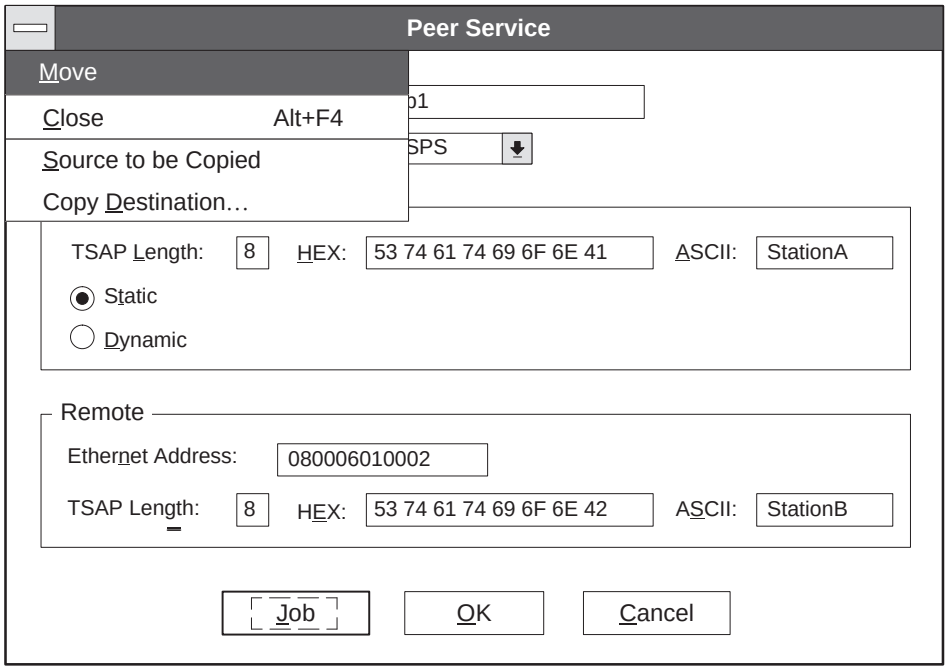


Figure 5-11 Copy Command Bar Menu

5. Click on **From This Source** or, if you do not have a mouse and are using the command bar menu, select **Source to be Copied** and press Enter.

6. Press Alt and Tab to invoke the Program Manager.

7. Double click on the H1 Configurator Icon under the Windows Program Manager to open a second instance of the H1 Configurator.

8. Select **File→Open** and double click on the filename where you want to paste the destination data, or, select **File→New**. The destination filename appears in the Title bar.

9. Create a new Peer Service by clicking on the **Peer Service** list box and then clicking on **Insert**, or by pressing Insert.

10. In the **Peer Service** window, click the **right** mouse button. Click the left mouse button on the pop-up menu and then click on **Copy**. The Copy pop-up menu in Figure 5-10 appears. If you do not have a mouse, press F10 and then the space bar; the command bar Copy menu shown in Figure 5-11 appears.

    If you have a mouse, you can also click on the command bar to invoke the menu shown in Figure 5-11.

11. Click on **To This Destination**. If you do not have a mouse and are using the command bar menu, select **Copy Destination**.

12. A dialog box (See Figure 5-12) appears. The **Switch TSAP fields** check box is selected by default. Click on the check box (or press the space bar) to turn it off if you do not want to switch the source's TSAPs and Ethernet address. Click on **OK** or press Enter.

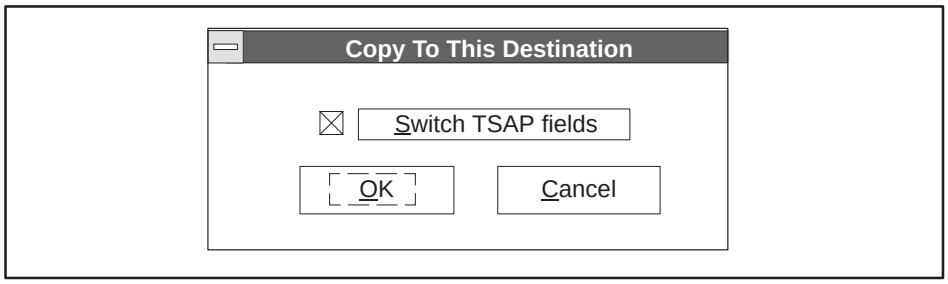


Figure 5-12 Copy To This Destination Dialog Box

The source data is now in the destination **Peer Service** window with the remote and local TSAPs of the source data switched. The local Ethernet address of the source data was copied as the destination's Remote Ethernet Address. See Figure 5-13.

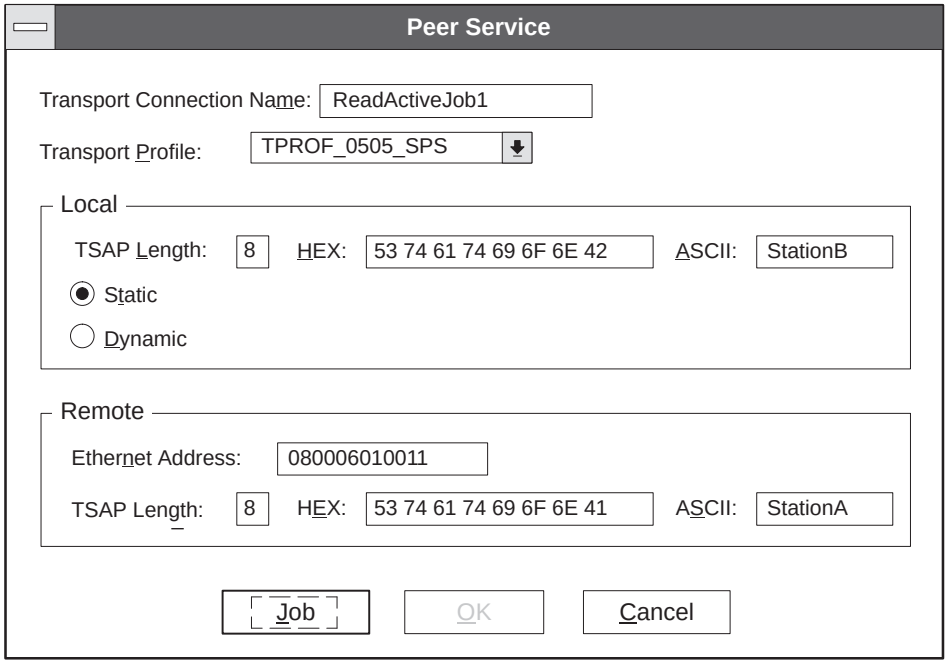


Figure 5-13 Destination Peer Service Window

Before you can save the destination Peer Service in a file, you must create a job definition by performing another copy of a Job Definition between the source and this destination. Or, you can manually create a Job Definition. To create a job definition by copying, perform the following steps:

1. Click on **JOB** in the destination's **Peer Service** window. The **Job Definition** dialog box appears. See Figure 5-14.

2. Press Alt and Tab until you return to the first instance of the H1 configurator.

3. Click on **JOB** in the source **Peer Service** window.

4. In the source **Job Definition** window, click the **right** mouse button. Click the left mouse button on the pop-up menu and then click on **Copy**. The Copy pop-up menu in Figure 5-10 appears. If you do not have a mouse, press F10 and then the space bar; the command bar Copy menu shown in Figure 5-11 appears.

   If you have a mouse, you can also click on the command bar to invoke the menu shown in Figure 5-11.

5. Click on **From This Source** or, if you do not have a mouse and are using the command bar menu, click on **Source to be Copied**.

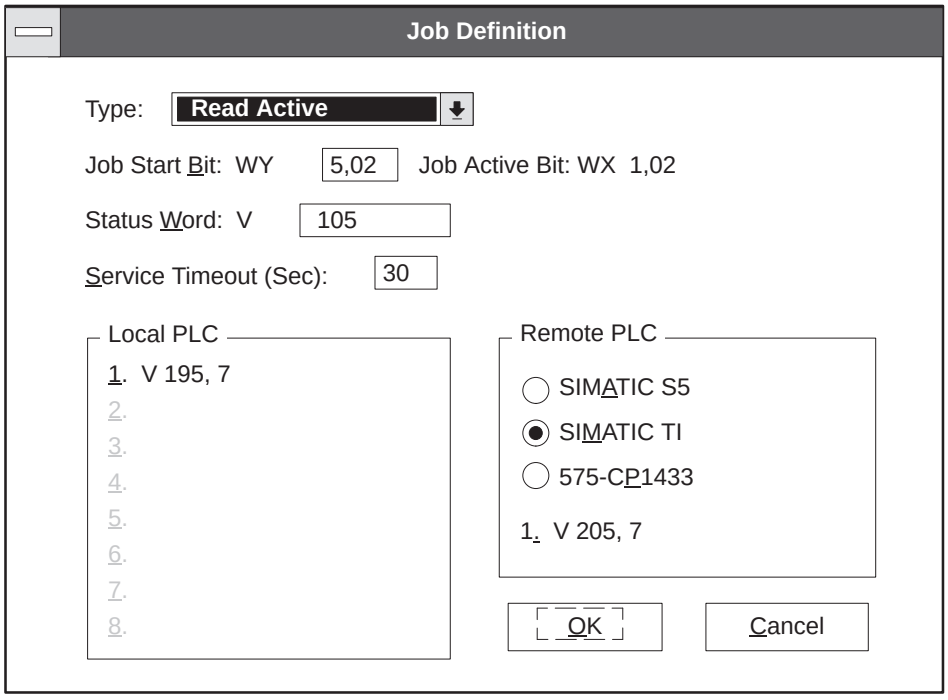


Figure 5-14 Job Definition Dialog Box

6. Press Alt and Tab until you return to the second instance of the H1 Configurator.

7. In the destination **Job Definition** window, click the **right** mouse button. Click the left mouse button on the pop-up menu and then click on **Copy**. The Copy pop-up menu in Figure 5-10 appears. If you do not have a mouse, press F10 and then the space bar; the command bar Copy menu shown in Figure 5-11 appears.

   If you have a mouse, you can also click on the command bar to invoke the menu shown in Figure 5-11.

8. Click on **To This Destination**. If you do not have a mouse and are using the command bar menu, click on **Copy Destination**.

9. The **Copy To This Destination** dialog box (See Figure 5-12) appears without the switch TSAPs check box. Click on **OK** or press Enter to complete the transfer. The source data is now in the destination **Job Definition** window. See Figure 5-13.

Perform the steps below to exit the operation:

1. Click on **OK** to exit the destination **Job Definition** window.

NOTE: You may need to change the start bit, if it is already in use, before you can save the Job Definition.

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2. Click on **OK** to exit the destination **Peer Service** window. The Peer Service name appears in the **Peer Service** list box.

3. To save your new configuration file click on **File→Save**.

4. Exit the second H1CP Configurator by selecting **File→Exit**.

5. Press Alt and Tab to return to the first instance of the H1 CP Configurator.

6. Exit the first H1CP Configurator by selecting **Cancel, Cancel, File→Exit**.

5.4 Saving the Configuration File

Selecting Save Commands

Use **Save** or **Save As** to save your configuration file to disk. At the main configuration screen, click on the **File** option on the menu bar and click on **Save** or **Save As**, as shown in Figure 5-15. The Save commands are described below.

- **Save** writes the configuration to a disk file and overwrites an existing disk file of the same name. In other words, it saves the changes that you have made to the file you are currently editing, and leaves the file open so that you can continue editing. If you execute **Save** while working in a file that has not been named, then a dialog box appears with a default filename.

- **Save As** allows you to name the new file you created; it also allows you to rename an existing file, saving it to a different location on disk. The new file remains open so that you can continue working on it, while the original file remains unchanged. When you select **Save As**, the dialog box shown in Figure 5-16 appears.

NOTE: If you open a new configuration file, then transfer it to the H1 CP module without assigning it a name, the software gives it the default name **noname.h1** for Transfer and Debug purposes only. However, the file is not saved unless you select either the **Save** or **Save As** command.

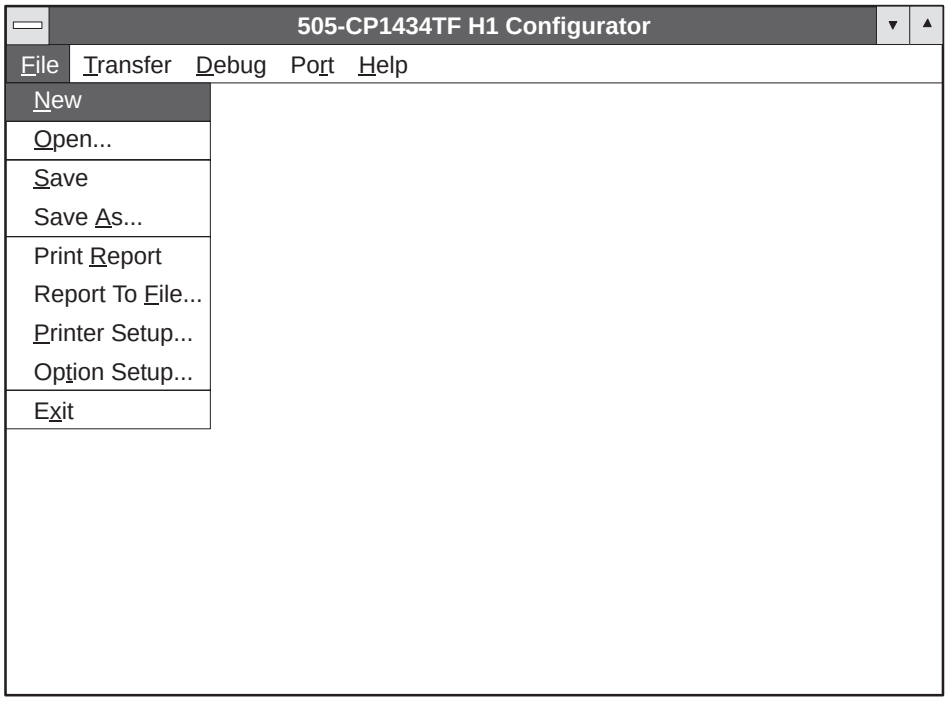


Figure 5-15 File Menu Commands

Using the Save Command

If you want to save an existing file (already named), select **Save** from the pull-down menu shown in Figure 5-15. This saves any changes you have made in the file you are currently working in and leaves the file open.

Using the Save As Dialog Box

To save your new configuration file to a new filename, use **Save As** and follow these steps. See Figure 5-16.

1. Verify that the directory shown on the screen is correct. This directory is where the file will be saved.
2. In the **File Name** text box, type the name of the file, using standard DOS file naming conventions (up to eight alphanumeric characters plus up to three characters for the dot extension).
3. Click on **OK**. The software saves the configuration file and takes you back to the main configuration screen. The new file name now appears in the top bar.

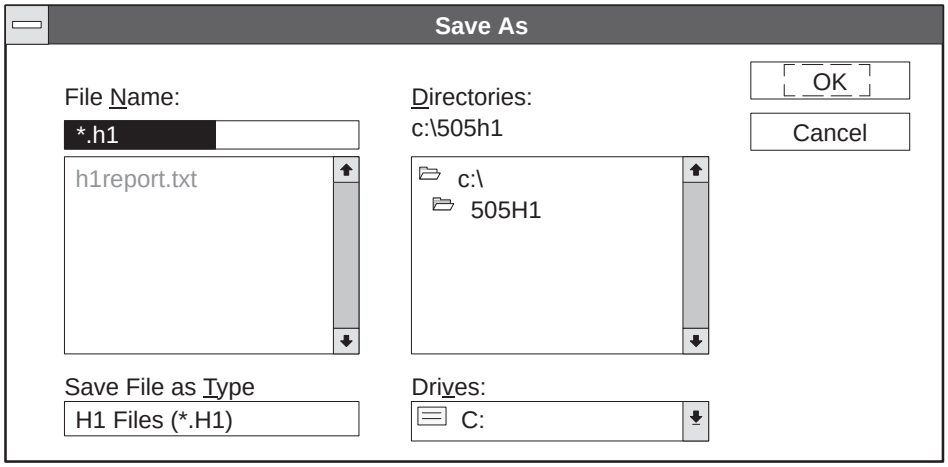


Figure 5-16 Save As Dialog Box

5.5 Printing a Configuration Report

Selecting Printer Functions

Menu items for printer functions remain disabled until you select **File→New** or **File→Open**. Click on **File** on the menu bar and slide the cursor down to select one of the following four print functions. You can also select a print function by pressing the Underlined letter of the function.

- **Print Report** allows you to print the currently loaded configuration file to the selected printer, formatted as shown in Figure 5-23. A dialog box is displayed for the **Print Report** function.

NOTE: You can change the format of a report by using **Report to File** to save the report to an ASCII file and then by using a word processor to edit it.

- **Report to File** allows you to save the current configuration file, in the format shown in Figure 5-23, either to an ASCII filename that you type or to the default filename.

  Selecting **Report to File** displays the **Save As** dialog box (see Figure 5-17) that allows you to either type in a filename or accept the default filename (**`h1report.txt`**) for the report. If you type in a filename without an extension, .txt is automatically appended to the filename. If you type in a filename ending in a dot or having an extension, the filename remains as typed. When the file is saved, a Pop-up box displays the message "Completed Report in file <path\filename>".

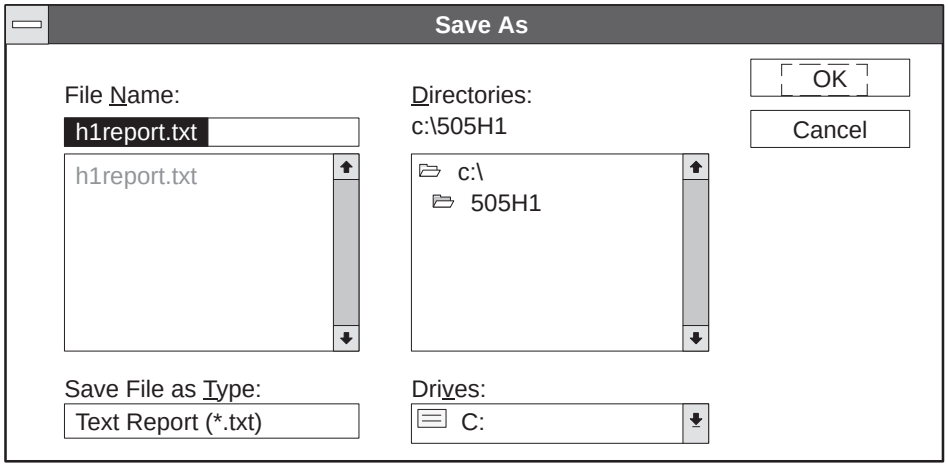


Figure 5-17 Report to File Dialog Box

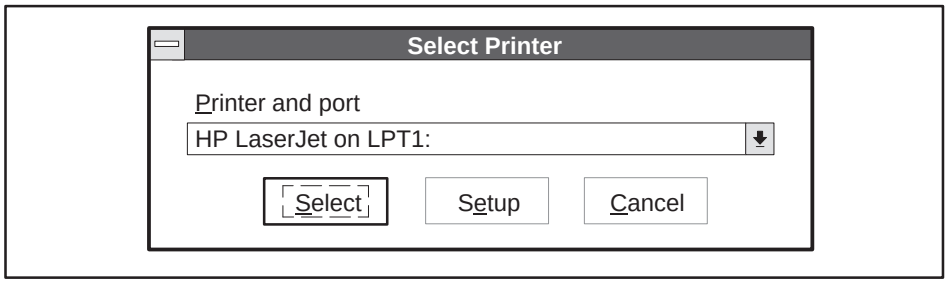


Figure 5-18 Select Printer Dialog Box

- **Printer Setup** when selected, invokes the **Select Printer** dialog box that allows you to **Select** either the default printer or a specific printer from the drop-down list box. See Figure 5-18.

  Clicking on **Setup** invokes a typical print setup box as shown in Figure 5-19. Each printer has a unique print setup dialog box with its name in the title bar. This dialog box allows you to choose other options such as: Resolution, Paper Size, Paper Source, Portrait or Landscape orientation. See Figure 5-19.

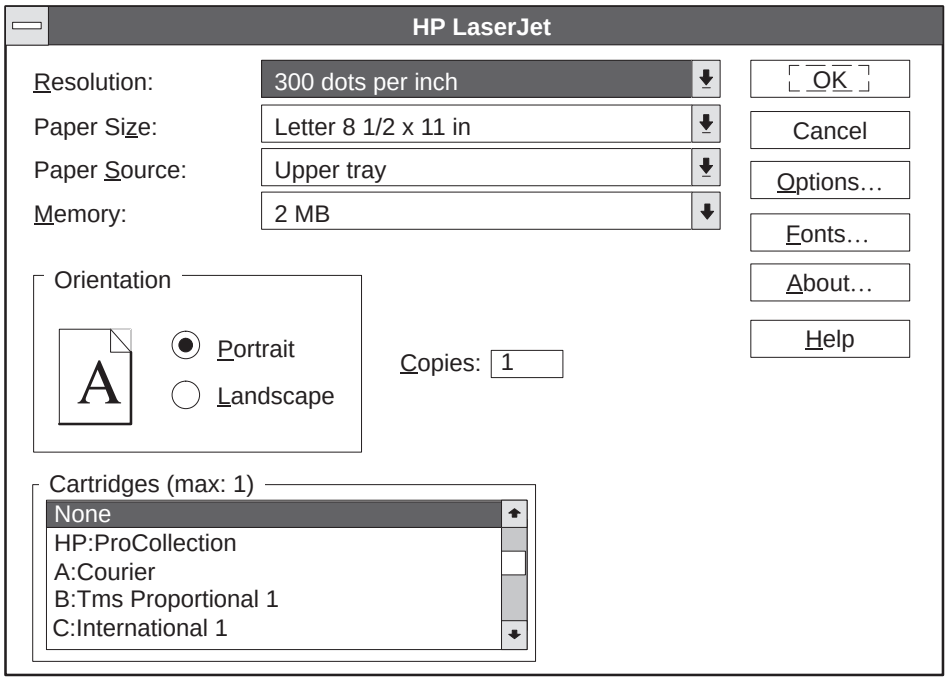


Figure 5-19 Typical Print Setup Dialog Box

Selecting the **Options** button in the print setup dialog box invokes an **Options** dialog box that allows you to adjust both print Intensity and Dithering. See Figure 5-20. The options dialog box are specific to each printer.

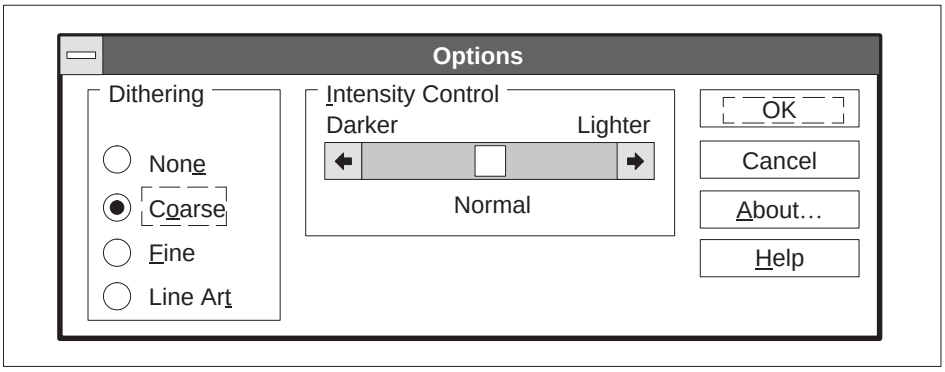


Figure 5-20 Typical Options Dialog Box

- **Option Setup** (selected from the **File** menu) displays a dialog box (see Figure 5-21) that allows you to define the format and the content of headers and footers in the printout. The default header (and footer) is shown Figure 5-23. Headers and footers are only included in hardcopy output; **Report to File** does not include headers or footers.

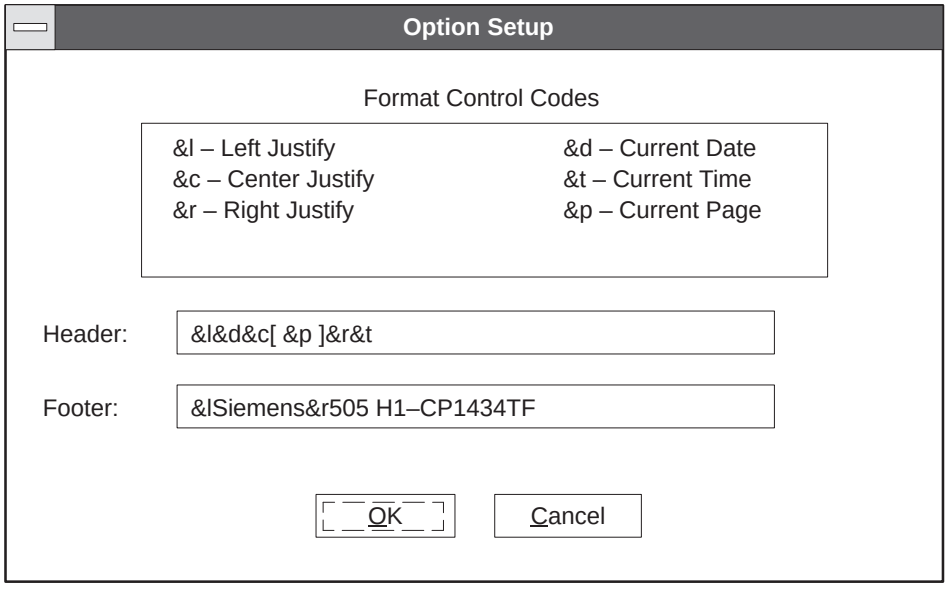


Figure 5-21 Option Setup Dialog Box

NOTE: In the DOS version, headers and footers are not included in output.

NOTE: In a report output (printer or file), the TF Variable field “PLC Bytes” reflects the number of total successive bits divided by 8 and rounded up. For example, a 9-bit string occupies 2 bytes.

Using the Exit Command

You can also save a file (already named) by selecting **Exit** from the **File** pull-down menu shown in Figure 5-15. Selecting **Exit** invokes a pop-up message box that lets you either save or lose your changes. See Figure 5-22. Selecting either **Yes** or **No** closes the file and returns you to Windows. If you did not change the file, then **Exit** simply exits.

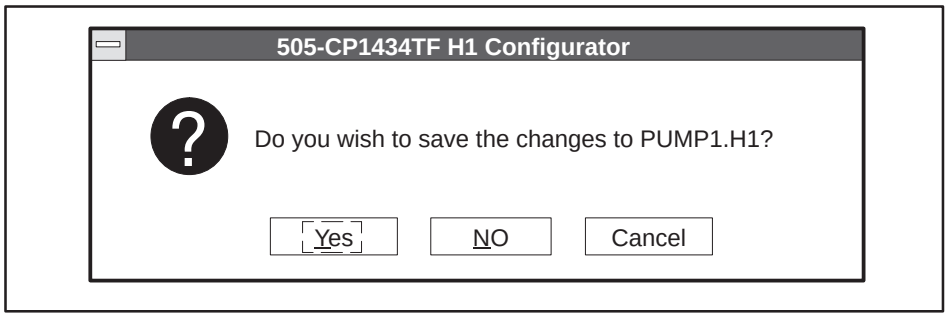


Figure 5-22 Save Pop-up Message Box

```
05-10-1994                    [ 1 ]                          16:25


           H1 505-CP1434TF FILENAME: D:\ALPHA1\ONEOFEA.H1
             LOCAL ETHERNET ADDRESS: 080006011234
               TIME SYNCHRONIZATION: 1000

************************** TF SERVICES ************************

 Association Configuration:
           Name: TFserviceOne
        Profile: APROF_1010_MDT
 Remote Ethernet: 080006010011
     Remote TSAP: tf1-rem_    (74 66 31 2D 72 65 6D 00 Hex)
      Local TSAP: tf1-loc_    (74 66 31 2D 6C 6F 63 00 Hex)
 Multiplex Addr.: 00

************************** TF VARIABLES ***********************
                          PLC     PLC          PLC        Read
Variable Name  DataType   Bytes   Memory       Address    Only
-------------- --------- ------  -----------  --------- --------

VariableOne    Integer16    2     K            96         No

************************** PEER SERVICES **********************
Connection Configuration:        JobDefinition:  Local Variables:
           Name: PeerOne          Send             1.V 10, 50
        Profile: TPROF_0505_MDT   Enable Bit:5,01  2.
 Remote Ethernet: 080006010555    Active Bit:1,01  3.
      Local TSAP: p1-loc_         Status Word:50   4.
     Remote TSAP: p1-rem_         Timeout(sec.):30 5.
      Remote PLC: SIMATIC S5                       6.
Local Connection: STATIC          Remote Variable: 7.
                                   1. V 205,7      8.
      Local TSAP: 70 31 2D 6C 6F 63 00 00 (Hex)
     Remote TSAP: 70 31 2D 72 65 6D 00 00 (Hex)

************************** END OF REPORT **********************


Siemens                                          505 H1-CP1434TF
```

Figure 5-23 Typical Report Format

5.6 Transferring the Configuration File

Selecting Transfer Commands

The **Transfer** menu allows you to select a command to download a configuration file to flash memory in an H1 CP, or to upload a configuration file from an H1 CP.

NOTE: Configuring H1 CPs over the network is not supported in the DOS version of the configurator.

Downloads and uploads may be accomplished by using either a serial port or a network node that you selected at the **Port** pull-down menu. Serial port is the default communication mode and is stored in a Windows .ini file that remembers your last mode and port selection when you next start up the H1 CP configurator.

At the Menu bar, click on **Transfer**. You can also press Alt T (as indicated by the underlined letter) to select **Transfer**. Figure 5-24 shows the **Transfer** pull down menu that appears.

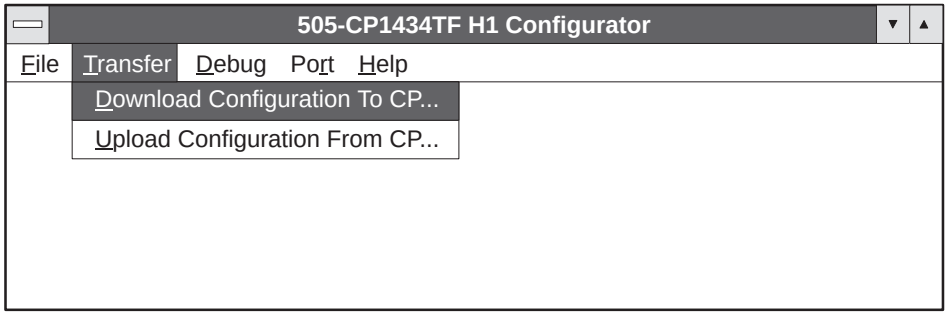


Figure 5-24 Transfer Pull Down Menu

Downloading the Configuration File

When you complete the configuration file, you can transfer it to the flash memory in the H1 CP module. The **Download Configuration File to CP** function remains disabled until you select **File→New** or **File→Open**.

At the **Transfer** menu, click on **Download Configuration File to CP**. Figure 5-25 shows the dialog box that appears.

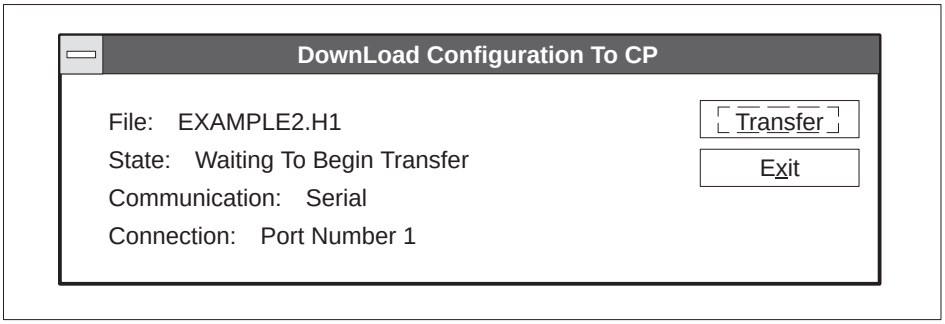


Figure 5-25 Download Configuration To CP Dialog Box

Executing the Download Command

The currently open file name appears in the dialog box. If you have not assigned a name to your configuration file, the default NONAME.H1 appears in the dialog box.

To initiate the download operation, click on the **Transfer** button. The message in the **State** field changes as the transfer operation runs. If the operation is successful, the following messages are displayed:

Transferring the file name.
Transferring the local database.
Transferring the Peer Services.
Transferring the TF Services.
Transferring the TF Variables.
Transferring the time information.
Testing module configuration. (1-2 min. delay)
Transfer is successful.

While the download operation is in progress, you cannot cancel or interrupt the operation. However, if you selected the wrong port, or wrong Ethernet address, or the cable is not connected, or any other communication problem exists, an error message is displayed after a brief delay.

Overwrite Warning

An overwrite warning message displays, see Figure 5-26, before the configurator downloads a configuration file to the H1 CP. The message box displays both the configuration filename that is presently in flash memory of the H1 CP and the filename currently loaded in the configurator.

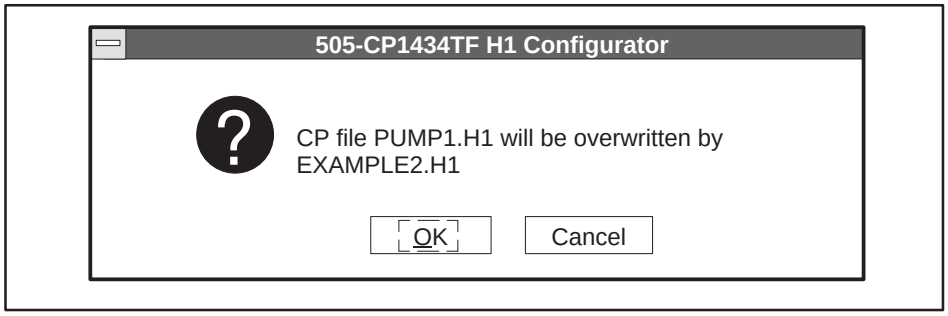


Figure 5-26 Download Overwrite Message

Observing the Module LED Status

After the file data has been transferred to the H1 CP module, the status LEDs on the H1 CP module go off temporarily while the module executes an automatic reset. The configurator now displays “Testing module configuration” in the download **State** field. While in reset mode, the module reads the memory configuration of the controller.

After about 10 or 15 seconds, the MOD GOOD LED indicator comes on, followed a few seconds later by the MOD READY indicator. When both LEDs are on and steady, the module is ready to begin or resume operation.

After the download operation has completed successfully, the **Transfer** button becomes disabled. Click on **Exit** to leave the window. If the configuration that was downloaded is not a valid configuration, a second reset of the module occurs to allow a default to the backup or previous module. The configurator then displays “Configuration Bad. Using Backup.” in the **State** field.

If the LEDs respond in any other manner, a possible hardware or software failure may have been detected. Consult Appendix B to determine the possible cause of the failure and the action required.

Port-Access Lock Command

Before a configurator performs a download, it sends a port-access lock command to determine if it has access to the H1 CP. If it receives a port locked task code exception, the configurator knows that another configurator is transferring data to/from the H1 CP, and the error message "The CP communication has been locked at another port. Please try again momentarily." appears.

When a configurator is finished using the H1 CP, it sends an unlock command that frees port access. The H1 CP has a built-in two-minute timeout to prevent a permanent port lock from occurring. The DOS version of the configurator does not send port lock commands.

H1 CP Configuration Backup

Flash memory in the H1 CP module retains the last configuration downloaded, plus a back-up copy of the previous configuration. If the downloaded configuration fails to initialize the module, it is discarded and a reboot is started using the back-up configuration. If the back-up configuration is successful, it remains in effect. If your new configuration fails, correct the problem in the file and download the file again.

Uploading the Configuration File

To upload a configuration file, at the **Transfer** menu click on **Upload Configuration From CP**. Figure 5-27 shows the dialog box that appears.

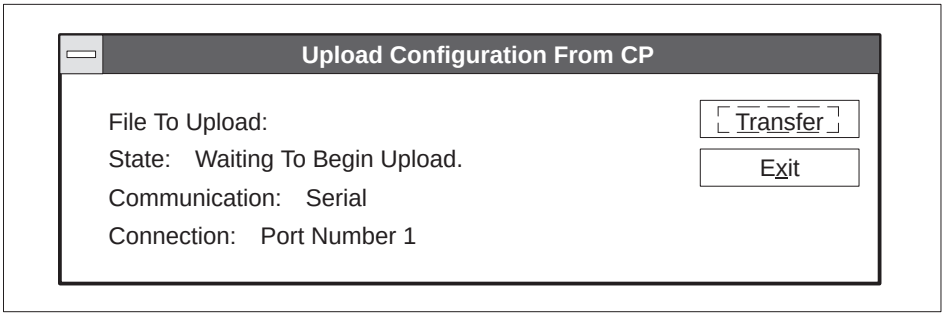


Figure 5-27 Upload Configuration From CP Dialog Box

If the file that is currently loaded in the configurator was changed but not saved, an overwrite warning message appears, as in Figure 5-28, asking if you wish to save your changes. If you click on the **No** button, the currently loaded file is closed without saving your changes, and the file specified in **File to Upload:** <**filename.h1**> is uploaded into the configurator.

If the file that is currently loaded in the configurator was not changed or was saved, it is overwritten (in the configurator) by the file specified in **File to Upload:** <**filename.h1**> .

After the file has been transferred, the **State** field changes to "Upload was successful" and the uploaded filename appears in the Main Configuration Screen title bar.

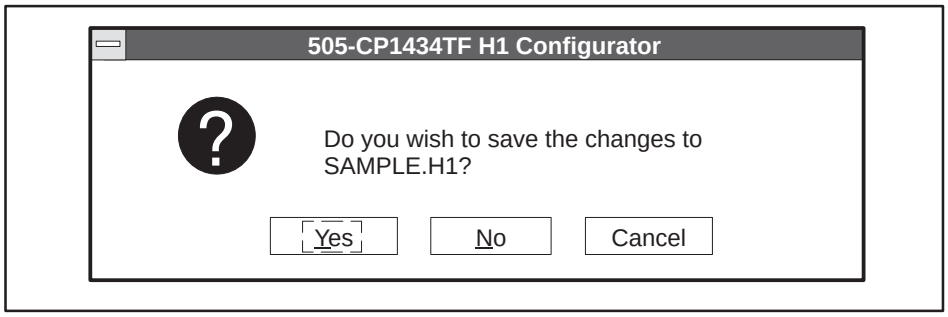


Figure 5-28 Upload Overwrite Message

Port-Access Lock Command

Before a configurator performs an upload, it sends a port-access lock command to determine whether it has access to the H1 CP. If it receives a port locked task code exception, the configurator knows that another configurator is transferring data to/from the H1 CP, and the error message "The CP communication has been locked at another port. Please try again momentarily." appears.

When a configurator is finished using the H1 CP, it sends an unlock command that frees port access. The H1 CP has a built-in two-minute timeout to prevent a permanent port lock from occurring.

5.7 Using the Debug Commands

Selecting Debug Commands

The **Debug** pull-down menu provides diagnostics commands to help you debug problems you may encounter during the configuration and operation of the module. At the menu bar, click on **Debug**. The commands shown in Figure 5-29 appear in the pull-down menu.

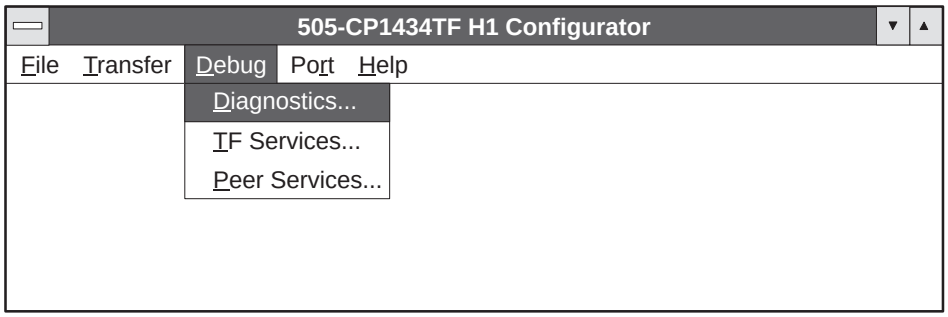


Figure 5-29 Debug Pull-Down Menu

Running Diagnostics

If you highlight the first command in the **Debug** menu, **Diagnostics**, the system checks the operating status of the CP module hardware, the controller interface, the local database of the configuration file, the name of the configuration file being used, and the state of the last downloaded configuration. It also displays the software part numbers for the module, configurator, and boot. See Figure 5-30.

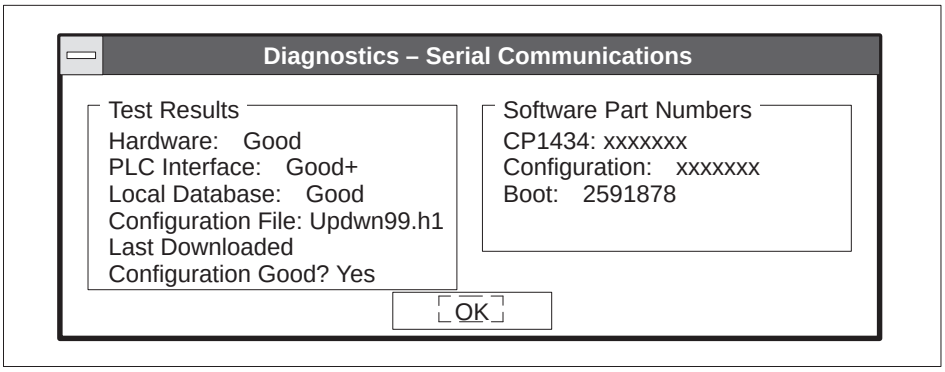


Figure 5-30 Debug - Diagnostics Window

The title bar displays either **Serial Communication** or **H1 Communications,** depending on which mode you selected under **Port**. Your selection is stored in a Windows .ini file that starts up the configurator in the last mode (and port) that you selected. The .ini file default is serial communication mode and port 1. Click on **OK** to exit the diagnostics window.

NOTE: The port-access lock command does not apply to Debug Functions. Most port access conflicts occur too rapidly to be seen in Debug mode.

Running TF Services Debug

If you click on the second command in the **Debug** menu, **TF Services**, the dialog box shown in Figure 5-31 appears. If you have successfully transferred a configuration file to the H1 CP module, and if communications between the PC and the CP module are established correctly, all TF associations currently in the CP module are shown in the TF Service Association list box.

Clicking on a TF Services Association name, in the list box, displays the status for that service in the **Job Information** box. If you prefer, you can scroll through the list with ↓ ↑ to select an association, to get the status of that item. You can also use Tab to move between the controls in the dialog box. The configuration's permanent CP1434TF association becomes visible in the **TF Service Associations** box.

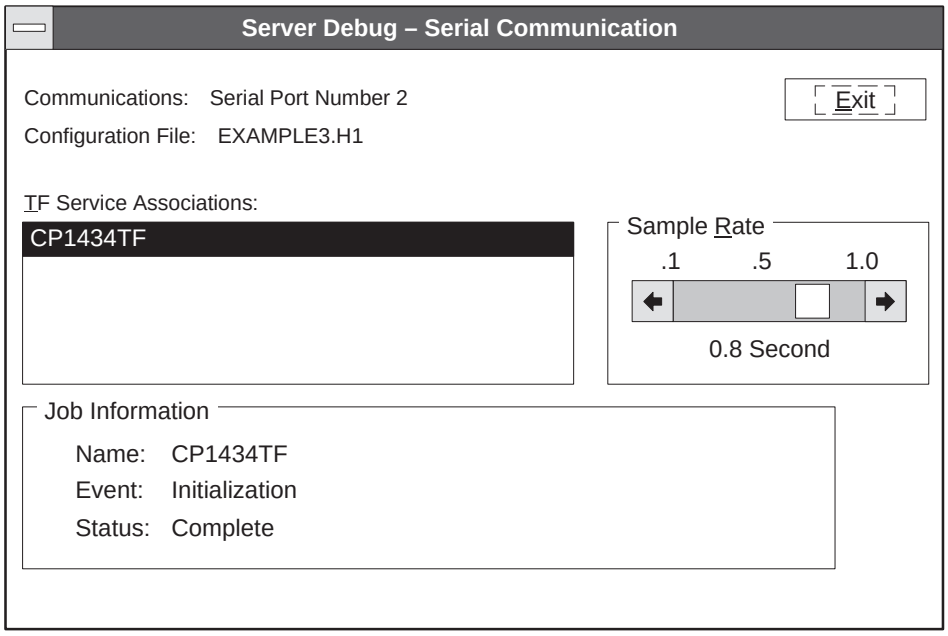


Figure 5-31 TF Services Debug Dialog Box

The **Communications:** field displays the Serial Port Number or Ethernet Node that you selected.

The **Configuration File:** field displays the current configuration filename.

The **TF Services Associations:** list box displays the available TF Service Associations.

The **Sample Rate** scroll bar controls the rate at which the **Job Information** field is updated. The **Sample Rate** defaults to 1.0 second, but is adjustable from 0.1 to 1.0 second. The debug sample data is continously transferred and redisplayed in the dialog box once you select the first service to be debugged.

NOTE: Continuous debug updates and the sample rate adjustment are not supported in the DOS version of the configurator.

If you are not using a mouse, a **Sample Rate** shorter than 1.0 second may make it difficult to use the keyboard to change the **Sample Rate** after samples begin transferring. Using the keyboard, you can change the Sample Rate by pressing Alt R and ↓ ↑ .

The **Job Information** field displays the current status of the TF Service Association you selected.

Clicking on **Exit**, pressing Enter, or pressing Alt E terminates the debug operation, and returns you to the main configurator screen.

Running Peer Services Debug

If you click on the third command in the Debug menu, **Peer Services,** the dialog box shown in Figure 5-32 appears. If you have successfully transferred a configuration file to the H1 CP module, all Peer connections currently in the CP module are shown in the **Transport Connections** list box.

Clicking on a Transport Connection name in the list box, displays the status for that connection in the Job Information box. Or, you can scroll through the list with ↓ ↑ to change jobs. You can also Tab between controls in the dialog box.

The **Communications:** field displays the Serial Port Number or Ethernet Node that you selected.

The **Configuration File:** field displays the CP module's current configuration filename.

The **Transport Connections:** list box displays the available Transport Connections.

The **Sample Rate** scroll bar controls the rate at which the **Job Information** field is updated. The **Sample Rate** defaults to 1.0 second, but is adjustable from 0.1 to 1.0 second.

NOTE: Continuous debug updates and the sample rate adjustment are not supported in the DOS version of the configurator.

If you are not using a mouse, a **Sample Rate** shorter than 1.0 second may make it difficult to use the keyboard to change the sample rate after you begin a debug function. Using the keyboard you can change the Sample Rate by pressing Alt R and ↓ ↑.

The **Job Information** field displays the current status of the Transport Connection that you selected in the list of jobs. If you prefer, you can scroll through the list by using ↓ ↑ to select a transport connection.

Clicking on **Exit**, pressing Enter, or pressing Alt E terminates the debug operation, and returns you to the main configurator screen.

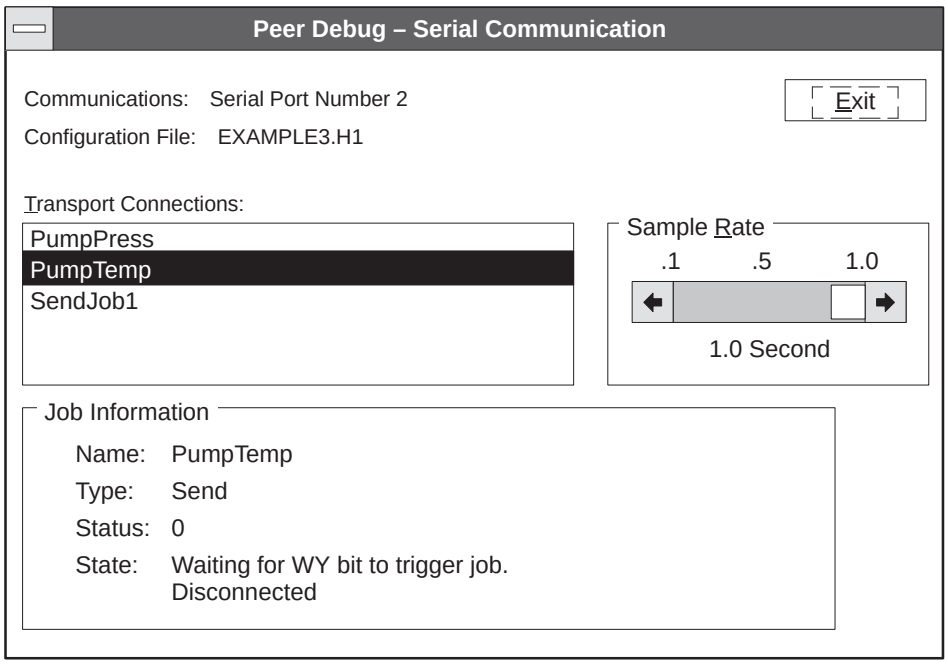


Figure 5-32 Peer Services Debug Dialog Box

5.8 Using Port Selection Options

Selecting Port Commands

The **Port** pull-down menu provides both **Serial Port Selection** and **H1 Network Node Selection** menus. At the menu bar, click on **Port**. The commands shown in Figure 5-33 appear with **Serial Port Selection** checked as the startup default.

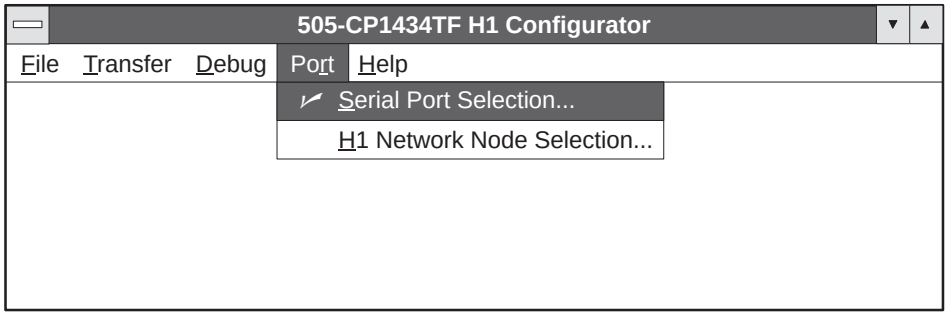


Figure 5-33 Port Pull Down Menu

Selecting a Serial Port

If you click on **Serial Port Selection** in the **Port** pull-down menu, the dialog box shown in Figure 5-34 appears. This dialog box allows you to select a serial communication port.

Port 1 is the default communications port. If you are communicating through a different port assignment, click on the option button that corresponds to the actual port in use on your computer. Ensure that the cable is properly connected to the programming port on the H1 CP module. Refer to Chapter 3.

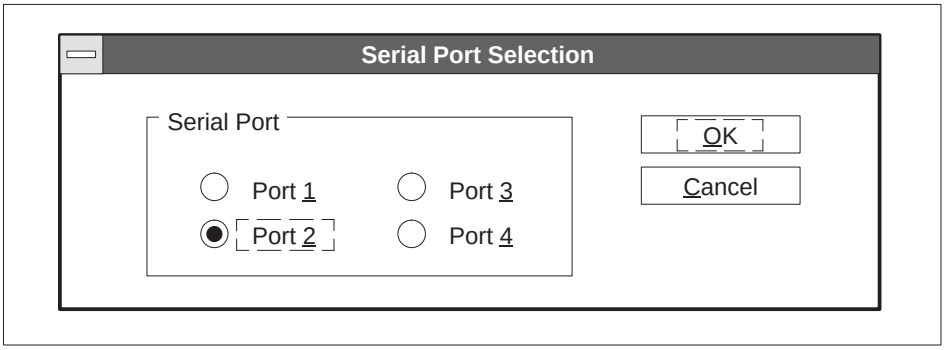


Figure 5-34 Serial Port Selection Dialog Box

Your port selection is stored in a Windows .ini file that is read each time the configurator is loaded. If you do not chose a port number, the .ini file defaults to port 1. Click on **OK** to accept the port selected and to exit the dialog box.

NOTE: Standard communication ports on MS-DOS PCs are usually setup with COM1 set as IRQ4 and COM2 set as IRQ3. Normally you select COM1 or COM2. If your MS-DOS PC is setup differently, ensure that the port you select is setup in your hardware as one of the following:

COM1	IRQ4	0x03F8
COM2	IRQ3	0x02F8
COM3	IRQ4	0x03E8
COM4	IRQ3	0x02E8

If you are using windows, these ports may be setup in the system.ini file.

Selecting H1 Network Nodes

If you click on **H1 Network Node Selection** in the **Port** pull-down menu, the dialog box shown in Figure 5-35 appears. This dialog box allows you to select an **Application Node Name** from a drop-down list box.

NOTE: Before you can use the H1 CP to communicate on the network, you must install the CP1413 module and associated software into your PC as summarized in Chapter 2 and detailed in *SINEC TF–Net1413/MS-DOS, Windows Operating Manual.*

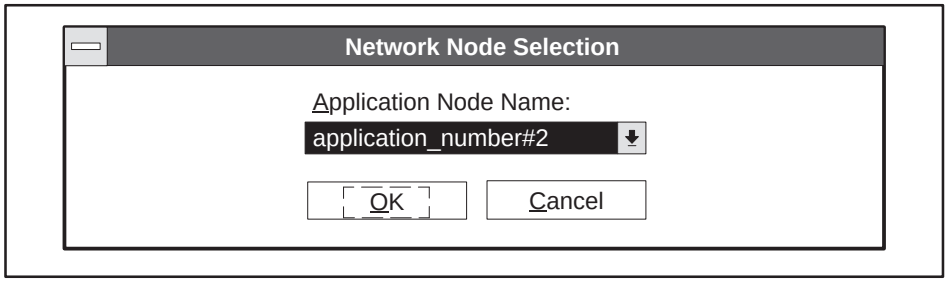


Figure 5-35 Network Node Selection Dialog Box

If you are communicating through a different node assignment, click on the drop down list and select the node name that corresponds to the actual node in use on your network. Ensure that the Ethernet cable is properly connected to H1 Ethernet Bus Interface port on the H1 CP module. Refer to Chapter 3.

NOTE: The Dos version of the configurator does not support H1 Ethernet communication. DOS serial port selection is found under the **Debug→Serial Port Selection** menu.

Port-Access Lock Command

Before a configurator performs an upload or download, it sends a port-access lock command to determine whether it has access to the H1 CP. If it receives a port locked task code exception, the configurator knows that another configurator has access to the H1 CP. When the other configurator's upload/download is complete, it sends an unlock command that frees port access. The H1 CP has a built-in two-minute timeout to prevent a permanent port lock from occurring.

H1 CP Configuration Backup

Flash memory in the H1 CP module retains the last configuration downloaded, plus a back-up copy of the previous configuration. If the downloaded configuration fails to initialize the module, it is discarded and a reboot is started using the back-up configuration. If the back-up configuration is successful, it remains in effect. If the back-up configuration fails, you will have to download the configuration through a local port.

5.9 Using the Help Screens

Selecting Help

To access the built-in Help information, click on **Help** in the menu bar, or press Alt H. The pull-down menu shows two choices: **About** and **Contents**.

If you click on **About**, a window appears showing information about the software version number and available memory.

If you click on **Contents,** the Main Help Screen appears, as shown in Figure 5-36. The screen provides an introduction to the H1 CP Configurator software followed by a list of topics. The main topics covered in the Help files are listed under **How To...** and under **Commands**.

Using Basic Help Functions

Either click on ▼ at the scroll bar to scroll the topics one line at a time, or hold the ▼ to scroll the text continuously (until you release the button). As you move the mouse cursor in the Help window toward the topics, the arrow changes to a pointing hand symbol. Use the hand symbol to point to the topic you want information about, and click the left button. The Help information for that topic appears in the window. Use the scroll bar arrows as needed to view all the text available for that screen.

Several of the main topics offer additional sub-topics, listed under **See Also**. Aim the hand cursor at the sub-topic you want information about, and click the left button.

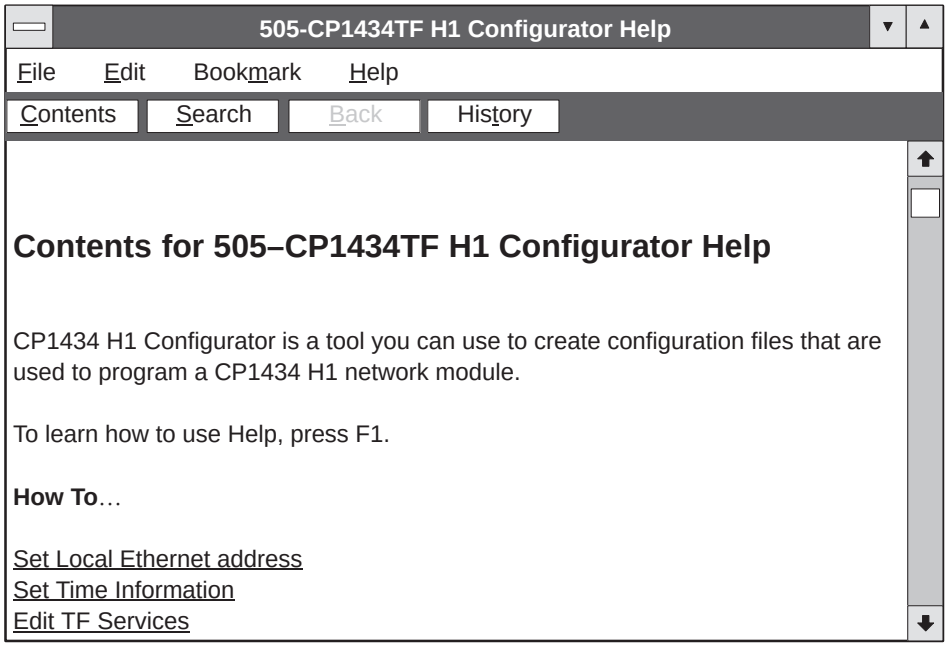


Figure 5-36 Main Help Screen

Using Additional Help Functions

You can also use the function buttons at the top of the Help window. These are described below.

- **Contents** always takes you back to the starting screen with the list of main topics, as shown in Figure 5-36.
- **Search** allows you to search for specific topics that may not be listed in the main topic list. It provides different options for setting up the search request, as shown in Figure 5-37. You can type in a topic name, or scroll through the topic list just below. Click on **Show Topics**. The higher level topic that contains the target topic appears in the lower box. Then click on **Go To** to access the Help information for that topic.

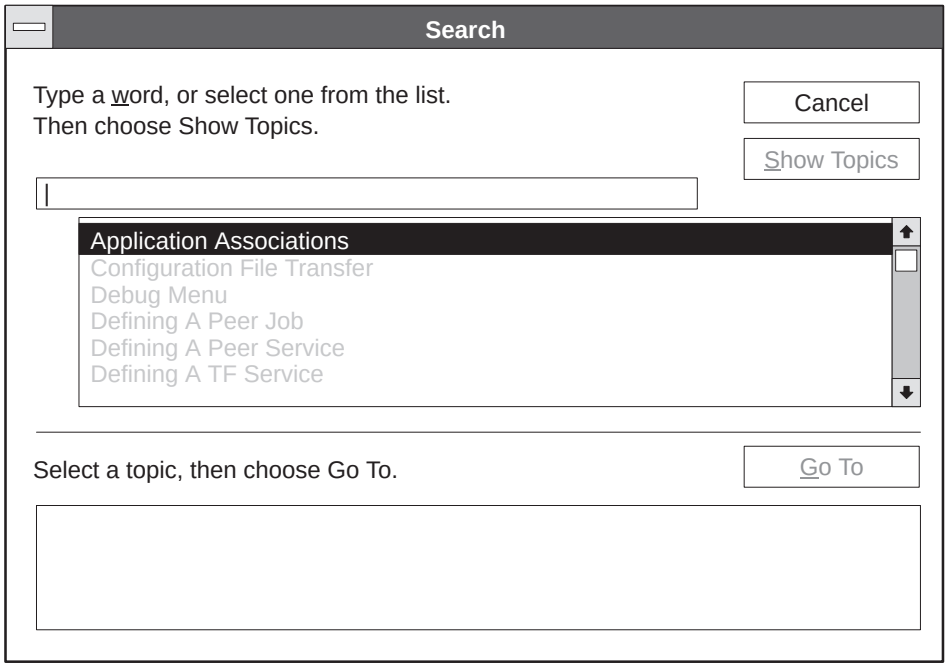


Figure 5-37 Search Dialog Box for Help Information

- **Back** takes you back to the screen you had previously viewed. You can click this button until you return to the top-level Contents window.
- **History** brings up a window listing all the windows that you have most recently displayed. You can then access any of the listed windows by selecting it and clicking the mouse button.

The higher level functions in the **Help** window, **File, Edit, Bookmark**, and **Help**, are standard Windows Help functions. Consult your Windows user manual for information on how to use those functions.

Chapter 6

Communication Examples

6.1 Peer Service Example: Read

Configuration Tasks

This chapter provides examples of peer-to-peer data transfer connections, taking you through the basic steps of configuring the H1 CP modules for each programmable logic controller in the network. Figure 6-1 summarizes the configuration steps needed to establish a Read Active/Read Passive transfer of data between PLC A and PLC B.

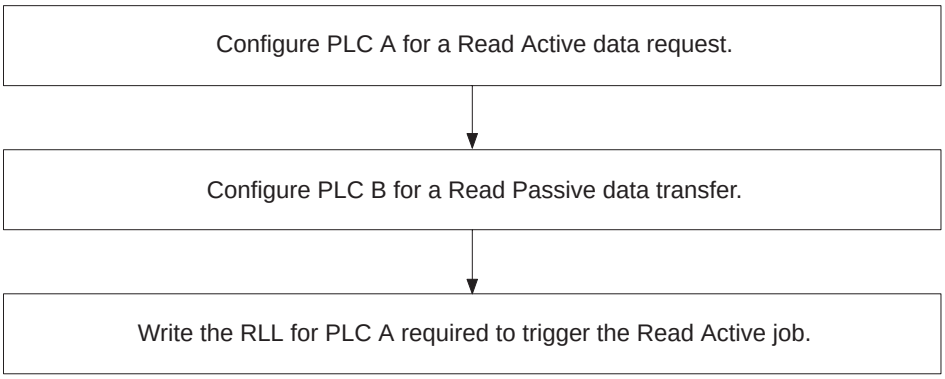


Figure 6-1 Flow of Configuration Tasks

READ Active for PLC A

Figure 6-2 shows the data transfer connection for this example of a Read Active/Read Passive job. PLC A is configured with a Read Active job type and is the initiator of data transfer requests. PLC B waits for the request and responds as required with the transfer of data from the source address specified by PLC A.

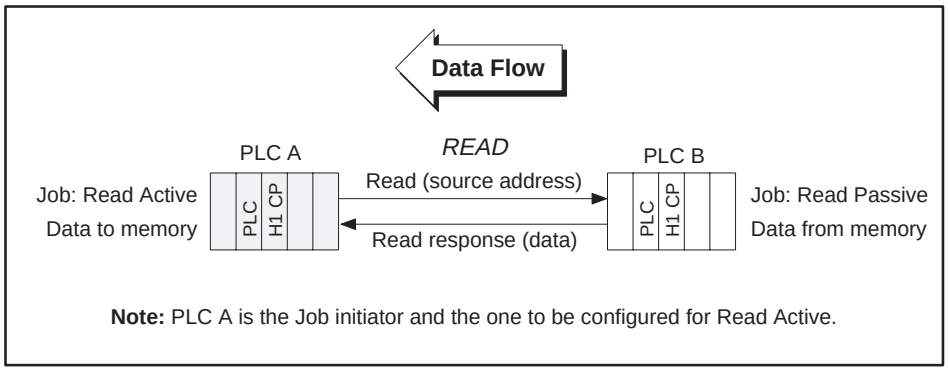


Figure 6-2 Read Data Flow

Opening a New File

As described in Chapter 5, select **New** on the **File** pull-down menu to access the Main Configuration screen (shown in Figure 6-3). This is where you begin to create a new configuration file.

Setting the Ethernet Address for the Active H1CP

In this example, set the Ethernet address for the H1CP in PLC A to 080006010001. Move the mouse cursor to the Ethernet Address field. In this field, the cursor changes from an arrow to the insert-text shape shown in Figure 6-3. Position this cursor to the right of the address and click the left mouse button. The editing cursor, a flashing vertical bar, is now active in the Ethernet address field: press Backspace to delete the last zero and type: **1**.

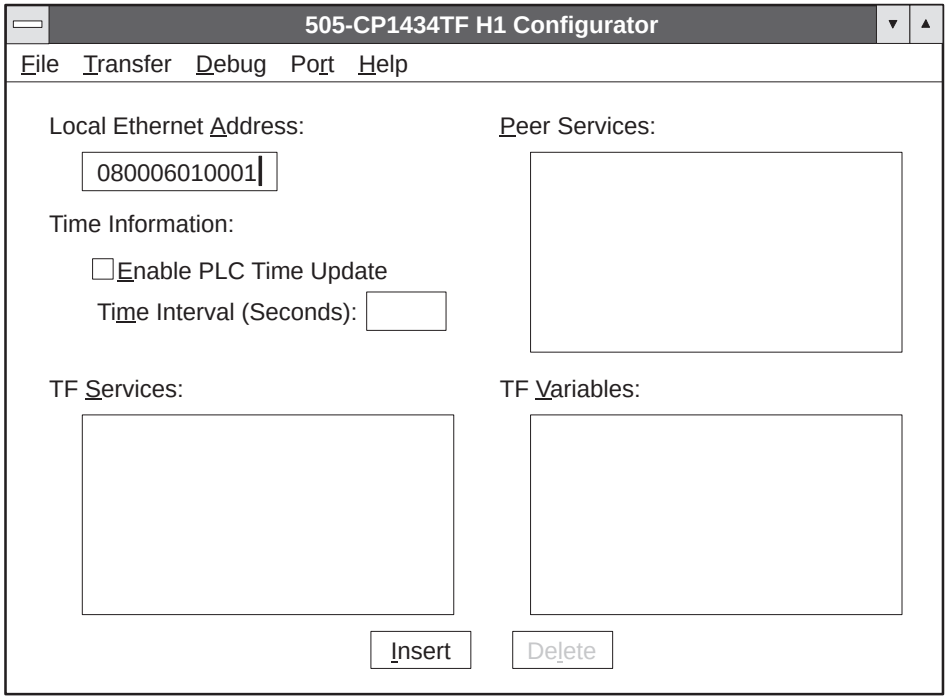


Figure 6-3 Main Configuration Screen

Creating a Peer Connection

To create a peer service connection, click in the **Peer Services** list box, and then click on the **Insert** button at the bottom of the dialog box shown in Figure 6-3, or press ALT I or Insert. This brings up the **Peer Service** dialog box, shown in Figure 6-4.

Defining the Peer Connection

In the Peer Service dialog box, you give the transport connection a name and create the TSAP (or Transport Service Access Point) that identifies the origin and destination of this communication link. In this dialog box, the editing cursor is already active in the **Transport Connection Name** field.

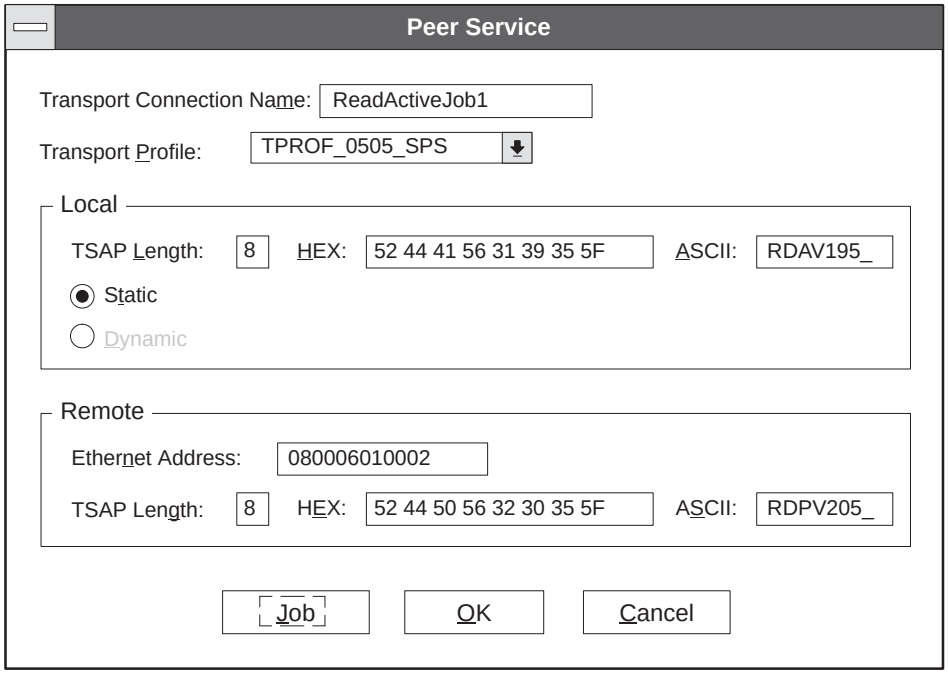


Figure 6-4 Peer Service Dialog Box

1. Type the name: **ReadActiveJob1**.

2. Press Tab to move to the next field. The **Transport Profile** text box becomes highlighted. Leave the profile at the default setting.

3. Press Tab three more times, or double click on the ASCII field for the Local TSAP. Type the name: **RDAV195** (Read Active to V-Memory starting at location V195).

4. The Static and Dynamic option buttons have a default setting of Static. Only Static is valid with a Read Job. Leave the default choice on.

5. Position the cursor to the right of the **Remote Ethernet Address** field and click, then press Backspace to delete the last zero and type: **2**.

6. Press Tab three times, or move the mouse cursor to the ASCII field for the Remote TSAP and double click the button. Type: **RDPV205** (Read Passive from V-Memory starting at location V205). (When you press Tab, or click the mouse button at another location in this dialog box, the HEX field is updated automatically with the hex codes that represent the ASCII characters in both Local and Remote fields.)

Defining the READ Active Job for PLC A

The following steps, required to complete the Peer connection for PLC A, define the type of job, the handshaking bits, the V-memory address for job status, and the block of data in memory to be transferred.

1. Click on the **Job** button outlined in bold at the bottom of the **Peer Service** dialog box, or press Enter to open the **Job Definition** window shown in Figure 6-5.

2. In the **Type** box press and hold the mouse button (on **Send)** to open the **Type** drop-down list box and slide the cursor down the menu until **Read Active** is highlighted. Select this choice by releasing the button. (You can also use ↓ or ↑ then Tab.)

3. Activate the editing cursor in the **Job Start Bit** field and type: **5, 15**. When you press Tab, or click the mouse button at another location in this dialog box, the **Job Active Bit** field is updated.

4. In the **Status Word** data field, assign a V-memory word address that stores the error status of the data transfer. The value can be read by the RLL program. For this example, type: **105** in the field. Press Tab twice.

5. For the **Local PLC** (PLC A), specify the address in memory where the data read from the remote PLC is to be stored. Type: **V 195, 7**. This means that incoming data is stored in 7 words, starting at V195. Press Tab twice.

6. For the **Remote PLC** (PLC B), type: **V 205,7**. This means that the data to be read is stored in 7 variable memory addresses, starting at V205.

7. Click on the **OK** button or press **Enter**. The software checks the validity of all values entered, and responds with an error message if a problem is found. If all values are valid, they are saved and you return to the Peer Service dialog box.

8. Click on **OK** or press ALT O in the Peer Service dialog box to write the configuration file to memory. Again, the software checks the validity of all values entered, and responds with an error message if a problem is found. If all values are valid, they are saved and you return to the main configuration screen (Figure 6-6). **ReadActiveJob1** now appears in the Peer Services list box.

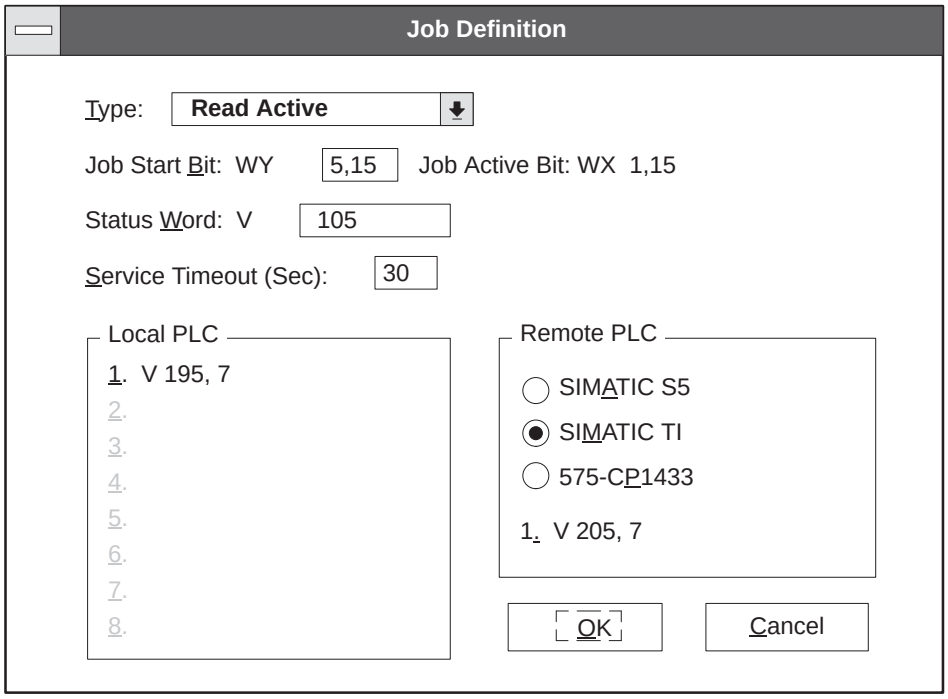


Figure 6-5 Job Definition Dialog Box

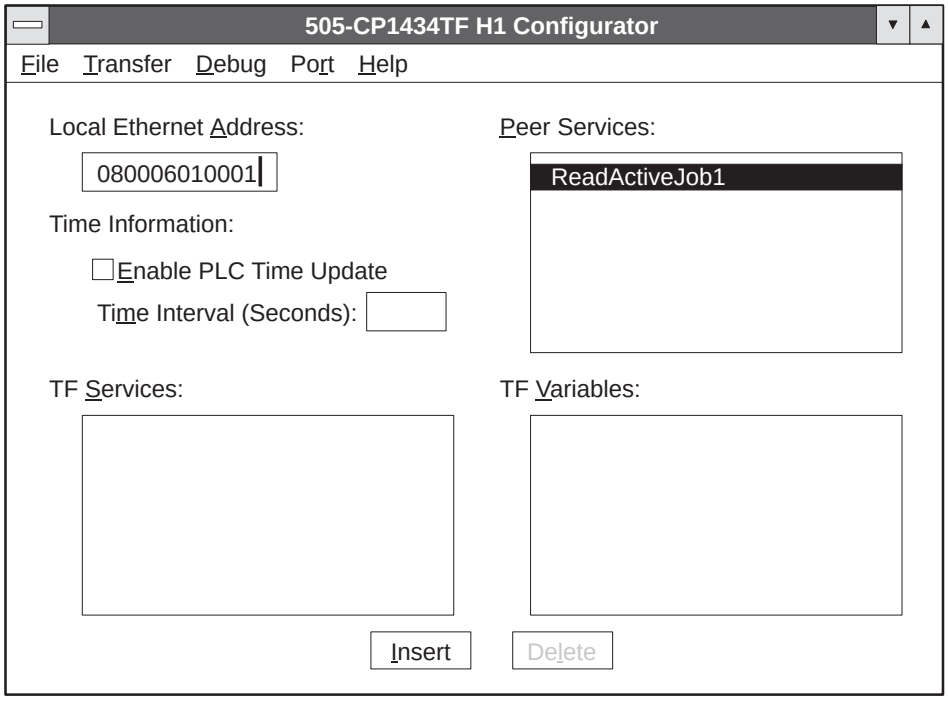


Figure 6-6 Main Configuration Screen

Writing the Configuration File to Disk

You need to name this configuration file and write it to disk, before you transfer it to the H1 CP module.

1. Click on **File** to open the pull-down menu.
2. Select **Save As** by clicking on your filename choice, or by using ↓ ↑ and then pressing Enter .

Saving and Naming the Configuration File

To save your new configuration file to disk using **Save As** dialog box, follow these steps. See Figure 6-7.

1. Verify that the directory shown on the screen is correct. This directory is where the file is saved.
2. In the **File Name** data field, type the name of the file: **`Example1.h1`**.
3. Click on **OK** or press Enter . The software saves the configuration file and returns to the main configuration screen. The new file name now appears in the title bar of the main configuration screen.

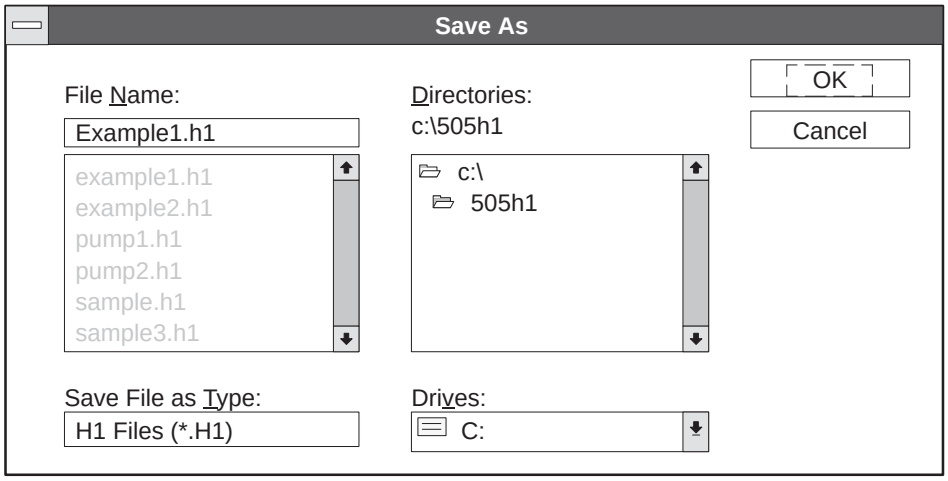


Figure 6-7 Save As Dialog Box

Downloading the Configuration File

You can now download the configuration file to flash memory in the H1 CP module. At the top of the main configuration screen, click on **Transfer**. Slide the cursor down to highlight **Download Configuration To CP** and release the button. You can also use the keyboard by pressing Alt T , then Enter . Figure 6-8 shows the dialog box that appears after you select the **Download Configuration To CP** option.

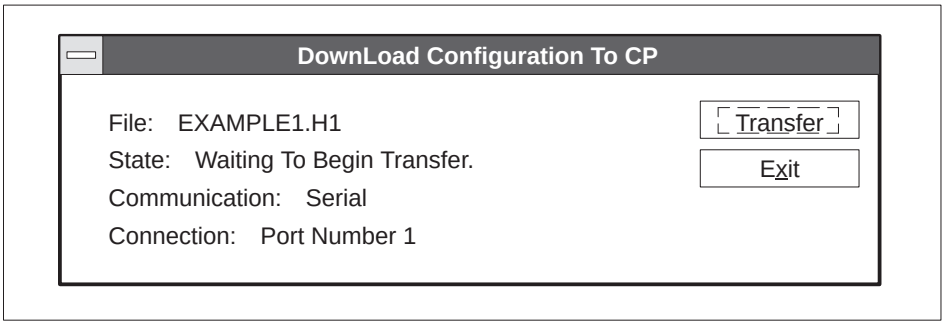


Figure 6-8 Download Configuration To CP Dialog Box

1. Verify the port selection. If the default Port 1 is correct, go to step 2. Otherwise, select the correct port under the **Port→Serial Port Selection...** menu. If you are using the DOS version, select **Debug→Serial Port**.

2. To initiate the transfer operation, click on the **Transfer** button. An overwrite warning message appears. See Figure 6-9. Click on **OK** to overwrite the file.

   The message in the **State** field changes as the transfer operation is running. After the transfer operation has completed successfully, the **Transfer** button becomes inactive (dimmed).

3. Click on **Exit** or press ALT X to return to the Main Configuration Screen.

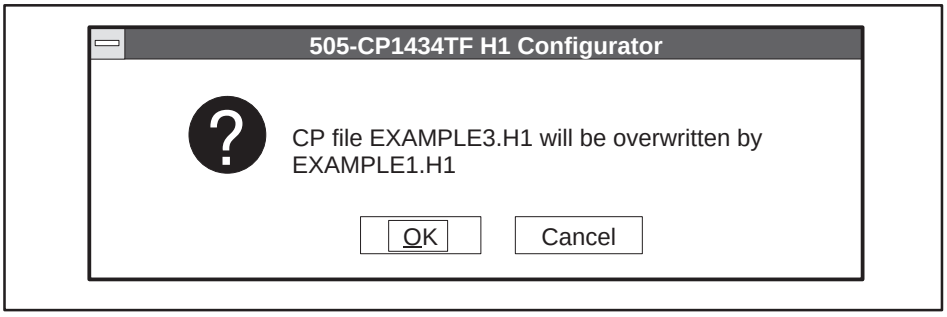


Figure 6-9 Configuration File Overwrite Warning

Observing the Module LED Status

After the file has been successfully transferred to the H1 CP module, the status LEDs on the H1 CP module go off temporarily while the module executes an automatic reset operation. After about 10 or 15 seconds, the MOD GOOD LED indicator comes on, followed a few seconds later by the MOD READY indicator. When both LEDs are on and steady, the module is ready to begin or to resume operation.

READ Passive for PLC B

To complete the connection, PLC B must be configured for a Read Passive data transfer, as shown in Figure 6-10.

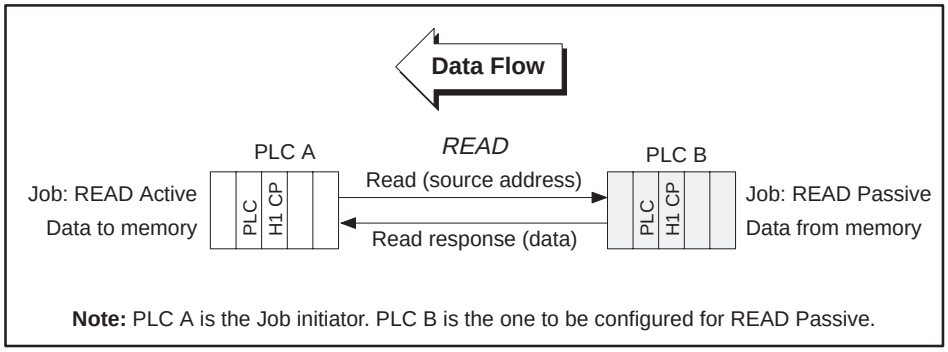


Figure 6-10 Read Data Flow

Referring to the figures and steps for configuring PLC A, follow these basic steps to configure the remote PLC B.

1. At the main configuration screen, select **New** on the **File** pull-down menu.
2. In the **Local Ethernet Address** type: **080006010002**.
3. Click in the **Peer Services** list box; and then click on the **Insert** button.
4. At the Peer Service dialog box, type the **Transport Connection Name**: **ReadPassiveJob1**.
5. Type the Local TSAP: **RDPV205**.
6. Type the Remote Ethernet Address: **080006010001**.
7. Type the Remote TSAP: **RDAV195**.
8. Click on the **Job** button to open the Job Definition dialog box.
9. Select **Read Passive** in the list box for **Type**. No additional input is required or allowed for the Read Passive Job Definition. (All other fields in the Job Definition dialog box become inactive.)

10. Click on the **OK** button to verify this setting and to return to the Peer Service dialog box.

11. Click on the **OK** button to verify these values and to return to the main configuration screen.

The configuration file for PLC B is ready to be saved and transferred. Follow the steps described for PLC A to save (give the file a different name, e.g., **Example2**), and to transfer this file to the CP module at PLC B.

Figure 6-11 shows a summary of the configuration files you have created for each of the programmable logic controller stations. The arrows show the required matching of Ethernet addresses, TSAPs, and Job Types to complete the data transfer connection.

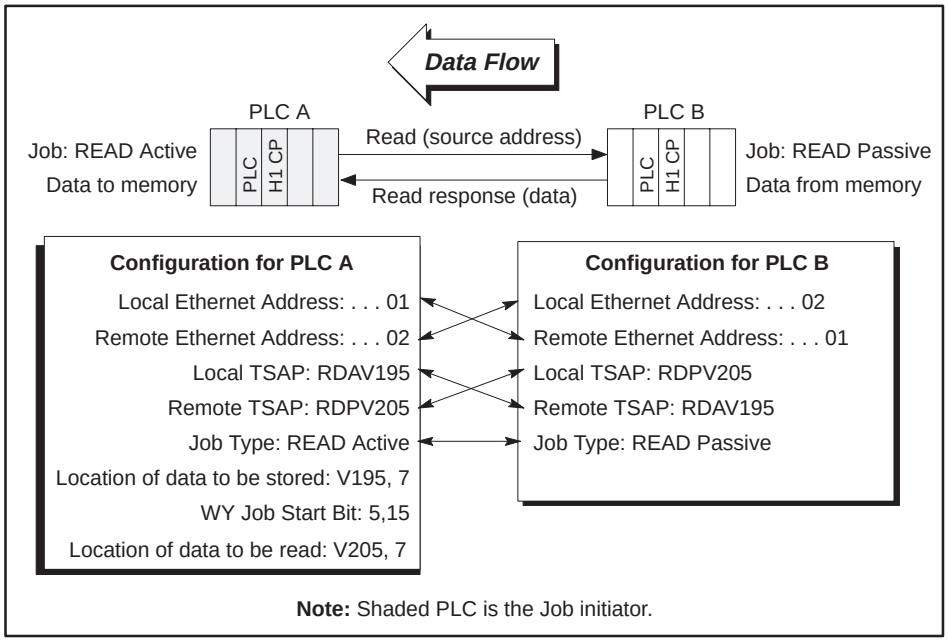


Figure 6-11 Summary of Configurations for Read Data Transfer

After successfully loading the configuration files to both programmable logic controller stations, RLL coding must be added to the RLL program of PLC A to activate the transfer of data. No RLL code is needed for PLC B. Refer to Figure 6-12 for an example of RLL code.

Example RLL Code for Read Active Job at PLC A

The Relay Ladder Logic example in Figure 6-12 demonstrates a typical scenario for using the Read Active Peer Service of the H1 CP module. This section assumes that you are familiar with Series 505 programmable logic controller language.

NOTE: If the Peer Service is to be executed only one time, you must take appropriate action to disable Xu after the data transfer has been made.

NOTE: This relay ladder logic assumes good transactions, and does not contain Status word checking. Error recovery must be implemented in ladder logic appropriate to your application. The WX and WY locations used in this RLL example correspond to module I/O addresses that have been configured in programmable logic controller memory using the Configure I/O function in TISOFT.

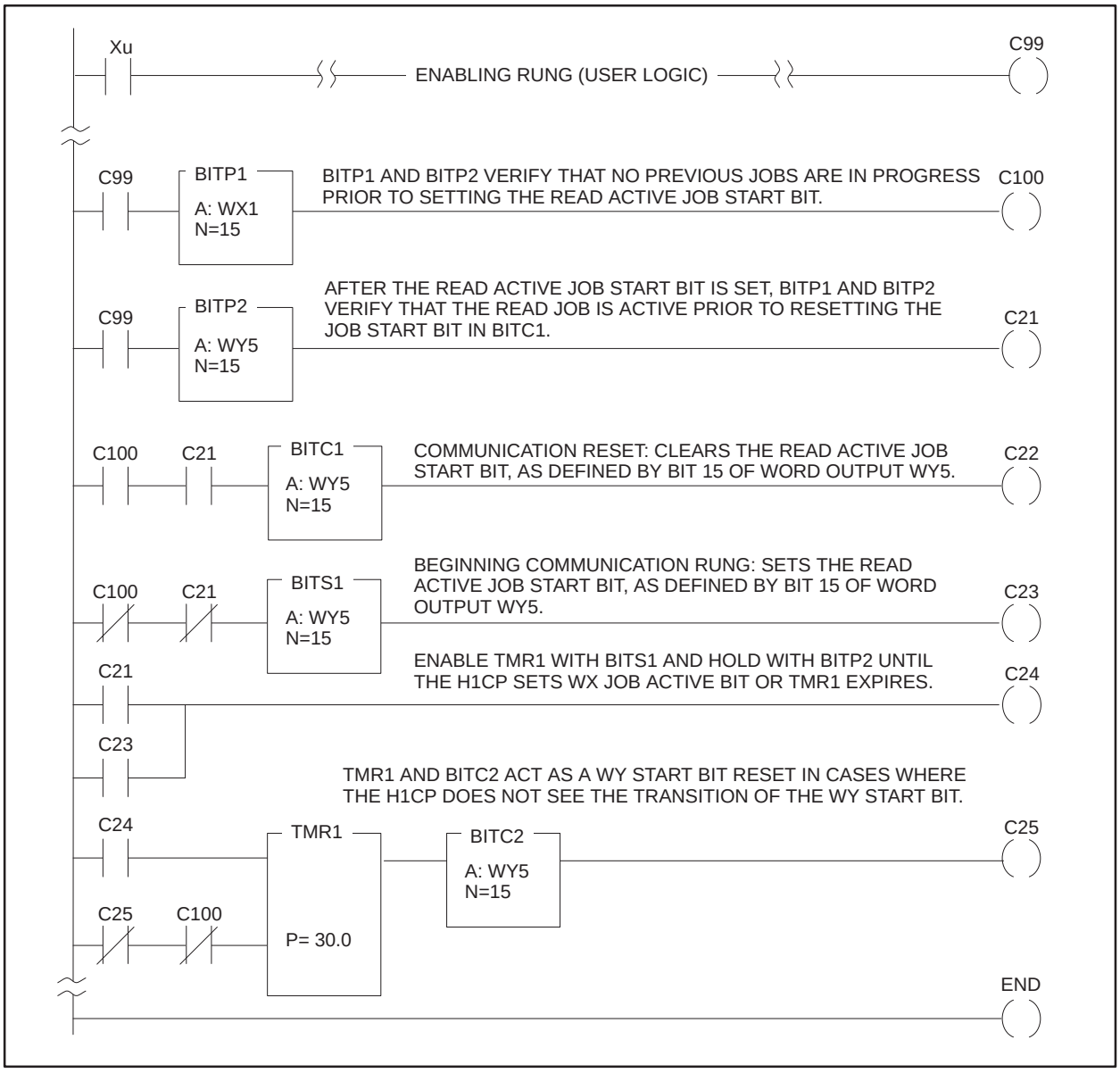


Figure 6-12 Read Active Relay Ladder Logic for PLC A

6.2 Peer Service Example: Send/Receive

Configuration Tasks

Figure 6-13 summarizes the configuration steps needed to establish a Send/Receive transfer of data between PLC A and PLC B.

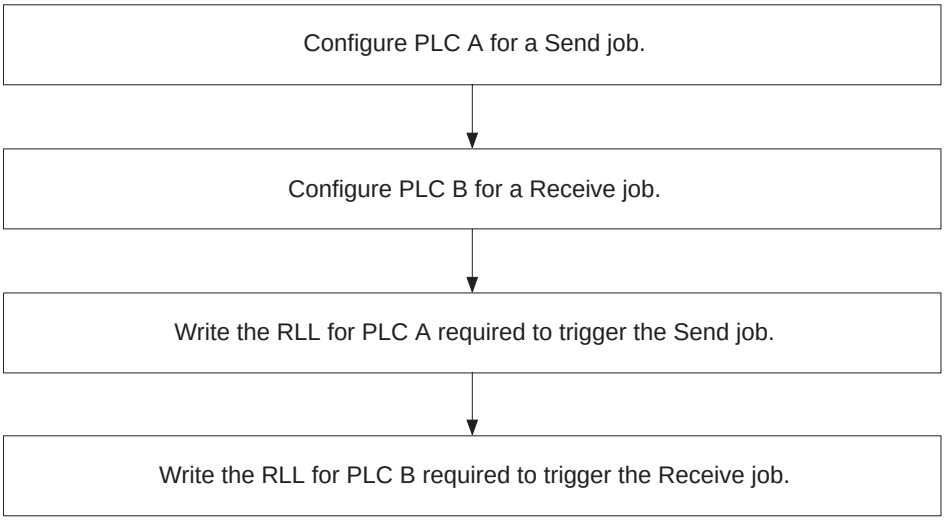


Figure 6-13 Flow of Send/Receive Configuration Tasks

Send Job for PLC A

Figure 6-14 shows the data transfer connection for this example of a Send/Receive job. PLC A is configured with a Send job type and is the initiator of data transfer requests. PLC B signals PLC A when it is ready to receive the data transfer request and responds as required by accepting the transfer of data from PLC A.

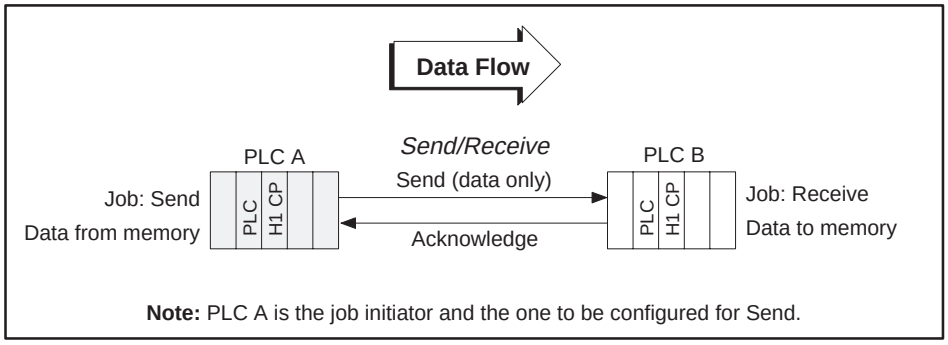


Figure 6-14 Send/Receive Data Flow

Opening a New File

As described in Chapter 5, select **New** on the **File** pull-down menu to access the Main Configuration screen, as shown in Figure 6-15. This is where you begin to create a new configuration file.

Setting the Ethernet Address for the Send H1CP

In this example, set the Ethernet address for the H1CP in PLC A to 080006010001. Move the cursor to the **Ethernet Address** field. In this field, the cursor changes from an arrow to the insert-text shape shown in Figure 6-15. Position the cursor to the right of the address and click the left mouse button. The editing cursor, a flashing vertical bar, active in the Ethernet address field; press **Backspace** to delete the last zero and type: **1**.

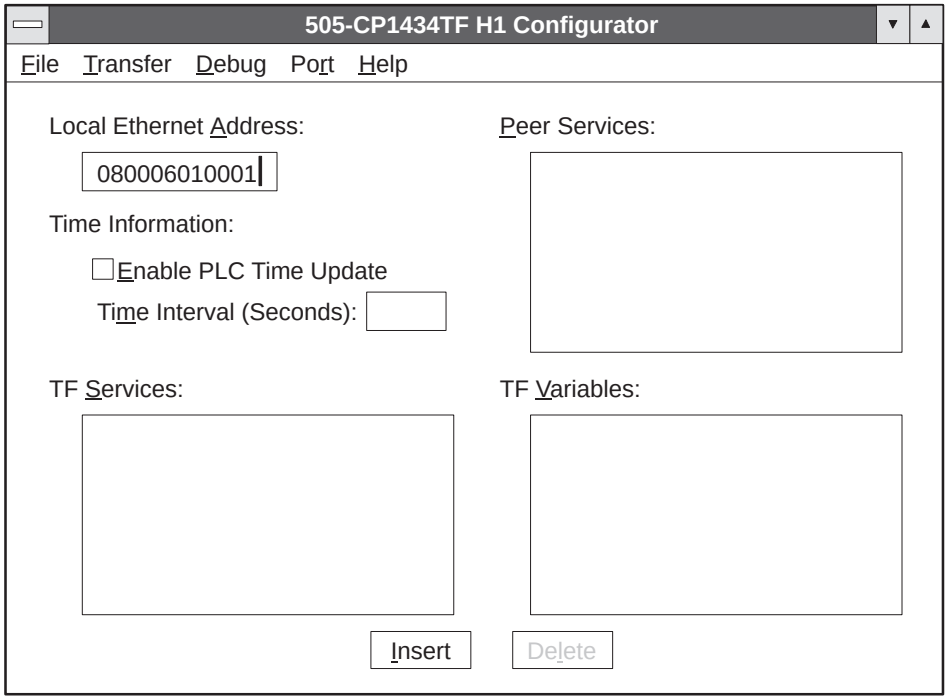


Figure 6-15 Main Configuration Screen

Creating a Peer Connection

To create a peer service connection, click in the **Peer Services** list box and then click on the **Insert** button at the bottom of the dialog box, as shown in Figure 6-15, or press **Insert** or pressing **Alt** **I** . This brings up the **Peer Services** dialog box, shown in Figure 6-16.

NOTE: When creating TSAPs you may want to:
(1) use all capitals or all small letters to make typing of TSAPs easier,
(2) keep the TSAPs unique by using a meaningful name
(for example) SNDT03 SND indicates a send job, and T03 indicates from node 2 to 3. At the receive node you could use RCVFM2.

Defining the Peer Connection

In the Peer Service dialog box, (Figure 6-16), you give the transport connection a name and create the TSAP (or Transport Service Access Point) to identify the origin and destination of this communication link. In this dialog box, the editing cursor is in the Transport Connection Name field.

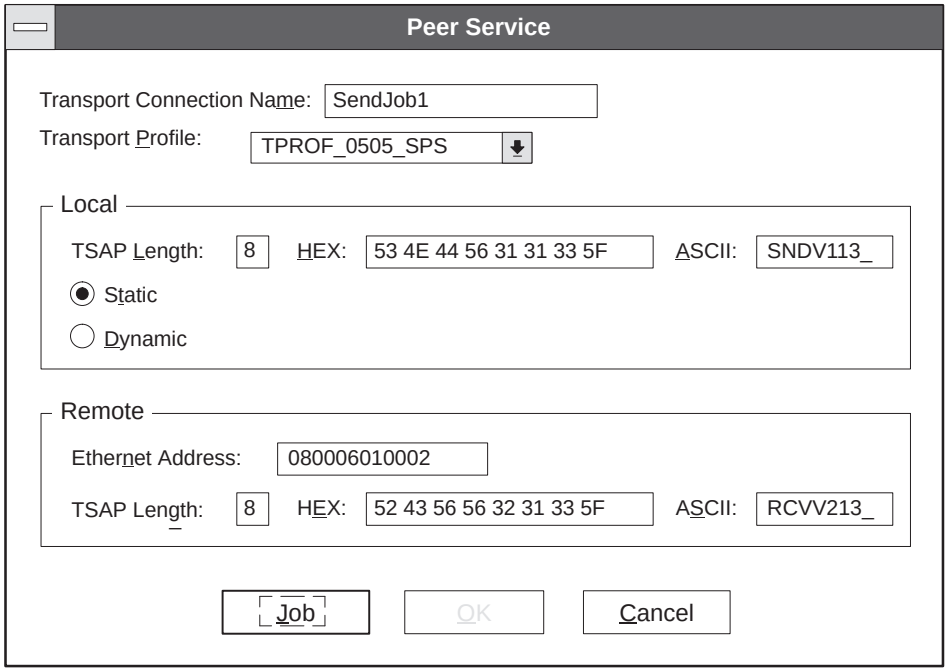


Figure 6-16 Peer Service Dialog Box

1. Type the name: **SendJob1**.

2. Press **Tab** to move to the next field. The **Transport Profile** becomes highlighted. Leave the profile at the default setting.

3. Press **Tab** three times, or move the mouse cursor to the ASCII field for the Local TSAP and double click. Type: **SNDV113** (Send data from V memory starting at location V113).

   The **Static** and **Dynamic** option buttons have a default setting of **Static**. Leave the default choice on.

4. Position the cursor to the right of the **Remote Ethernet Address** field and click, then press **Backspace** to delete the last zero and type: **2**.

5. Press Tab three times, or move the cursor to the ASCII field for the Remote TSAP and double click. Type: **RCVV213** (Receive data and store it in V Memory starting at location V213). (When you press Tab or click the mouse button at another location in the Remote dialog box, the HEX field is updated automatically with the hex codes that represent the ASCII characters in both Local and Remote fields.)

Defining the Send Job for PLC A

The following steps are required to complete the Peer connection for PLC A, by defining the type of job, the handshaking bits, the V-memory address for job status, and the blocks of data in memory to be transferred.

1. Click on the **Job** button at the bottom of the Peer Service dialog box, or press Enter to open the Job Definition window shown in Figure 6-17.

2. **Send** is the highlighted default job **Type** in the drop-down list box. Leave this field at the default setting and continue with step 3.

3. Activate the editing cursor in the **Job Start Bit** field, and type 5,01 in the **Job Start Bit** field. (When you press Tab or click the mouse button at another location in this dialog box, the **Job Active Bit** field is updated.)

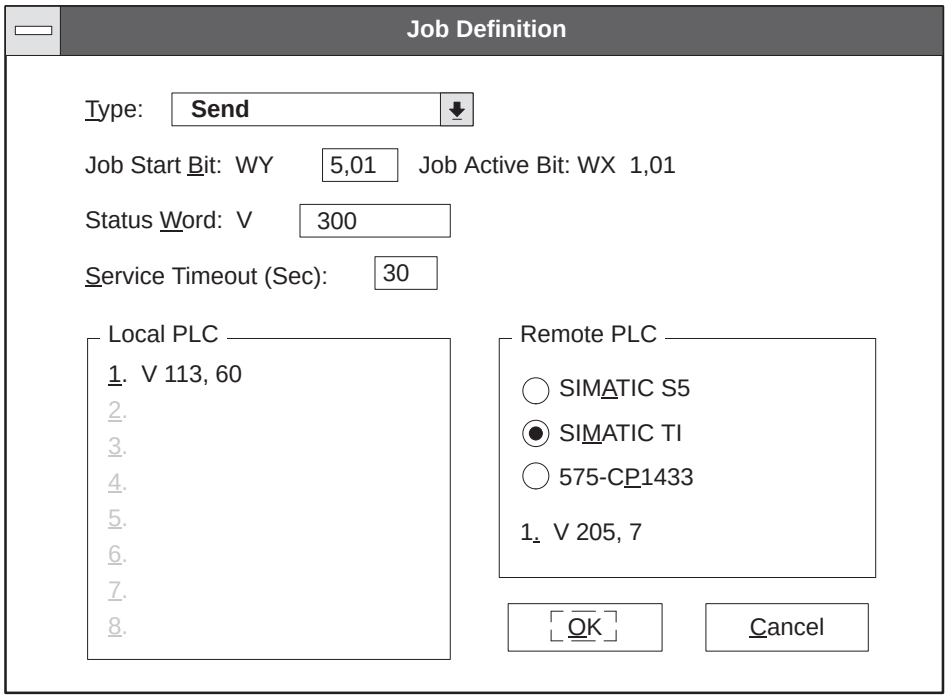


Figure 6-17 Job Definition Dialog Box

4. In the **Status Word** data field, assign a V-memory word address that stores the error status of the data transfer. The value can be read by the RLL program to evaluate the success of the transfer. For this example, type: **300** in the field.

5. For the Local PLC specify the address in memory where the data, to be sent to the remote PLC, is located. Type: **V113, 60**. This means that outgoing data is stored in 60 words, starting at V113.

6. Click on **OK**. The software checks the validity of all values entered, and responds with an error message if a problem is found. If all values are valid, they are saved and you return to the Peer Service dialog box.

7. Click on **OK** in the **Peer Services** window. The software checks the validity of all values entered, responding with an error message if a problem is found. If all values are valid, they are saved and you return to the main configuration screen (Figure 6-18). **SendJob1** now appears in the **Peer Services** list box.

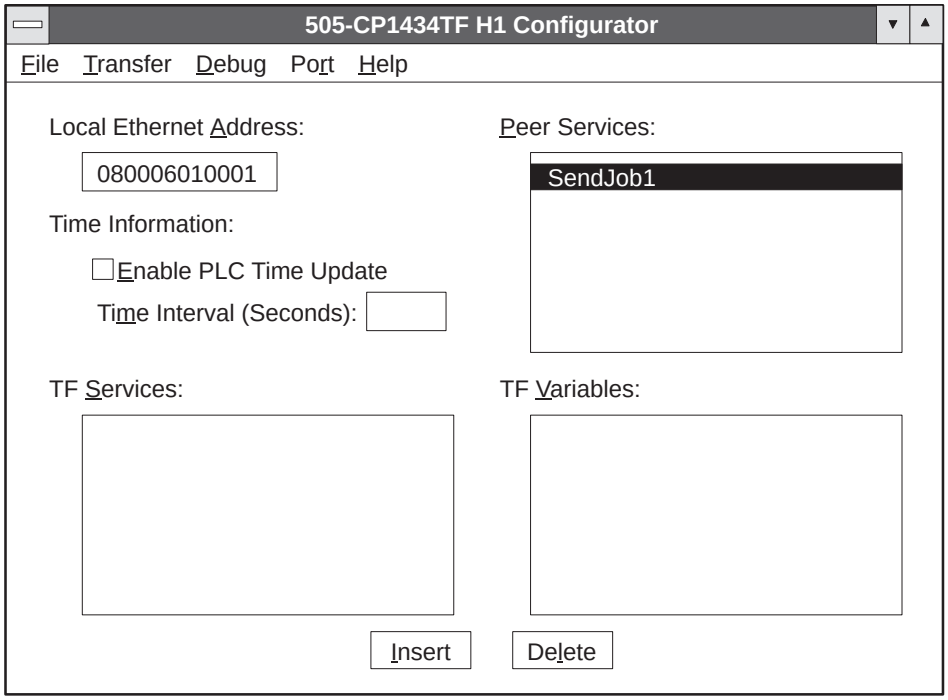


Figure 6-18 Main Configuration Screen

Writing the Configuration File to Disk

Before you can write the configuration file to the H1 CP's flash memory, you need to name it and save it to disk.

1. Point to **File** and press the mouse button to open the pull-down menu.
2. Select **Save As** by highlighting the choice and releasing the button.

Saving and Naming the Configuration File

To save your new configuration file to disk using **Save As**, follow these steps. See Figure 6-19.

1. Verify that the directory shown on the screen is correct. The file is saved in this directory.
2. Type the name of the file: **`Example3.h1`** in the **File Name** data field.
3. Click on **OK**. The software saves the configuration file and takes you back to the main configuration screen. The new file name now appears in the title bar of the main configuration screen (see Figure 5-2).

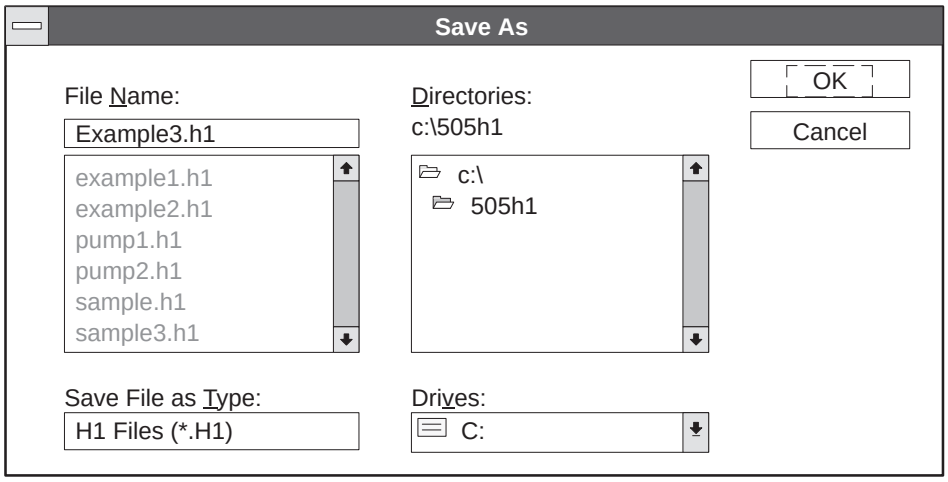


Figure 6-19 Save As Dialog Box

Downloading the Configuration File

You can now download the configuration file to flash memory in the H1 CP module.

1. At the top of the main configuration screen, click on **Transfer**. Slide the cursor down to highlight **Download Configuration To CP** and release the button. You can also use the keyboard by pressing Alt T, then Enter. Figure 6-20 shows the dialog box that appears after you select the **Download Configuration To CP** option.

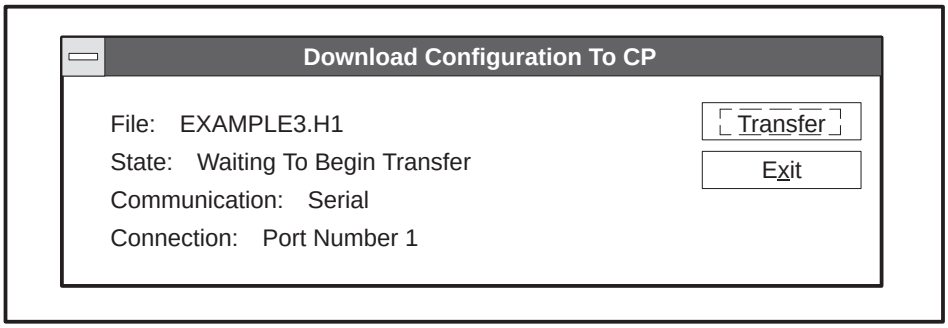


Figure 6-20 Download Configuration To CP Dialog Box

2. Verify the port selection. If the default Port 1 is correct, go to step 3. Otherwise, select the correct port under the **Port→Serial Port Selection** menu. If you are using the DOS version, select **Debug→Serial Port**.

3. To initiate the transfer operation, click on the **Transfer** button. An overwrite warning message appears. See Figure 6-21. Click on **OK** to overwrite the file. The message in the **State** field changes as the transfer operation is running.

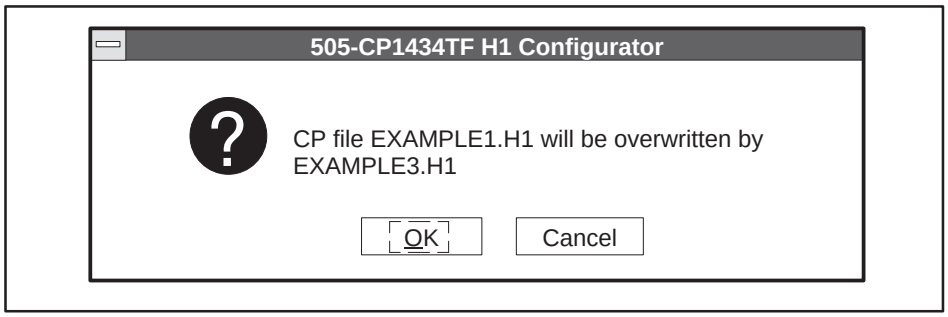


Figure 6-21 Configuration File Overwrite Warning

4. After the transfer operation has completed successfully, the **Transfer** button becomes inactive (dimmed). Click on **Exit** to exit from the window.

Observing the Module LED Status

After the file has been successfully transferred to the H1 CP module, the status LEDs on the H1 CP module go off temporarily and the module executes an automatic reset operation. After about 10 or 15 seconds, the MOD GOOD LED indicator comes on, followed a few seconds later by the MOD READY indicator. When both LEDs are on and steady, the module is ready to begin or resume operation.

Receive Job for PLC B

To complete the connection, PLC B must be configured for a Receive job, as shown in Figure 6-22. First, select **New** on the **File** menu.

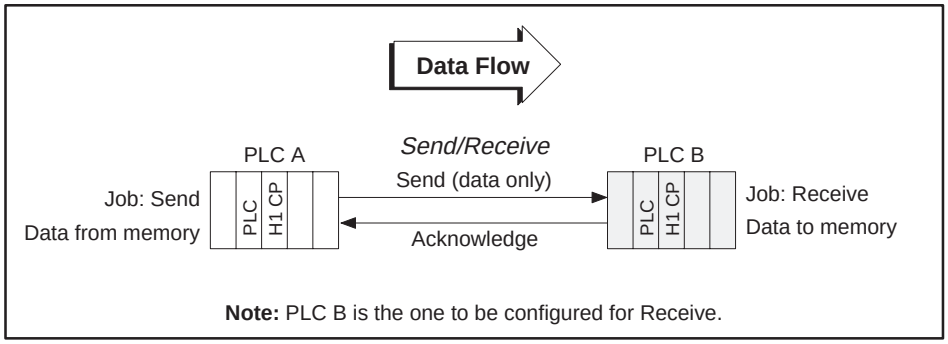


Figure 6-22 Send/Receive Data Flow

Setting the Ethernet Address for the Receive H1CP

In this example, set the Ethernet address for the H1CP in PLC B to 080006010002 as shown in Figure 6-23. Press **Backspace** to delete the last zero and type **2**.

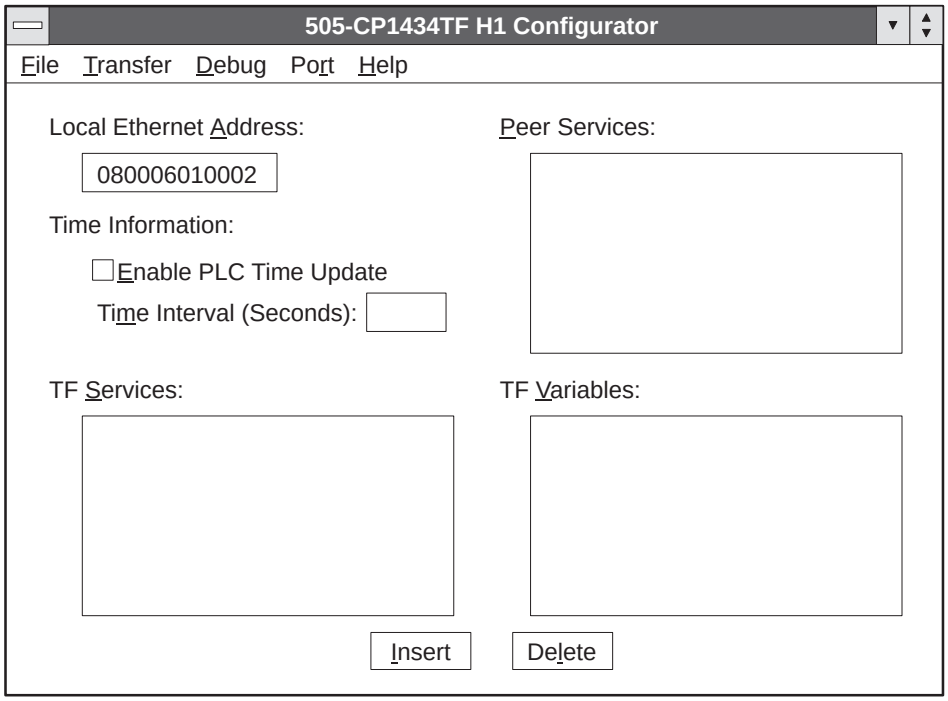


Figure 6-23 Main Configuration Screen

Creating a Peer Connection

To create a peer service connection, click in the **Peer Services** list box and then click on the **Insert** button at the bottom of the dialog box shown in Figure 6-23, or press Insert. This brings up the **Peer Service** dialog box, shown in Figure 6-24.

Defining the Peer Connection

In the Peer Service dialog box, you give the transport connection a name and create the TSAP (or Transport Service Access Point) that identifies the origin and destination of this communication link. In this dialog box, the editing cursor is already active in the **Transport Connection Name** field.

1. Type the name: **ReceiveJob1**.
2. Press Tab to move to the next field. The **Transport Profile** becomes highlighted. Leave the profile at the default setting.
3. Press Tab three times, or move the cursor to the ASCII field for the Local TSAP and double click the button. Type the name: **RCVV213** (Receive data and store it in V-memory starting at location V213).

   The **Static** and **Dynamic** option buttons have a default setting of **Static**. Leave the default choice on.
4. Click on the right side of the **Remote Ethernet Address** field, then press Backspace to delete the last zero and type: **1**.

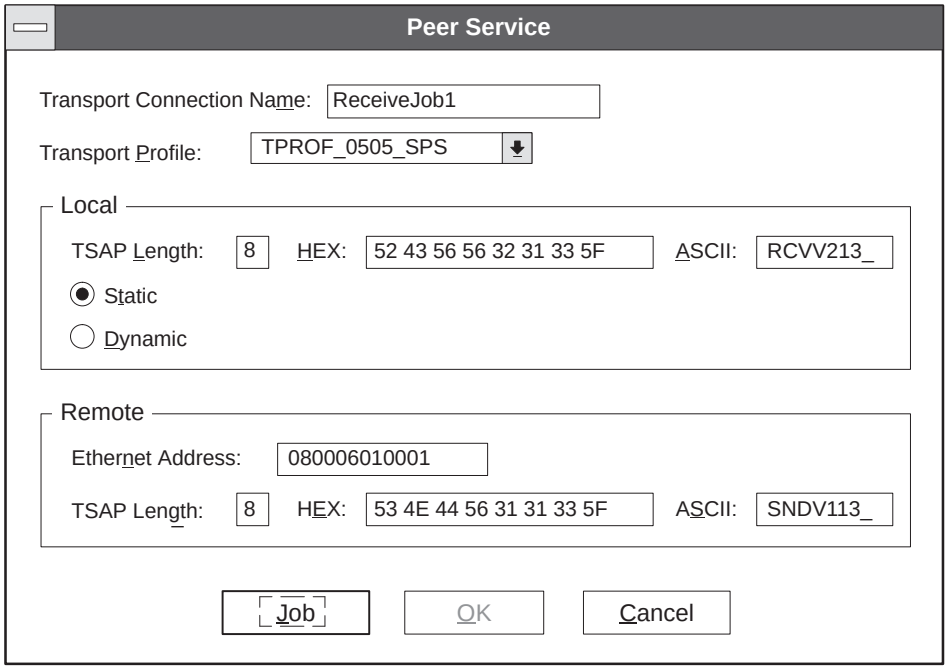


Figure 6-24 Peer Service Dialog Box

5. Press Tab three times, or move the mouse cursor to the ASCII field for the Remote TSAP and double click the button. Type: **SNDV113** (send data from V-memory starting at location V113). (When you press Tab or click the mouse button at another location in this dialog box, the HEX field is updated automatically with the hex codes that represent the ASCII characters in both Local and Remote fields.)

Defining the Receive Job for PLC B

The following steps are required to complete the Peer connection for PLC B, by defining the type of job, the handshaking bits, the V-memory address for job status, and the blocks of data in memory to be transferred.

1. Click on the **Job** button bottom of the Peer Service dialog box, or press Enter to open the Job Definition window shown in Figure 6-25.

2. Press and hold the mouse button to open the **Type** drop-down list box and slide the cursor down the menu until **Receive** is highlighted. Select this choice by releasing the button. (Or you can press ↓ on your keyboard to select **Receive**.)

3. Activate the editing cursor in the **Job Start Bit** field and set the **Job Start Bit** to 6,01. (When you press Tab or click the mouse button at another location in this dialog box, the **Job Active Bit** field is updated.)

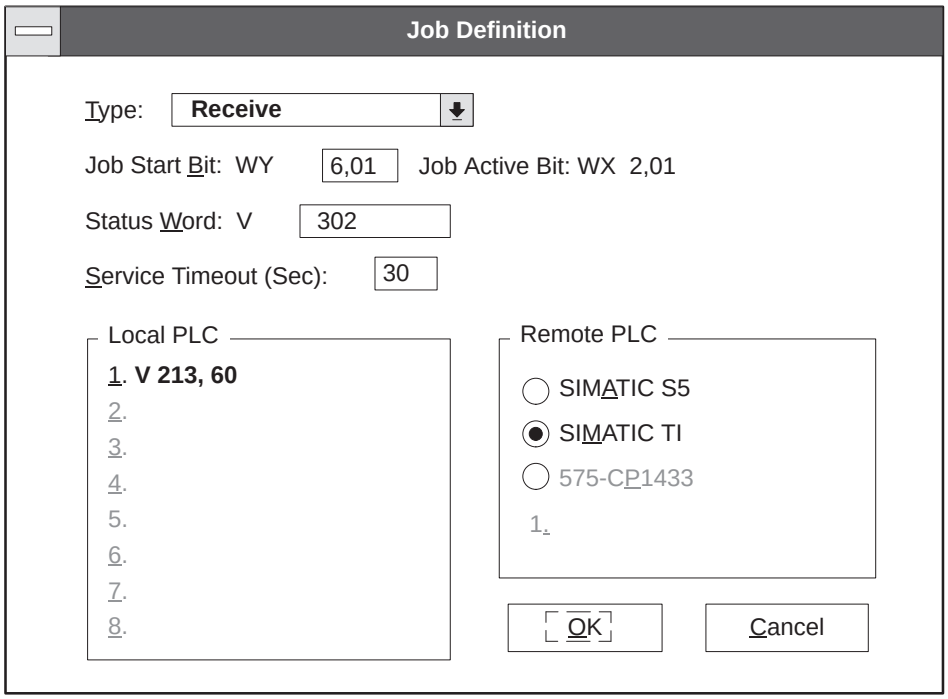


Figure 6-25 Job Definition Dialog Box

4. In the **Status Word** data field, assign a V-memory word address that stores the error status of the data transfer. The value can be read by the RLL program to evaluate the success of the data transfer. For this example, type: **302** in the field.

5. For the **Local PLC,** specify the address in memory where the data sent from the remote PLC is to be stored. Type: **V 213, 60**. This means that incoming data is stored in 60 words, starting at V213.

6. Click on **OK**. The software checks the validity of all values entered, and responds with an error message if a problem is found. If all values are valid, they are saved and you return to the Peer Service dialog box.

7. Click on **OK** in the Peer Service window. The software checks the validity of all values entered, responding with an error message if a problem is found. If all values are valid, they are saved and you return to the main configuration screen (Figure 6-26). **ReceiveJob1** now appears in the Peer Services list box.

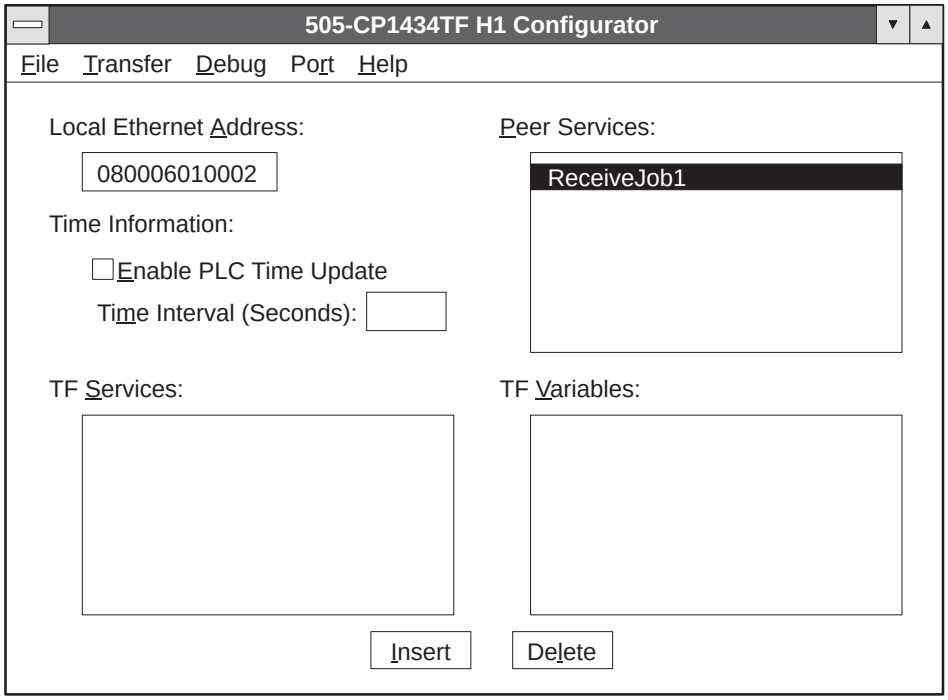


Figure 6-26 Main Configuration Screen

Writing the Configuration File to Disk

Before you can transfer the configuration file to the H1 CP, you need to name it and write it to the computer's disk.

1. Click on **File** to open the pull-down menu.
2. Select **Save As** by highlighting the choice and releasing the button.

Saving and Naming the Configuration File

To save your new configuration file using **Save As**, follow these steps. Refer to Figure 6-27.

1. Verify that the directory shown on the screen is correct. The file is saved in this directory.
2. Type the name of the file: **`Example4.h1`** in the **File Name** data field.
3. Click on **OK**. The software saves the configuration file and takes you back to the main configuration screen. The new file name now appears in the title bar of the main configuration screen.

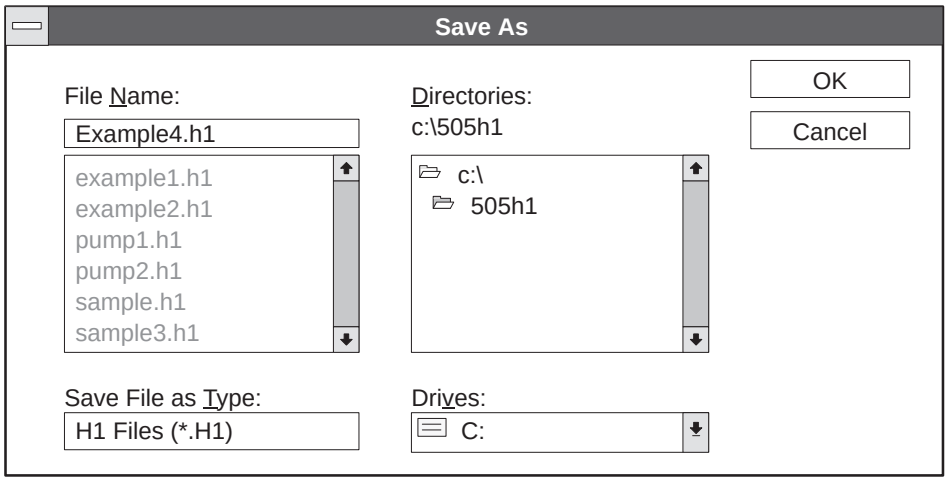


Figure 6-27 Save As Dialog Box

Downloading the Configuration File

You can now download the configuration file to flash memory in the H1 CP module. At the top of the main configuration screen, click on **Transfer**. Slide the cursor down to highlight **Download Configuration To CP** and release the button. You can also use the keyboard by pressing Alt T, then Enter. Figure 6-28 shows the dialog box that appears after you select the **Download Configuration To CP** option.

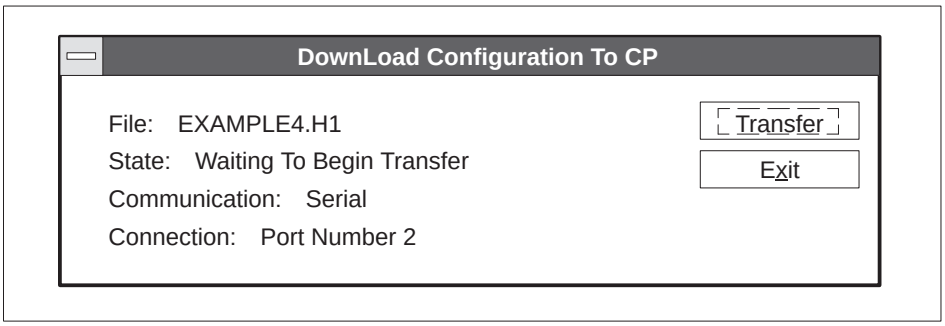


Figure 6-28 Download Configuration to CP Dialog Box

1. Verify the port selection. If the default Port 1 is correct, go to step 2. Otherwise, select the correct port on the **Port→Serial Port Selection** menu. If you are using the DOS version, select **Debug→Serial Port**.

2. To initiate the transfer operation, click on the **Transfer** button. An overwrite warning message appears. See Figure 6-29. Click on **OK** to overwrite the file.

3. The message in the **State** field changes as the transfer operation is running. After the transfer operation has completed successfully, the **Transfer** button becomes inactive (dimmed). Click on **Exit** to exit from the window.

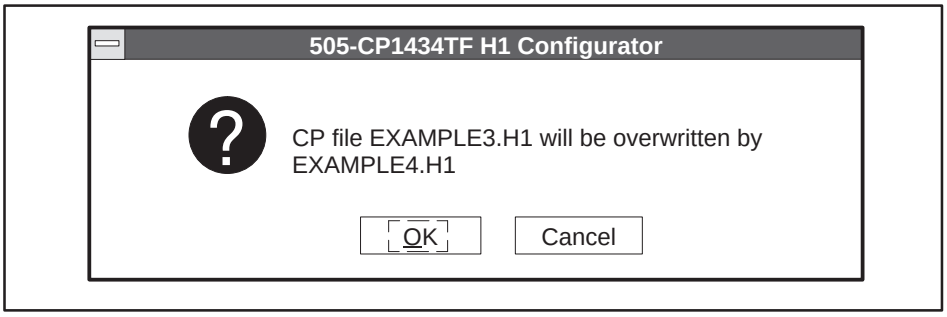


Figure 6-29 Configuration File Overwrite Warning

Observing the Module LED Status

After the file has been successfully transferred to the H1 CP module, the status LEDs on the H1 CP module go off temporarily and the module executes an automatic reset operation. After about 10 or 15 seconds, the MOD GOOD LED indicator comes on, followed a few seconds later by the MOD READY indicator. When both LEDs are on and steady, the module is ready to begin or to resume operation.

Figure 6-30 shows a summary of the configuration files you have created for each of the programmable logic controller stations. The arrows show the required matching of Ethernet addresses, TSAPs, and Job Types to complete the data transfer connection.

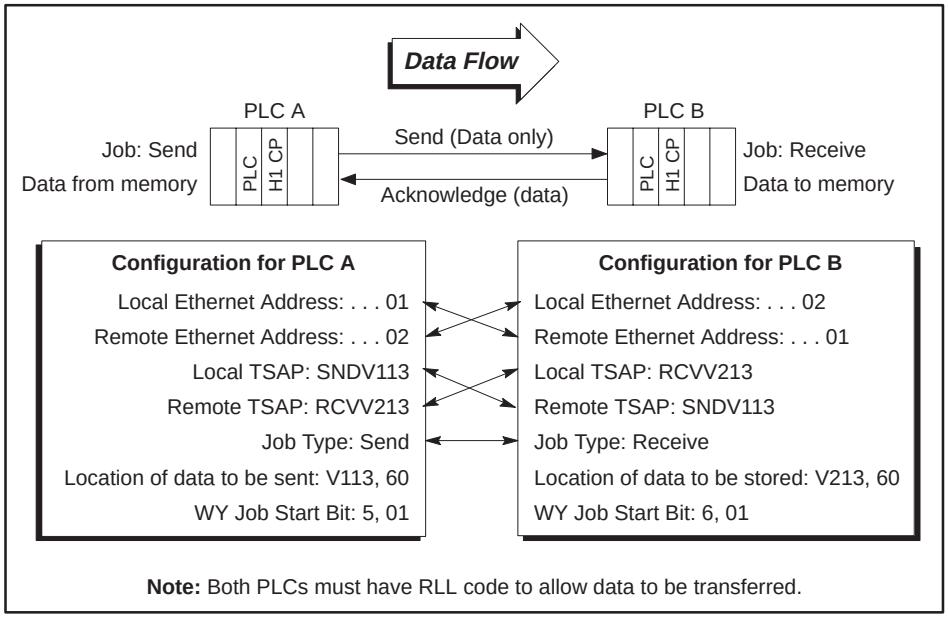


Figure 6-30 Summary of Configurations for Send/Receive Data Transfer

After successfully loading the configuration files to both programmable logic controller stations, RLL coding must be added to the RLL programs of both programmable logic controllers to activate the transfer of data. Refer to Figure 6-31 for an example of RLL code to activate the Send request and to Figure 6-32 for an example of RLL code to activate the Receive request.

Example RLL Code for Send Job at PLC A

The Relay Ladder Logic example in Figure 6-31 demonstrates a typical scenario for enabling a Send request. This section assumes that you are familiar with Series 505 programmable logic controller language. The WX and WY locations used in this RLL example correspond to module I/O addresses that have been configured in programmable logic controller memory using the Configure I/O function in TISOFT.

The logic shown in Figure 6-31 performs as follows:

C98	Enables condition logic defined by the application (Xu) which must remain active until job completion.
MOVW1	Sets status word V300 to a positive value (1) prior to each transaction. This positive value is used for job completion check in CMP1.
BITP3/BITP4	Assures that no pending Peer Service jobs exist prior to starting a Peer Service (defined for Bit 1 of H1 CP module, located at I/O address WY5).
BITC3	Clears the H1 CP Peer Service defined for Bit 1 of the H1 CP module located at WY5 after the Peer Service job active bit WX1 is set.
BITS2	Sets the H1 CP Peer Service Start Bit defined for Bit 1 of the H1 CP module located at WY5 to invoke a data transfer function.
CMP1	Tests the completion status of the Peer Service data transfer by the same H1 CP module, placed in V300, against a zero constant stored at location V15. When the Peer job has completed, the value of status word V300 is zero—good transaction—or a non-zero value (see NO TAG)—bad transaction. You must take appropriate action in the USER ERROR CONTROL LOGIC ladder rung at this time. If the Peer Service is to be executed only one time, you take must take action to disable Xu after the Status word changes value from its preset condition.
TMR2 BITC4	The parallel net of C41 and C43 act together to start and hold TMR2 on until the H1CP recognizes the Job Start bit WY5, 1 has been set and responds by setting the Job Active bit WX1, 1 or TMR2 time expires. TMR2 and BITC4 are used to clear an unrecognized Job Start bit WY5, 1. Either a reset of the CP or a power cycle of the entire base may result in the programmable logic controller ladder setting a WY Job Start bit prior to CP module recovery. When this condition occurs the CP module will not execute the job.

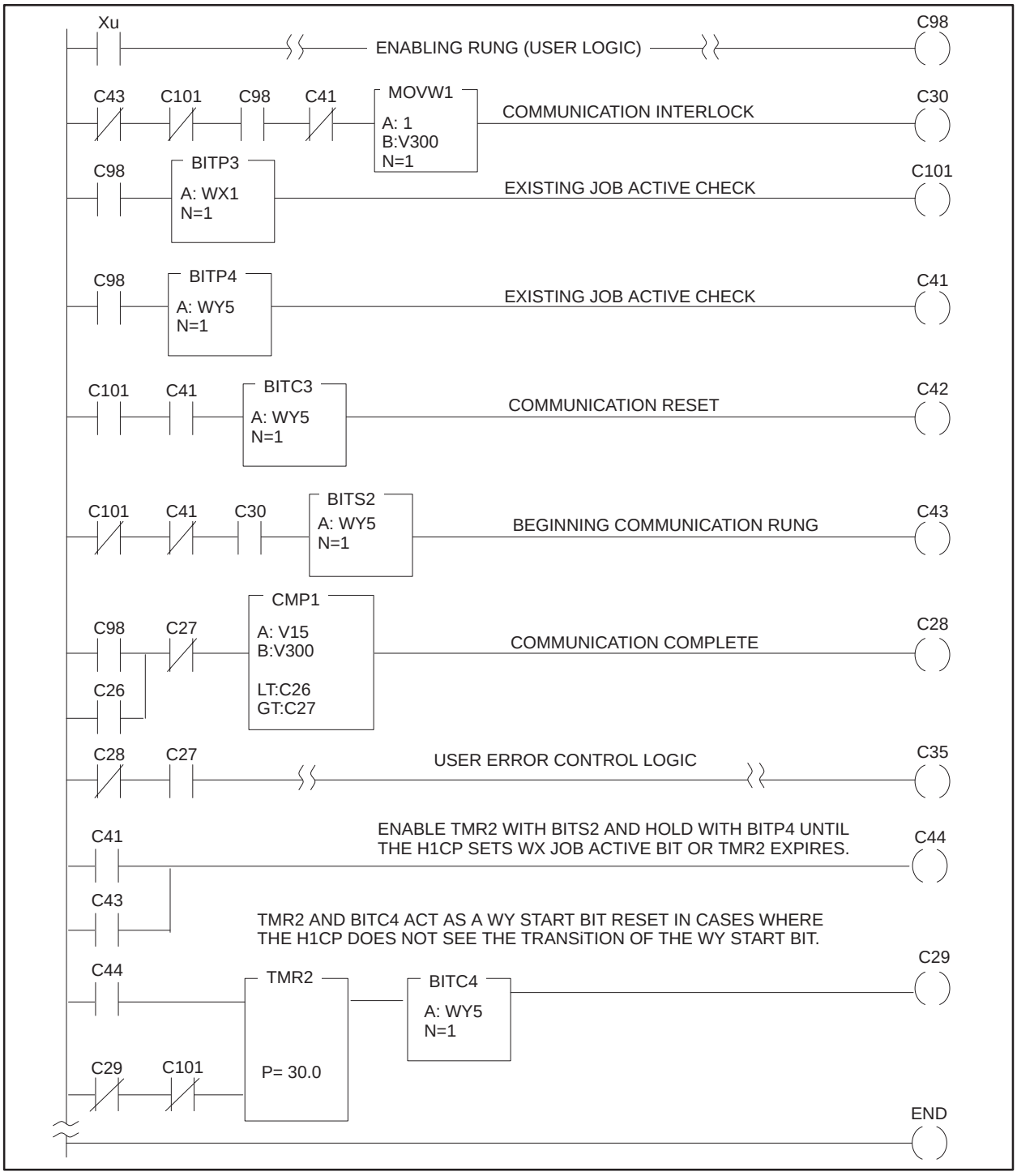


Figure 6-31 Send Relay Ladder Logic for PLC A

Example RLL Code for Receive Job at PLC B

The Relay Ladder Logic example in Figure 6-32 demonstrates a typical scenario for enabling a Receive acknowledgement. This section assumes that you are familiar with Series 505 programmable logic controller language. The WX and WY locations used in this RLL example correspond to module I/O addresses that have been configured in programmable logic controller memory using the Configure I/O function.

The logic shown in Figure 6-32 performs as follows:

C49	Enables condition logic defined by the application (Xu) which must remain active until job completion.
MOVW1	Sets status word V302 to a positive value (1) prior to each transaction. This positive value is used for job completion check in CMP1.
BITP1/BITP2	Assures that no pending Peer Service jobs exist prior to starting a Peer Service defined for Bit 1 of H1 CP module, located at I/O address WY14.
BITC1	Clears the H1 CP Peer Service defined for Bit 1 of the H1 CP module located at WY14 after the Peer Service job active bit WX10 is set.
BITS1	Sets the H1CP Peer Service Start Bit defined for Bit 1 of the H1 CP module located at WY14 to invoke a data transfer function.
CMP1	Tests the completion status of the Peer Service data transfer by the same H1 CP module, placed in V302, against a zero constant stored at location V25. When the Peer job has completed, the value of status word V302 is zero—good transaction—or a non-zero value (see NO TAG)—bad transaction. You must take appropriate action in the USER ERROR CONTROL LOGIC ladder rung at this time. If the Peer Service is to be executed only one time, you take must take action to disable Xu after the Status word changes value from its preset condition.
TMR1 BITC2	The parallel net of C31 and C33 act together to start and hold TMR1 on until the H1CP recognizes the Job Start bit WY14, 1 has been set and responds by setting the Job Active bit WX10, 1 or TMR1 time expires. TMR1 and BITC2 are used to clear an unrecognized Job Start bit WY14, 1. Either a reset of the CP or a power cycle of the entire base may result in the programmable logic controller ladder setting a WY Job Start bit prior to CP module recovery. When this condition occurs the CP module will not execute the job.

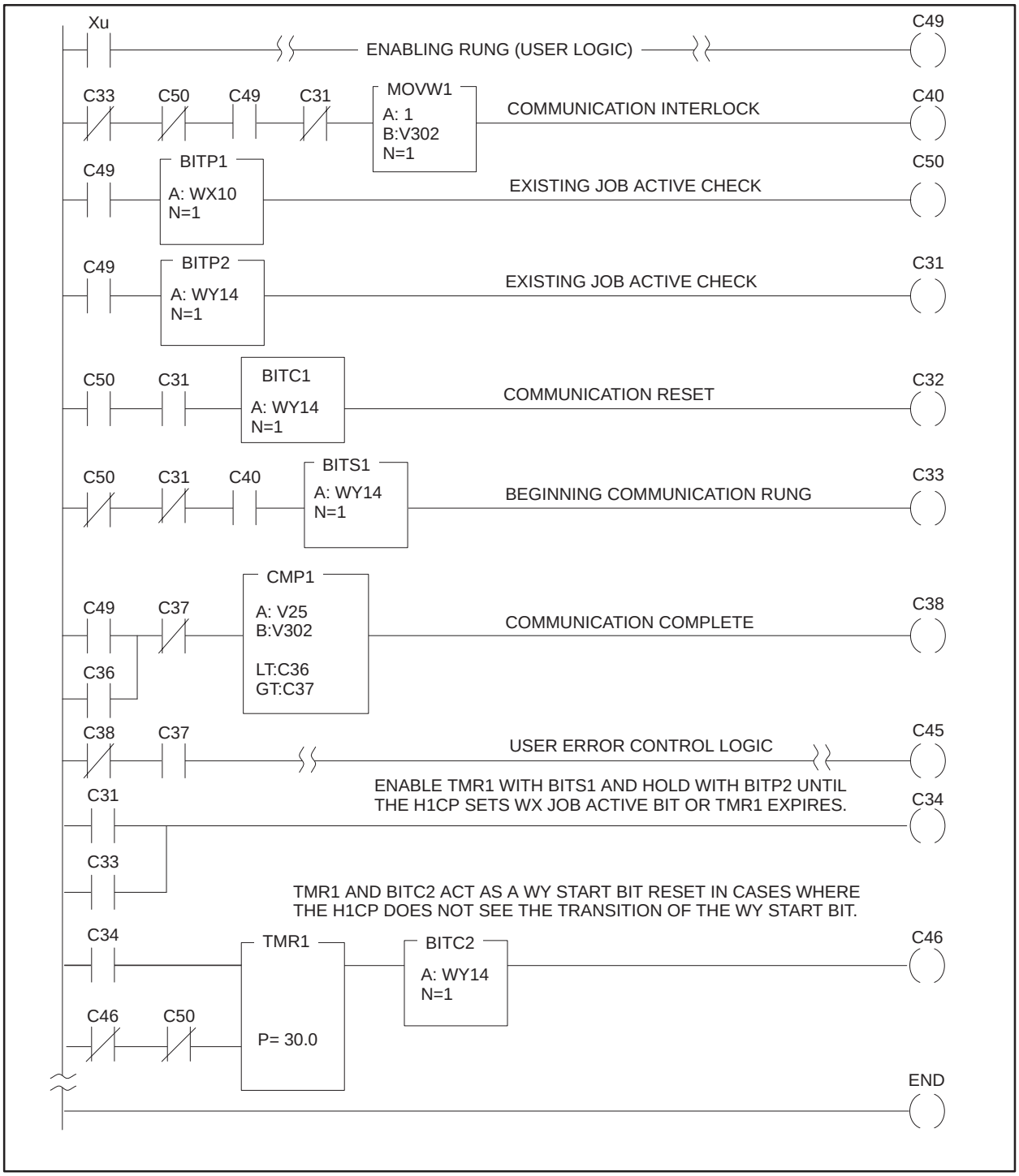


Figure 6-32 Receive Relay Ladder Logic for PLC B

Successful Timing Example

Figure 6-33 shows the sequence of events for a successful Send/Receive transaction.

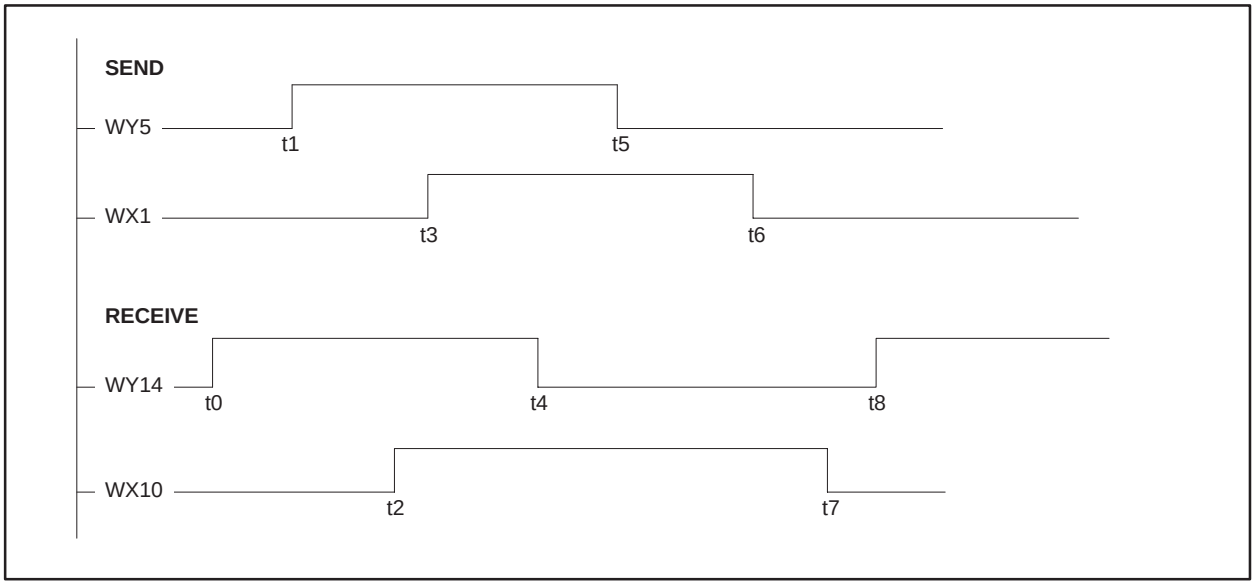


Figure 6-33 Successful Timing Example

The list below explains the sequence of events.

t0 Receive job enables Peer Service data transfer to accept request.

t1 Send job requests that a peer transfer be invoked.

t2 Receive Job Active bit is set by the H1 CP. Receive job waits for Send job to transmit the data.

t3 Send Job Active bit is set by the H1 CP. Data transfer begins.

t4 Receive Job Start Bit is reset to inactive by Receive job RLL in response to H1 CP Job Active bit going high.

t5 Send Job Start Bit is reset to inactive by Send job RLL in response to H1 CP Job Active bit going high.

t6 Send job completes the data transfer. Send job resets Job Active bit. Send job is complete.

t7 Receive job has received data and placed it in programmable controller memory. Receive job resets Job Active bit. Receive job is complete.

t8 Receive job re-enables the peer data transfer service for another data transfer if required.

Unsuccessful Timing Example

Figure 6-34 shows the sequence of events for an unsuccessful Send/Receive transaction.

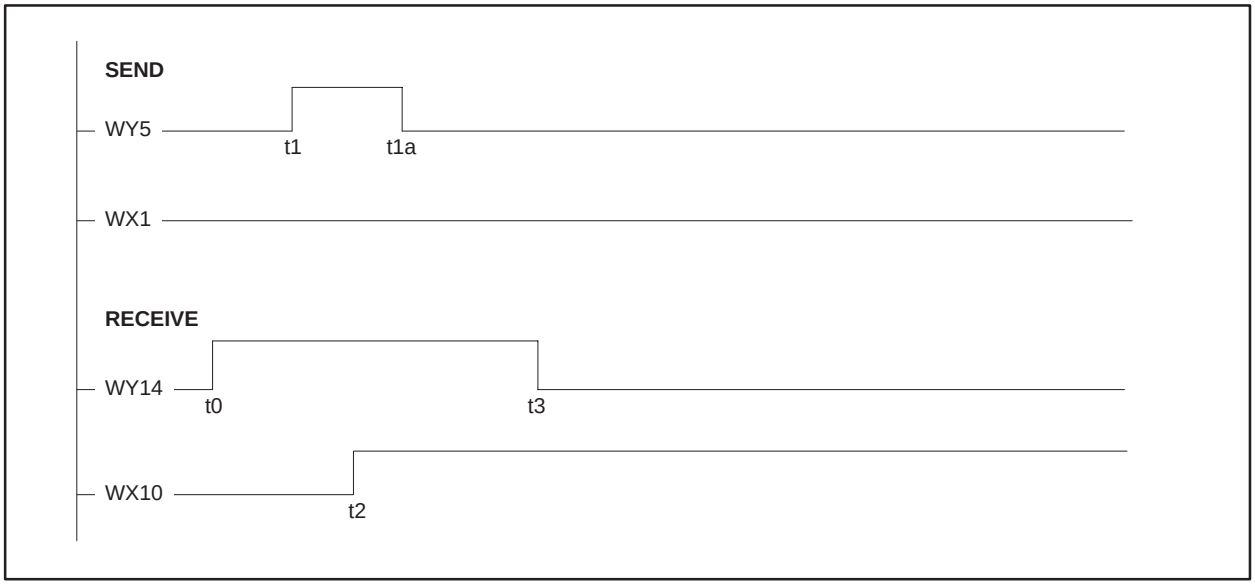


Figure 6-34 Unsuccessful Timing Example

The list below explains the sequence of events.

t0 Receive job enables Peer Service data transfer to accept request.

t1 Send job requests that a peer transfer be invoked.

t1a PLC sets WY5 low *before* seeing WX1 go high. (RLL code prematurely resets WY5 to zero.)

t2 Receive Job Active bit is set active by the H1 CP. Receive waits for Send data transfer.

WX1 never goes high; that is, the job never starts.

t3 Receive job Start Bit is reset to inactive by Receive job RLL in response to H1 CP Job Active bit.

WX10 remains high until data is actually sent.

Appendix A

Reference Data

A.1 Data Element List

Table A-1 shows the allowed data types (elements) for local or remote SIMATIC TI505 PLCs. It also shows the SIMATIC S5 data type to use when accessing a TI505 from an S5 PLC; (see Section A.5 for examples).

For more information on using TF Services, refer to the *SINEC TF User Interface User Guide*, Version: 12/91, Order No. 6GK1971-1AB00-0AA1.

Table A-1 Data Element List

Data Element Description	Notes	Name	PLC TT	Access	PLC Repres.	S5 Q/ZTYP	S5 DBNR Hex (Dec)	TF Encoding	S5 Types
Variable Memory		V	01	read/ write	integer	DB=01	msb offset	Integer16	b
Constant		K	02	r/w	integer	PB=05	msb offset	Integer16	b
Discrete Input		X	03	r/w	Boolean	BS=08	03 (3)	Boolean	a
Discrete Output		Y	04	r/w	Boolean	BS=08	04 (4)	Boolean	a
Control Register		C	05	r/w	Boolean	BS=08	05 (5)	Boolean	a
Discrete Input Packed		XP	06	r/w	packed	EB=03		Bitstring1	a
Discrete Output Packed		YP	07	r/w	packed	AB=04		Bitstring1	a
Control Register Packed		CP	08	r/w	packed	MB=02		Bitstring1	a
Word Input		WX	09	r/w	integer	BS=08	09 (9)	Integer16	b
Word Output		WY	0A	r/w	integer	BS=08	0A (10)	Integer16	b
Timer/Counter Preset		TCP	0E	r/w	integer	BS=08	0E (14)	Unsigned16	b
Timer/Counter Current		TCC	0F	r/w	integer	BS=08	0F (15)	Unsigned16	b
Drum Step Preset		DSP	10	r/w	integer	BS=08	10 (16)	Unsigned16	b
Drum Step Current		DSC	11	r/w	integer	BS=08	11 (17)	Unsigned16	b
Drum Count Preset	4	DCP	12	r/w	integer	BS=08	12 (18)	Unsigned16	b
System Status Words		STW	1A	r/w	16-bit	BS=08	1A (26)	Unsigned16	b
Drum Current Count		DCC	1B	read	32-bit	BS=08	1B (27)	Unsigned32	c
Variable Memory	5	VF	1C	r/w	real	TB=07	msb offset	FloatingPoint	c
Constant Memory	5	KF	1D	r/w	real	ZB=06	msb offset	FloatingPoint	c
Loop Status		LS	1E	read	16-bit	BS=08	1E (30)	Unsigned16	b
Loop Mode		LM	1F	r/w	16-bit	BS=08	1F (31)	Unsigned16	b
Loop Gain		LKC	20	r/w	real	BS=08	20 (32)	FloatingPoint	c
Loop Reset time (minutes)		LTI	21	r/w	real	BS=08	21 (33)	FloatingPoint	c
Loop Rate time (minutes)		LTD	22	r/w	real	BS=08	22 (34)	FloatingPoint	c
Loop High Alarm Limit		LHA	23	r/w	real	BS=08	23 (35)	FloatingPoint	c
Loop Low Alarm Limit		LLA	24	r/w	real	BS=08	24 (36)	FloatingPoint	c
Loop Process Variable		LPV	25	r/w	real	BS=08	25 (37)	FloatingPoint	c
Loop PV High Limit		LPVH	26	r/w	real	BS=08	26 (38)	FloatingPoint	c
Loop PV Low Limit		LPVL	27	r/w	real	BS=08	27 (39)	FloatingPoint	c
Loop Orange Deviation Alarm Limit		LODA	28	r/w	real	BS=08	28 (40)	FloatingPoint	c

S5 Allowable Data Types	
a) Boolean (Integer8, Unsigned8):	MB, EB, AB, PB, QB, OY
b) Integer16, Unsigned16:	DB, ZB, TB, BS, AS, DX, DE
c) Unsigned32, FloatingPoint:	DB, ZB, TB, BS, AS, DX, DE *
*S5 side of transfer length must be specified as 2 times the length of H1 CP transfer length.	

Table A-1 Data Element List (continued)

Data Element Description	Notes	Name	PLC TT	Access	PLC Repres.	S5 Q/ZTYP	S5 DBNR Hex (Dec)	TF Encoding	S5 Types
Loop Yellow Deviation Alarm Limit		LYDA	29	r/w	real	BS=08	29 (41)	FloatingPoint	c
Loop Sample rate (seconds)		LTS	2A	r/w	real	BS=08	2A (42)	FloatingPoint	c
Loop Setpoint		LSP	2B	r/w	real	BS=08	2B (43)	FloatingPoint	c
Loop Output (percent)		LMN	2C	r/w	real	BS=08	2C (44)	FloatingPoint	c
Loop V-flags	6	LVF	2D	r/w	16-bit	BS=08	2D (45)	Unsigned16	b
Loop C-flags		LCF	2E	r/w	32-bit	BS=08	2E (46)	Unsigned32	c
Loop Ramp/Soak Status Flags	6	LRSF	2F	r/w	16-bit	BS=08	2F (47)	Unsigned16	b
Loop Error		LERR	30	read	real	BS=08	30 (48)	FloatingPoint	c
Loop Bias		LMX	31	r/w	real	BS=08	31 (49)	FloatingPoint	c
Loop High-High Alarm Limit		LHHA	32	r/w	real	BS=08	32 (50)	FloatingPoint	c
Loop Low-Low Alarm Limit		LLLA	33	r/w	real	BS=08	33 (51)	FloatingPoint	c
Loop Rate-of-change Alarm Limit		LRCA	34	r/w	real	BS=08	34 (52)	FloatingPoint	c
Loop Setpoint High Limit		LSPH	35	r/w	real	BS=08	35 (53)	FloatingPoint	c
Loop Setpoint Low Limit		LSPL	36	r/w	real	BS=08	36 (54)	FloatingPoint	c
Loop Alarm Deadband		LADB	37	r/w	real	BS=08	37 (55)	FloatingPoint	c
Loop Raw High Alarm Limit		LHAR	38	r/w	integer	BS=08	38 (56)	Unsigned16	b
Loop Raw Low Alarm Limit		LLAR	39	r/w	integer	BS=08	39 (57)	Unsigned16	b
Loop Raw Process Variable		LPVR	3A	r/w	integer	BS=08	3A (58)	Unsigned16	b
Loop Raw Orange Dev Alarm Limit		LODAR	3B	r/w	integer	BS=08	3B (59)	Unsigned16	b
Loop Raw Yellow Dev Alarm Limit		LYDAR	3C	r/w	integer	BS=08	3C (60)	Unsigned16	b
Loop Raw Output		LMNR	3D	r/w	integer	BS=08	3D (61)	Unsigned16	b
Loop Raw Setpoint		LSPR	3E	r/w	integer	BS=08	3E (62)	Unsigned16	b
Loop Raw Error		LERRR	3F	read	integer	BS=08	3F (63)	Integer16	b
Loop Raw High/High Alarm Limit		LHHAR	40	r/w	integer	BS=08	40 (64)	Unsigned16	b
Loop Raw Low/Low Alarm Limit		LLLAR	41	r/w	integer	BS=08	41 (65)	Unsigned16	b
Loop Raw Alarm Deadband		LADBR	42	r/w	integer	BS=08	42 (66)	Unsigned16	b
Loop Raw Bias		LMXR	48	r/w	integer	BS=08	48 (72)	Integer16	b
Loop Raw Setpoint Low Limit		LSPLR	49	r/w	integer	BS=08	49 (73)	Unsigned16	b
Loop Raw Setpoint High Limit		LSPHR	4A	r/w	integer	BS=08	4A (74)	Unsigned16	b
Loop Most-sig word loop C-flags		LCFH	4B	r/w	integer	BS=08	4B (75)	Unsigned16	b
Loop Least-sig word loop C-flags		LCFL	4C	r/w	integer	BS=08	4C (76)	Unsigned16	b

S5 Allowable Data Types	
a) Boolean (Integer8, Unsigned8):	MB, EB, AB, PB, QB, OY
b) Integer16, Unsigned16:	DB, ZB, TB, BS, AS, DX, DE
c) Unsigned32, FloatingPoint:	DB, ZB, TB, BS, AS, DX, DE *
*S5 side of transfer length must be specified as 2 times the length of H1 CP transfer length.	

Table A-1 Data Element List (continued)

Data Element Description	Notes	Name	PLC TT	Access	PLC Repres.	S5 Q/ZTYP	S5 DBNR Hex (Dec)	TF Encoding	S5 Types
Loop Derivative Gain Limiting Coef		LKD	4D	r/w	real	BS=08	4D (77)	FloatingPoint	c
Loop Ramp/Soak Step Number		LRSN	4E	r/w	integer	BS=08	4E (78)	Unsigned16	b
Loop Alarm Acknowledge Flags		LACK	4F	r/w	integer	BS=08	4F (79)	Unsigned16	b
High Alarm Limit	7	AHA	50	r/w	real	BS=08	50 (80)	FloatingPoint	c
Low Alarm Limit	7	ALA	51	r/w	real	BS=08	51 (81)	FloatingPoint	c
Process Variable	7	APV	52	r/w	real	BS=08	52 (82)	FloatingPoint	c
PV High Limit	7	APVH	53	r/w	real	BS=08	53 (83)	FloatingPoint	c
PV Low Limit	7	APVL	54	r/w	real	BS=08	54 (84)	FloatingPoint	c
Orange Deviation Alarm Limit	7	AODA	55	r/w	real	BS=08	55 (85)	FloatingPoint	c
Yellow Deviation Alarm Limit	7	AYDA	56	r/w	real	BS=08	56 (86)	FloatingPoint	c
Sample rate in seconds	7	ATS	57	r/w	real	BS=08	57 (87)	FloatingPoint	c
Alarm Setpoint	7	ASP	58	r/w	real	BS=08	58 (88)	FloatingPoint	c
Alarm V-flags	6, 7	AVF	59	r/w	16-bit	BS=08	59 (89)	Unsigned16	b
Alarm C-flags	7	ACF	5A	r/w	32-bit	BS=08	5A (90)	Unsigned32	c
Alarm Error	7	AERR	5B	read	real	BS=08	5B (91)	FloatingPoint	c
High-High Alarm Limit	7	AHHA	5C	r/w	real	BS=08	5C (92)	FloatingPoint	c
Low-Low Alarm Limit	7	ALLA	5D	r/w	real	BS=08	5D (93)	FloatingPoint	c
Rate-of-change Alarm Limit	7	ARCA	5E	r/w	real	BS=08	5E (94)	FloatingPoint	c
Setpoint High Limit	7	ASPH	5F	r/w	real	BS=08	5F (95)	FloatingPoint	c
Setpoint Low Limit	7	ASPL	60	r/w	real	BS=08	60 (96)	FloatingPoint	c
Alarm Deadband	7	AADB	61	r/w	real	BS=08	61 (97)	FloatingPoint	c
Raw High Alarm Limit	7	AHAR	62	r/w	integer	BS=08	62 (98)	Unsigned16	b
Raw Low Alarm Limit	7	ALAR	63	r/w	integer	BS=08	63 (99)	Unsigned16	b
Raw Process Variable	7	APVR	64	r/w	integer	BS=08	64 (100)	Unsigned16	b
Raw Orange Deviation Alarm Limit	7	AODAR	65	r/w	integer	BS=08	65 (101)	Unsigned16	b
Raw Yellow Deviation Alarm Limit	7	AYDAR	66	r/w	integer	BS=08	66 (102)	Unsigned16	b
Alarm Raw Setpoint	7	ASPR	67	r/w	integer	BS=08	67 (103)	Unsigned16	b
Raw Alarm Deadband	7	AADBR	68	r/w	integer	BS=08	68 (104)	Unsigned16	b
Alarm Raw Error	7	AERRR	69	read	integer	BS=08	69 (105)	Integer16	b
Raw High-High Alarm Limit	7	AHHAR	6A	r/w	integer	BS=08	6A (106)	Unsigned16	b
Raw Low-Low Alarm Limit	7	ALLAR	6B	r/w	integer	BS=08	6B (107)	Unsigned16	b
Raw Setpoint Low Limit	7	ASPLR	6F	r/w	integer	BS=08	6F (111)	Unsigned16	b
Raw Setpoint High Limit	7	ASPHR	70	r/w	integer	BS=08	70 (112)	Unsigned16	b

S5 Allowable Data Types	
a) Boolean (Integer8, Unsigned8):	MB, EB, AB, PB, QB, OY
b) Integer16, Unsigned16:	DB, ZB, TB, BS, AS, DX, DE
c) Unsigned32, FloatingPoint:	DB, ZB, TB, BS, AS, DX, DE *
*S5 side of transfer length must be specified as 2 times the length of H1 CP transfer length.	

Table A-1 Data Element List (continued)

Data Element Description	Notes	Name	PLC TT	Access	PLC Repres.	S5 Q/ZTYP	S5 DBNR Hex (Dec)	TF Encoding	S5 Types
Most-sig word Alarm C-flags	7	ACFH	71	r/w	integer	BS=08	71 (113)	Unsigned16	b
Least-sig word Alarm C-flags	7	ACFL	72	r/w	integer	BS=08	72 (114)	Unsigned16	b
Alarm Acknowledge Flags	7	AACK	73	r/w	integer	BS=08	73 (115)	Unsigned16	b
VME (TI575 only) A24 Space	1	VMM	D3	r/w	integer	AS=09	msb offset	Integer16	b
VME (TI575 only) A16 Space	1	VMS	D4	r/w	integer	BS=08	D4 (212)	Integer16	b
GZ (App Z global Variables)	3	GZ	D5	r/w	integer	BS=08	D5 (213)	Integer16	b
GY (App Y global Variables)	3	GY	D6	r/w	integer	BS=08	D6 (214)	Integer16	b
GX (App X global Variables)	3	GX	D7	r/w	integer	BS=08	D7 (215)	Integer16	b
GW (App W global Variables)	3	GW	D8	r/w	integer	BS=08	D8 (216)	Integer16	b
GV (App V global Variables)	3	GV	D9	r/w	integer	BS=08	D9 (217)	Integer16	b
GU (App U global Variables)	3	GU	DA	r/w	integer	BS=08	DA (218)	Integer16	b
GT (App T global Variables)	3	GT	DB	r/w	integer	BS=08	DB (219)	Integer16	b
GS (App S global Variables)	3	GS	DC	r/w	integer	BS=08	DC (220)	Integer16	b
GR (App R global Variables)	3	GR	DD	r/w	integer	BS=08	DD (221)	Integer16	b
GQ (App Q global Variables)	3	GQ	DE	r/w	integer	BS=08	DE (222)	Integer16	b
GP (App P global Variables	3	GP	DF	r/w	integer	BS=08	DF (223)	Integer16	b
GO (App O global Variables)	3	GO	E0	r/w	integer	BS=08	E0 (224)	Integer16	b
GN (App N global Variables)	3	GN	E1	r/w	integer	BS=08	E1 (225)	Integer16	b
GM (App M global Variables)	3	GM	E2	r/w	integer	BS=08	E2 (226)	Integer16	b
GL (App L global Variables)	3	GL	E3	r/w	integer	BS=08	E3 (227)	Integer16	b
GK (App K global Variables)	3	GK	E4	r/w	integer	BS=08	E4 (228)	Integer16	b
GJ (App J global Variables)	3	GJ	E5	r/w	integer	BS=08	E5 (229)	Integer16	b
GI (App I global Variables)	3	GI	E6	r/w	integer	BS=08	E6 (230)	Integer16	b
GH (App H global Variables)	3	GH	E7	r/w	integer	BS=08	E7 (231)	Integer16	b
GG (App G global Variables)	3	GG	E8	r/w	integer	BS=08	E8 (232)	Integer16	b
GF (App F global Variables)	3	GF	E9	r/w	integer	BS=08	E9 (233)	Integer16	b
GE (App E global Variables)	3	GE	EA	r/w	integer	BS=08	EA (234)	Integer16	b
GD (App D global Variables)	3	GD	EB	r/w	integer	BS=08	EB (235)	Integer16	b
GC (App C global Variables)	3	GC	EC	r/w	integer	BS=08	EC (236)	Integer16	b
GB (App B global Variables)	3	GB	ED	r/w	integer	BS=08	ED (237)	Integer16	b
GA (App A global Variables)	3	GA	EE	r/w	integer	BS=08	EE (238)	Integer16	b
G (Local App global Variabls)	2	G	EF	r/w	integer	BS=08	EF (239)	Integer16	b

S5 Allowable Data Types	
a) Boolean (Integer8, Unsigned8):	MB, EB, AB, PB, QB, OY
b) Integer16, Unsigned16:	DB, ZB, TB, BS, AS, DX, DE
c) Unsigned32, FloatingPoint:	DB, ZB, TB, BS, AS, DX, DE *
*S5 side of transfer length must be specified as 2 times the length of H1 CP transfer length.	

Note 1. VMS corresponds to VME address modifier 29 (Short non-privileged access). VMM corresponds to VME address modifier 39 (Standard non-privileged data access.) The access size is always 16 bits. The offset field contains the relative word of the specified address space. Access to VMS and VME partitions is not supported by TF name-encoded addressing.

Note 2. The G memory partitions (in the TI575 PLC) are global memories accessible by the local PLC as well as by other bus masters. Access to the G memory partition associated with the local PLC is provided through plcTT ef (hex). The addressing of this partition is 24 bit zero relative; (i.e., the first element of G memory is G1, which has an offset of 0).

Note 3. Each PLC in a TI575 system may contain one or more application process. These applications are identified by a single letter ranging from Application A through Application Z. Associated with each application is a G Memory partition. Access to the G memory partitions (in the TI575 PLC) associated with a PLC application is provided through plcTT d5 through ee (hex). Addressing (plcTT offset) of these partitions is 24 bit zero relative.

Note 4. The DCP address is a three-byte address containing a drum number in the most significant 20 bits and a step number in the least significant 4 bits. The format is as follows:

<DCP> <drum address> <step number>, <number of steps>

For example: DCP 5 S 1, 16 indicates the Drum Count Preset values of Drum 5, starting at Step 1, through Step 16.

Note 5. The VF and KF types are overlaid on the V and K memory directly. Note that VF and KF addressing makes use of word-oriented addressing even though VF and KF refer to double-word (real) data elements. For example, VF100 references the 32-bit (IEEE) floating-point value stored at locations V100 and V101.

Note 6. These flags have a “control” part and a “status” part. When written, only the control part is written. When read, the status part is returned with the control part set to zero.

Note 7. This data element is an Analog Alarm type.

NOTE: Some S5 family products limit the range of offsets that you can specify in Read/Write Active transactions. Note that this may limit your ability to access the full range of data types and offsets available in the SIMATIC TI505 PLCs from an S5 (see Section A.5 for more information).

A.2 TF Services

Services Supported

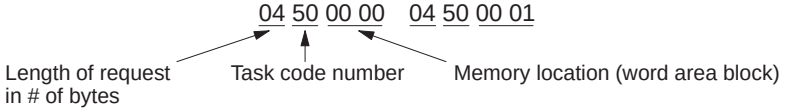
Table A-2 lists the services supported by the H1 CP Layer 7 associations.

Table A-2 TF Services Supported

TF Service Category	Services Supported
General Management Services	Initiate Conclude Abort
VMD Support Services	Status Get Namelist Identify
Variable Access Services	Read Write Get Variable Access Attributes
Domain Management Services **Note:** Host must specify the domain name P_DOMAIN.	Initiate Download Sequence Download Segment Terminate Download Sequence Initiate Upload Sequence Upload Segment Terminate Upload Sequence Delete Domain Get Domain Attributes
Program Invocation Management Services **Note:** Host must specify the program invocation name P_PROGRAM.	Create Program Invocation Delete Program Invocation Start Stop Reset Get Program Invocation Attributes
Non-Open Services	Message Exchange (see below)

The TF Message Exchange service allows the host to issue Series 505 Task Codes to the server PLC. The CP module interprets the request as one or more task codes and issues these task codes to the PLC (CPU). The CP module returns the PLC's response with the Message Exchange response.

An example of the Message Exchange request format is shown below:



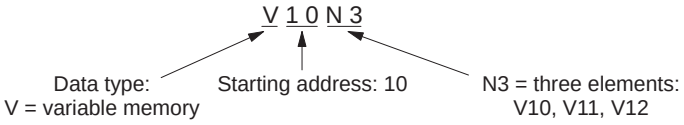
Request = two task code #50 requests to read PLC memory from V1 and from V2.

Refer to *SIMATIC TI575 Task Code User Manual* (PPX:575–8104–x) for more information on Series 505 Task Codes.

Name-Encoded Addressing

Name-encoded addressing allows you to access data elements by TF Read and TF Write by referring to their names as listed in the **Name** column in Table A-1.

The syntax includes the element name and the start address, and can also include a specified number of contiguous elements. For example, V10N3 represents three elements of V-memory data starting at address 10, as shown below.



To request a non-contiguous block of data, the symbol $ is used as a separator between address numbers. For example, V25$100 represents V-memory data at address 25 and also data at address 100. The data type can only be specified once at the beginning of the name-encoded address.

The symbol $ used as a prefix calls for data in raw PLC format.

Table A-3 shows examples of preferred usage name-encoded addresses.

Table A-3 Name-Encoded Address Examples

Encoded Address	Description
V10	V10 (data in V-memory address 10)
V10N3	V10, V11, V12 as an array
V10$2	V10, V2 as an array
$V10	V10 as data in raw PLC format (octet string)
V10N2$20N3	V10, V11, V20, V21, V22 as an array of Integer16
DCP2S1	DCP Drum 2 Step 1
$DCP2S1$3S1N3	DCP Drum 2 Step 1, Drum 3 Step 1, 2, 3 as an octet string

Unconstrained Addressing

Unconstrained Addressing allows you to access data elements by TF Read and TF Write by referring to their PLC partition as listed in the PLC TT column in Table A-1. These addresses use a different protocol specification than other TF Variable addresses; they are not variable names, but they can be encoded and used by a user–written host program.

The Unconstrained Address is a string of 8 octets as specified as in Table A-4:

Table A-4 Unconstrained Addressing

Octet	Description	Comments
0	3	CPU Type (always 3 for 505 PLC)
1	0	CPU ID (always 0)
2	PLC TT	PLC partition from Table A-1
3	msbOffset	Most significant byte data element offset
4	nmsbOffset	Next most significant byte data element offset
5	lsbOffset	Least significant byte data element offset
6	msbLength	Length of data block
7	lsbLength	Length of data block

Data accessed via Unconstrained Addressing is always transferred as an octet string in raw PLC format.

A.3 TF Variables

Data Type Matching Requirements for TF Variables

When creating a simple, pre-defined TF Variable, the type of variable specified must match the data type as listed in Table A-1 (TF Encoding column). Any mismatch results in an error message (enforced by the software's strong data-type checking). For example, if you specify a V-memory location in the **Address** field, the data type defined in the **Data Type** list box below must be **Integer 16**.

The **Data Type** group box is an option that allows you to create a more complex TF Variable.

- An Array is a special type of TF variable that allows more than one memory location to be specified. Array entries apply strong-type rule checking in the same way as the pre-defined types described above. For example, to create an array of floating-point types, you must assign a starting address that specifies a Floating-Point memory type address.
- A Structure is another special type of TF variable. Less restrictive type-checking rules are applied to structures and arrays of structures. Any combination of the pre-defined types can be inserted into a TF Structure. A Structure is checked only to ensure that the last data item falls on a multiple of the memory type specified in the **Address** field (that is, it must adhere to the memory type boundary).

After you program TF Variables in the CP module with the H1 Configurator, a Layer 7 host device can read and write to these variables in the PLC. When reading any variable, the host receives data in the format specified by the Configurator. To ensure correct data type matching when writing variables, follow these guidelines:

- When writing variables specified as simple types or arrays of simple types, the host must send data in exactly the format specified by the Configurator.
- When writing variables specified as structures or arrays of structures, the host only has to match the length of the data to the length of the variable.

NOTE: For compatibility with S5 products, the H1 CP supports Read/Write by alternate access. Refer to S5 or other H1 documentation for more information concerning alternate access. This feature provides access to individual elements of an array or structure defined as a TF variable.

Matching Memory Type Boundaries

The example in Figure A-2 shows the proper method of matching the data types to the PLC V-memory type boundaries.

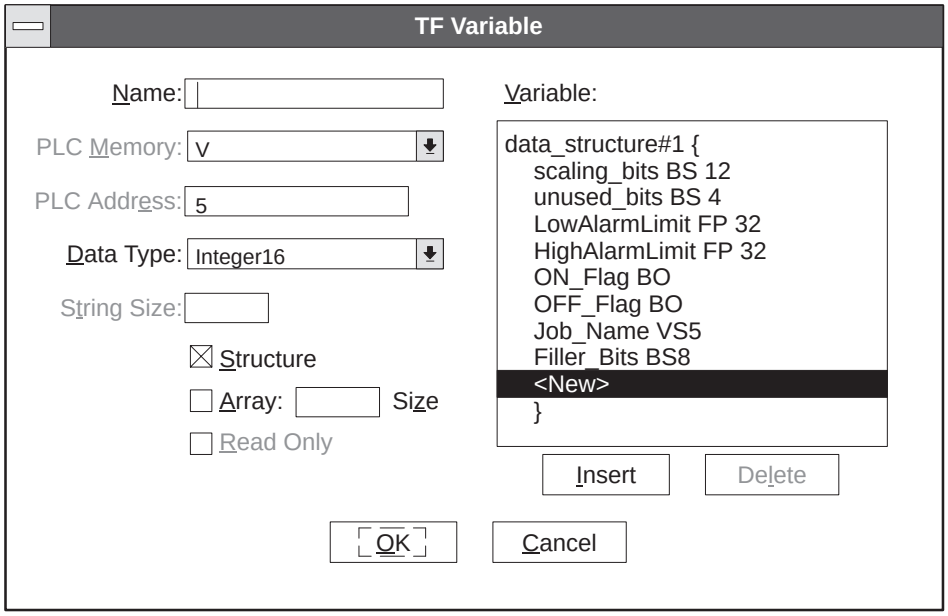
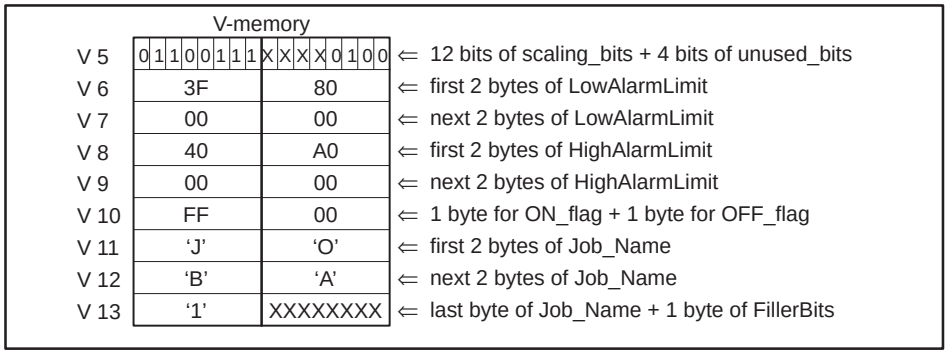


Figure A-1 TF Variable Dialog Box

data_structure#1 {	**Example Data Values:**	
scaling_bits BS12	111001100010	(binary)
unused_bits BS4	XXXX	(binary)
LowAlarmLimit FP32	1.0	(floating point, ≈ 3F800000 hex)
HighAlarmLimit FP32	5.0	(floating point, ≈ 40A00000 hex)
ON_flag BO	TRUE	(Boolean, ≈ FF hex)
OFF_flag BO	FALSE	(Boolean, ≈ 00 hex)
Job_Name VS5	“JOBA1”	(ASCII character string)
FillerBits BS8	XXXXXXXX	(binary)
}		

Figure A-2 Example of a Valid TF Variable Structure

The structure in the example is valid because items within the structure end on a multiple of the V-memory type, as shown in the chart below.



A.4 Guidelines and Requirements for Peer Data Transfers

Reading or Writing Discrete Data Types

When discrete data types (X, Y, and C) are read or written from the PLC, they can be accessed as either "Boolean" or "packed" (see Table A-1 Data Element List, PLC Representation column).

If you access a discrete data type as Boolean (X, Y, or C), each discrete item is transferred as a separate byte, as shown in Figure A-3:

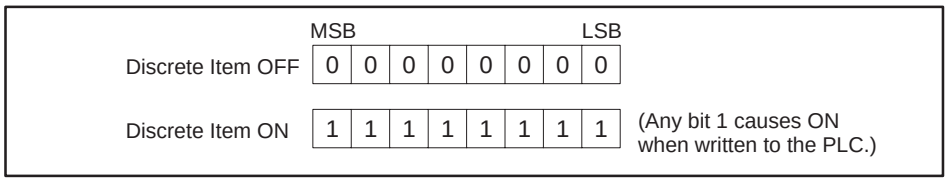


Figure A-3 Boolean Discrete Data Type Format

If you access a discrete data type as packed (XP, YP, or CP), up to 8 discrete items can occupy each byte transferred, as shown in Figure A-4:

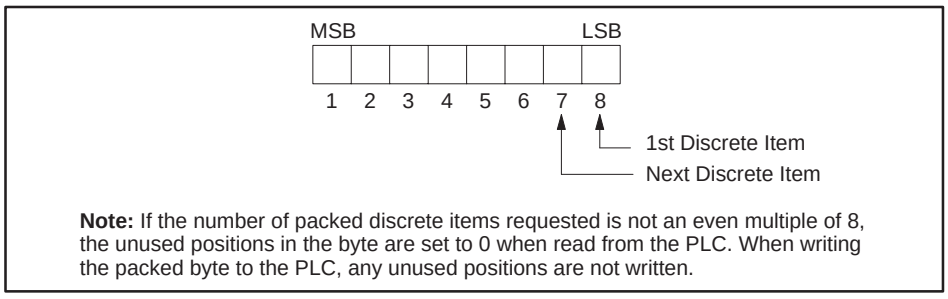


Figure A-4 Packed Discrete Data Type Format

When packed data items are transferred to/from integer memory (e.g., V), the following mapping results. For example, a Write Active job specifies Local V10, 1 and Remote CP100, 14, as shown in Figure A-5.

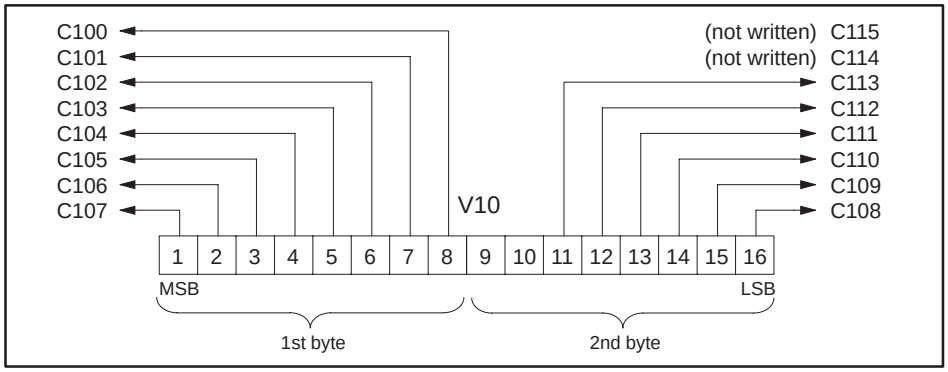


Figure A-5 Packed Discrete Data Type Transfer

Byte Balance between Local and Remote PLCs

When defining either a Read Active or Write Active job type between a local TI505 PLC and another TI505 remote PLC, or a remote S5, or a TI575 system with a CP1433 card, you must make sure that the total number of bytes entered for the Local PLC matches the number of bytes entered for the Remote PLC. The Configurator does not allow a job that is not "byte balanced."

Any data type from the Name column of Table A-1 Data Element List can be used for either the local or remote PLC on the Configurator. If you select an S5 system for the remote PLC, you can use any data type listed in Table A-7. Each S5 word-based data type consists of 2 bytes.

To help illustrate the byte balance enforced by the Configurator, Table A-5 gives the number of bytes for each data element type listed in the PLC Representation column of Table A-1.

Table A-5 Number of Bytes per Data Type

PLC Representation	Bytes for N Items
Boolean	N x 1
Integer	N x 2
16-bit	N x 2
32-bit	N x 4
Real	N x 4
Packed	(N + 7)/8 (with remainder ignored)

As an example, if you select a quantity of 4 integer-sized data items for the Local PLC and if you choose a real data type for the Remote PLC, then the Configurator requires you to enter the quantity of 2 for the real data type to obtain a byte balance (4 x 2 integer items = 2 x 4 real items, i.e., 8 = 8).

When packed data types (XP, YP, or CP) are used, maintaining byte balance is a bit more complicated. For example, if 29 CPs are to be transferred, the number of bytes is (29 + 7)/8 = 4. You can balance this with 4 Boolean data types, 2 integer data types, or 1 real data type, etc. If you transfer 19 CPs, (19 + 7)/8 = 3 bytes, you can balance this with 3 Boolean data types or from 17 to 24 packed items.

Transferring Data to an S5 System

When you select the S5 option button for the Remote PLC on the Configurator, you can specify any TI505 data type from Table A-1 for the Local PLC and any S5 data type from Table A-7 for the Remote PLC. The same byte balance requirement is enforced as described above.

However, when a packed data type is chosen for the Local PLC, a restriction is imposed upon the quantity of items: the number of packed data items for the Local field must be an exact multiple of 8 (i.e., 8, 16, 24, 32, . . .). You can choose any starting address for a packed data item for the Local PLC.

Transferring Data to a TI575 System with CP1433

When you select the CP1433 option button for the Remote PLC on the Configurator, you can specify any TI505 data type from Table A-1. The same byte balance requirement is enforced as described above.

However, when a packed data type is chosen for the Remote PLC or the Local PLC, certain restrictions are imposed upon the starting address and the quantity of items: the number of packed data items for both the Local and the Remote fields must be an exact multiple of 8 (i.e., 8, 16, 24, 32, . . .). The starting address for any packed data item in the Remote field must be one greater than a multiple of 8 (i.e., 1, 9, 17, 25, . . .). You can choose any starting address for a packed data item for the Local PLC.

Maximum Data Block Sizes

When you specify the data to be transferred in the Peer Job Definition dialog box, the format is the following:

<memory type> <start address> , <number of items> (e.g. V101, 20)

The maximum number of items allowed depends on the memory type. A maximum total of 65,535 bytes can be transferred for each job. Smaller data types (packed discretes or Boolean types) allow more items per transfer than larger data units (integer or real). The maximum limits for the different types are shown in Table A-6.

Table A-6 Maximum Number of Locations per Data Type

PLC Representation	Maximum Number of Items per Job
Packed	65535 bytes x 8 items per byte = 524,280
Boolean	65535 bytes x 1 item per byte = 65,535
16-bit, Integer	65535 bytes / 2 bytes per item = 32,767
32-bit, Real	65535 bytes / 4 bytes per item = 16,383

Of course, the number of items that can be transferred also depends on the memory capacity and configuration of the local and remote PLCs.

SIMATIC S5 Data Types Supported

Table A-7 lists the S5 data types supported by the H1 CP module.

Table A-7 SIMATIC S5 Data Types Supported

Org ID	International Mnemonic Set	German Mnemonic Set (with example)	Format
01	DB	DB 5 DW 5, 100	words
02	FY	MB 5, 100	bytes
03	IB	EB 5, 100	bytes
04	QB	AB 5, 100	bytes
05	PY	PB 5, 100	bytes
06	CB	ZB 5, 100	words
07	TB	TB 5, 100	words
08	RS	BS 5, 100	words
09	AS	AS 5, 100	words
0A	DX	DX 5 DW 5, 100	words
10	DE	DE 5 DW 5, 100	words
11	OY 5, 100	No equivalent	bytes

NOTE: S5 addresses are 0-based. TI505 PLCs and TI575 systems (CP1433) are 1-based. See Section A.5 for additional information on accessing TI505 data from an S5 system.

A.5 Accessing TI505 PLC Data from a SIMATIC S5 PLC

If you want to create a Write Active or a Read Active job in a SIMATIC S5 PLC system to access data in a TI505 PLC (containing a Write Passive or Read Passive job), you must use specific S5 data types that map correctly to the TI505 data types. In S5 memory, you must fill out an 8-word Read/Write data structure. The Data Element List (Table A-1) contains all the necessary information to accomplish this; the sub-table at the bottom of each page of Table A-1 indicates the recommended local S5 Q/ZTYP for the source or destination for a corresponding TI505 data type in a Read Active or Write Active job in the S5 system.

The following examples illustrate how to use that table to build the S5 Read/Write data structures.

NOTE: When programming an S5 to access a TI505 starting address, offset the address by subtracting 1, since TI505 numbering convention starts from 1, while S5 starts from 0. For example, to access starting address V1000 in a TI505 PLC, enter 999 in the Remote Q/ZANF field of the S5 data structure.

The maximum memory offset in a TI505 PLC that can be accessed from an S5 is FFFFFF hex (24 bits) = 1048575 decimal (e.g., V1048576).

Enter the offset only when accessing TI505 memory from an S5 program, not when using the Configurator.

Example 1

Read 100 words from a TI505 PLC starting at V1000 into DB20, DW10 in the S5 PLC. Fill out the S5 data structure for the Read Active job as follows

Word	Description	Data	Comments
QANF + 0 KS:	Remote QTYP	DB	indicates V
1 KY:	Remote DBNR	0	MS byte offset
2 KF:	Remote QANF (source start address)	999	LS word offset
3 KF:	Remote QLAE (source length)	100	
4 KS:	Local ZTYP	DB	
5 KY:	Local DBNR	20	
6 KF:	Local ZANF (destination start address)	10	
7 KF:	Local ZLAE (destination length)	100	

The source start address, 999 in the Data column, is offset to correspond to V1000, since TI505 numbering starts from 1, while S5 starts from 0.

Example 2

Read 100 words from a TI505 PLC starting at V900000 into DB20, DW10 in the S5 PLC. Fill out the S5 data structure for the Read Active job as follows (MS = most significant, LS = least significant):

Word	Description	Data	Comments
QANF + 0 KS:	Remote QTYP	DB	indicates V
1 KY:	Remote DBNR	13	MS byte offset
2 KF:	Remote QANF (source start address)	48031	LS word offset
3 KF:	Remote QLAE (source length)	100	
4 KS:	Local ZTYP	DB	
5 KY:	Local DBNR	20	
6 KF:	Local ZANF (destination start address)	10	
7 KF:	Local ZLAE (destination length)	100	

The remote address offset of V900000 is 899999 = DBB9F hex. The most significant (MS) byte is D (13 decimal) and the least significant (LS) word is BB9F (48031 decimal).

Example 3

Get 2 flag bytes starting at FY100 and Write them to C97 through C112 in the TI505 PLC. Fill out the S5 data structure for the Write Active job as follows:

Word	Description	Data	Comments
QANF + 0 KS:	Local QTYP	MB	
1 KY:	Local DBNR	0	N/A
2 KF:	Local QANF (source start address)	100	
3 KF:	Local QLAE (source length)	2	num. of bytes
4 KS:	Remote ZTYP	MB	indicates CP
5 KY:	Remote DBNR	0	N/A
6 KF:	Remote ZANF (destination start addr.)	12	byte offset
7 KF:	Remote ZLAE (destination length)	2	num. of bytes

The data type MB maps to the TI505 type CP, or packed control relay bits. The remote starting address specifies a virtual “byte” offset into CP memory space. For example, offset 0 corresponds to C1, offset 1 corresponds to C9, and so on. Therefore, offset 12 corresponds to C97. This illustrates the requirement that for packed discretes (CP, XP, and YP), the starting address is restricted to values 1, 9, 17, 25, etc. when accessed from an S5.

When the 2 flag bytes are written to the TI505 PLC, the following bit correspondence applies:

C97 = F100.0
C98 = F100.1
C99 = F100.2
C100 = F100.3
C101 = F100.4
C102 = F100.5
C103 = F100.6
C104 = F100.7

C105 = F101.0
C106 = F101.1
C107 = F101.2
C108 = F101.3
C109 = F101.4
C110 = F101.5
C111 = F101.6
C112 = F101.7

The same mechanism is used for Reading packed data types from an S5: multiples of 8 bits must be read from the TI505 PLC by the S5 and the starting bit address in the TI505 PLC must be on byte boundaries (e.g., 1, 9, 17, 25, etc.).

Example 4

Read 100 floating-points from a TI505 PLC starting at KF66000 into absolute memory address 8000 hex in the S5 PLC. Fill out the S5 data structure for the Read Active job as follows:

Word	Description	Data	Comments
QANF + 0 KS:	Remote QTYP	ZB	indicates KF
1 KY:	Remote DBNR	1	MS byte offset
2 KF:	Remote QANF (source start address)	463	LS word offset
3 KF:	Remote QLAE (source length)	100	num. of floats
4 KS:	Local ZTYP	AS	
5 KY:	Local DBNR	0	N/A
6 KF:	Local ZANF (destination start address)	32768	
7 KF:	Local ZLAE (destination length)	200	num. of words

Note: MS = most significant, LS = least significant

The TI505 CP1434 converts an IEEE floating-point type to S5 floating-point format prior to transmitting the response. The S5 programmer does not have to convert floating-point formats.

Example 5

Get 24 words (formatted as twelve floating-point values) from S5 starting at DX15, DW100 and Write them to LRCA1 through LRCA12 (Rate-of-Change Alarm Limit data type) in the TI505 PLC. Fill out the S5 data structure for the Write Active job as follows:

Word	Description	Data	Comments
QANF + 0 KS:	Local QTYP	DX	
1 KY:	Local DBNR	15	
2 KF:	Local QANF (source start address)	100	
3 KF:	Local QLAE (source length)	24	num. of words
4 KS:	Remote ZTYP	BS	
5 KY:	Remote DBNR	52	34 (hex)
6 KF:	Remote ZANF (destination start addr.)	0	offset
7 KF:	Remote ZLAE (destination length)	12	num. of floats

In this case the remote DBNR is the plcTT value for the accessed data type; the starting offset is therefore limited to 65535, well above the typical largest address for these TI505 data types. TI505 data types that do not require an 8-bit address extension in the DBNR field use the BS Q/ZTYP.

The Remote ZLAE is 12, representing the number of floats to be written to the TI505. After receiving the data, the CP1434 converts it from S5 format to IEEE format. The S5 programmer does not have to convert floating-point formats.

A.6 Standard Transport and Association Profile Configurations

Profile Formats

A profile configuration defines a set of communication parameters that are necessary for node communication. To simplify the task of configuring the TF Service and Peer Service connections, the configurator provides standard profiles that you can select. All profiles available with the configurator provide for a combination of Layer 7 and Layer 4 services that can be run simultaneously.

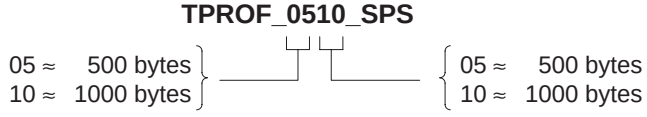
- Association Profiles for TF services are identified by the prefix **APROF**.
- Transport Profiles for Peer services are identified by the prefix **TPROF**.

Each available profile selection contains two data units which specify the amount of data that can be transmitted across the network in a packet.

- The first two digits refer to the Transport Protocol (relating to Layer 4) data unit size.
- The second two digits refer to the Transport Interface (or Application Protocol, relating to Layer 7) data unit size.

NOTE: The Application Protocol data units are automatically segmented for transmission within smaller Transport Protocol data units. The maximum Application Protocol data unit size of 1000 bytes will accommodate approximately 471 words of V Memory transferred as a TF variable.

The format of the profile is xPROF_yyzz_SPS or xPROF_yyzz_MDT, as shown in the following Peer Service Transport Connection Profile:



The Two Main Groups of Profiles

The suffix, **_SPS** or **_MDT** identify which main group the profile belongs to.

- **SPS** profiles are used if the communication partner (remote connection) is a programmable controller. Credits and time monitorings are adjusted accordingly (smaller credits and shorter times).
- **MDT** profiles are used if the communication partner is a computer system. Credits and time monitorings are adjusted accordingly (higher credits and longer times).

Selected profiles allow you to optimize the network based on the data sizes being communicated between nodes. For instance, to set up data transfers that send larger amounts of data with fewer transactions, you can select the larger data unit sizes. Keep in mind, however, that many large transfers can create internal bottlenecks in the system that may hinder performance. Trade-offs between performance and data unit size must be considered when configuring the network. It is a good idea to begin with smaller sizes and build gradually until reaching an optimum performance level.

Additional Profiles

The **Mgt.Applaso** profile in TF Service associations and the **Mgt.Tcon** profile in Peer Service connections handle functions such as download and diagnostics. These "Management Connections" are used for administrative purposes such as loading a configuration description into a station, running a diagnostic function, etc.

NOTE: Mgt. profiles serve no purpose for the typical user. Do not choose these profiles when creating either Peer Service connections or TF Service associations.

Custom Profiles

A Layer 7 custom profile is made available by the use of an MS-DOS file that resides in the directory with the CP1434TF configurator executable file. A file with the extension .PFL signifies a custom-profile definition. A custom profile, **SIMATIC PCS**, is provided with for users of SINEC PCS systems. The **SIMATIC PCS** profile can be selected in the Profiles list box when defining a TF Service.

When all of the user's TF Services are defined by the **SIMATIC PCS** profile, the allowed maximum number of TF Services becomes 50. However, when the PCS profile is not selected, entering more than the normal maximum of 31 TF Services causes a bad LDB that, when downloaded to the CP module, fails to initialize properly.

NOTE: Use of faulty profile data may prevent proper initialization of the CP1434TF network module. The custom profile definitions (the pcs.pfl file) should only be modified by experts who fully understand the details of SINEC Local Databases and transport communication parameters.

A.7 ASCII Characters with Hex Code Equivalents Supported

All of the ASCII characters listed in Table A-8 can be used in the ASCII string representations of TSAPs.

Table A-8 ASCII Character Codes

ASCII	Hex	ASCII	Hex	ASCII	Hex
space	20	@	40	‘	60
!	21	A	41	a	61
”	22	B	42	b	62
#	23	C	43	c	63
$	24	D	44	d	64
%	25	E	45	e	65
&	26	F	46	f	66
’	27	G	47	g	67
(	28	H	48	h	68
)	29	I	49	i	69
*	2A	J	4A	j	6A
+	2B	K	4B	k	6B
,	2C	L	4C	l	6C
–	2D	M	4D	m	6D
.	2E	N	4E	n	6E
/	2F	O	4F	o	6F
0	30	P	50	p	70
1	31	Q	51	q	71
2	32	R	52	r	72
3	33	S	53	s	73
4	34	T	54	t	74
5	35	U	55	u	75
6	36	V	56	v	76
7	37	W	57	w	77
8	38	X	58	x	78
9	39	Y	59	y	79
:	3A	Z	5A	z	7A
;	3B	[	5B	{	7B
<	3C	\	5C	|	7C
=	3D	]	5D	}	7D
>	3E	^	5E	~	7E
?	3F	_	5F		

A.8 TSAP Similarity to COM 143 Local Link Editor

TSAP Compatibility with COM 143

TSAP entry for Peer and TF services is similar to COM 143 Transport TSAP entry as defined by the following rules:

- Default TSAP length is 8 characters.
- Default HEX field is 20 20 20 20 20 20 20 20 .
- Default ASCII field is _____ (8 underlines).
- Reducing the TSAP length reduces the length of the HEX and ASCII fields by blanking out character(s) on the right.
- Increasing the TSAP length adds 20s to the right in the HEX field, and adds underlines to the right in the ASCII field.
- The value entered and displayed in the HEX field becomes the TSAP value used by the system. The ASCII field is only for reference and data entry convenience.
- Unprintable hex values (< 0x21 or > 0x7E) entered in the HEX field display in ASCII as an underline (0x5F). Blank (0x20) is also considered unprintable and also displays as an underline in the ASCII field.
- Printable characters (0x20 to 0x7E) in the HEX field display the corresponding character in the ASCII field, including underlines (0x5F).
- Any value from 00 to FF entered into a HEX field only affects the corresponding value in the ASCII field.
- Any character typed into the ASCII field only affects the corresponding hex character pair in the HEX field.
- If the entire ASCII field is blanked out with back spaces or the space bar, the ASCII characters remain blank while the cursor is in the ASCII field, but are redisplayed as underlines when the ASCII field is exited and the characters in the HEX field display as 20s when the ASCII field is exited.

NOTE: To change an underline character (that is substituting for a blank or unprintable character in the ASCII field) to a true underline (5F) you must change the underline character to another character and then exit the ASCII field. Then that character can be changed to an underline (causing a 5F to appear in the HEX field) when you exit the ASCII field. The HEX field can also be edited directly to produce the 5F.

- The HEX field can be packed. For example, if you enter 0102030405060708 in the HEX field; when you exit the HEX field 01 02 03 04 05 06 07 08 displays.

- The HEX field can be entered with extra spaces between the digits. For example, with a TSAP length of 3, if you enter 0 12233 in the HEX field, when you exit the HEX field 01 22 33 displays.

- Non-hex characters entered into a HEX field past the TSAP length are ignored. For example in a HEX field with a length of 3, 010203ww is accepted and displays as 01 02 03 when the HEX field is exited

- Non-hex characters in a HEX field, within the first TSAP length (not counting blanks) nullify changes made. On exit, the HEX field reverts to its previous values, and the ASCII field does not change.

  For example: if the HEX field is 01 02 03 with a TSAP length of 3, and is edited to 11 w233; on exit it reverts back to 01 02 03 owing to the illegal hex digit 'w' within the first six non-blank characters.

- Entry of a fewer than the required number of hex characters in the HEX field nullifies the change. On exit, the HEX field reverts to its previous value and the ASCII field does not change.

Appendix B

Error Codes and Troubleshooting

B.1 Applications Requiring More than Two Modules in a Base

Multiple H1 CP Module Requirements

For applications requiring three or more H1 CP modules in a single base, you need to disable the DC-to-DC converter on each module installed in the base in order to reduce the power consumption of each module and to stay within the power budget of the I/O base. This must be done after loading the configurator files from the PC to each module, since the loading (transfer) function requires the DC-to-DC converter to be enabled.

Disabling the converter is an option only if you do not require +12 V to the AUI port and you do not need to reprogram the flash memory. With the DC-to-DC converter disabled, AUI port communications must be powered externally.

Disabling the Converter

To disable the DC-to-DC converter, remove the jumper. You can store the jumper on the module itself by plugging it back in any direction on either one of the E1 male header pins.

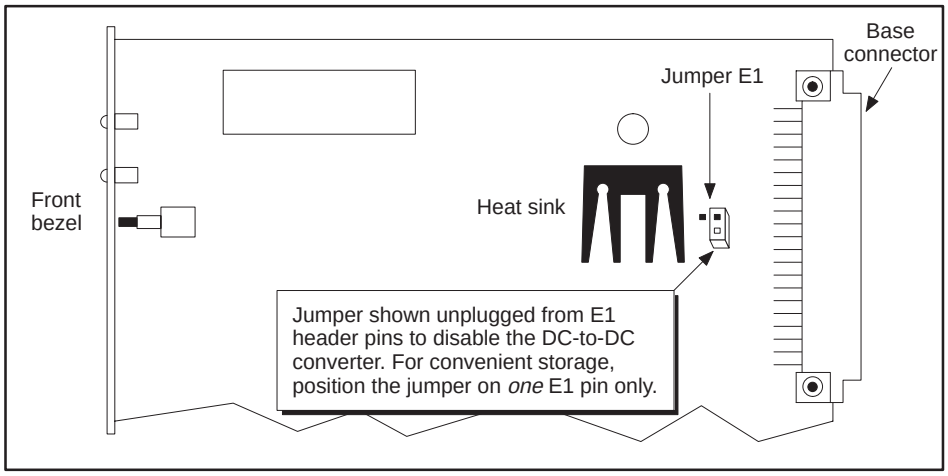


Figure B-1 DC-to-DC Converter Disabled

The primary advantage of disabling the converter is that the module power requirement from the base is lower than when the converter is enabled, allowing more than two H1 CP modules to be installed in a single I/O base. (See Appendix NO TAG for power consumption specifications.)

Disadvantages include the need to power down the entire Series 505 base to change the jumper setting in order to reprogram the flash memory, the need to provide external power for Ethernet communications, and the risk of ESD or other forms of damage to the module during handling.

NOTE: With the converter disabled, you cannot load a new configuration file into the module's flash memory. With the converter disabled, you must use a transceiver with an external power supply. This is easily accomplished by a standard fan-out unit such as the SINEC SSV 75S, PPX:6ES5 755-7AA11.

B.2 Configurator Pop-Up Error Messages

The pop-up error messages in Table B-1 may result from one of several possible causes. These messages are organized by functional groups with possible causes.

Table B-1 Configurator Error Messages

Error Message	Possible Causes and Corrective Actions
File I/O Error Messages	
"An error occurred while writing the configuration file."	• Attempting to save an invalid file name (e.g., Name.LDB). Rename file with valid extension (e.g., Name.H1) and save again. • Attempting to perform a Save operation on a read-only file. • Attempting to perform a Save operation to a non-existent or non-accessible drive.
"You have attempted to open a non-CP1434TF H1 configuration file."	• File may be non-compatible. File name input must be an .H1 file that was previously created and saved by the configurator. • File name input is not accepted because only files created by configurator or compatible systems may be loaded by the 505-CP1434TF H1 Configurator. Select a file that has been created by the 505-CP1434TF H1 Configurator. • Both components of the configuration file are not on the disk. A configuration file consists of two files that must be present: <**Filename.H1**> and <**filename.LDB**>.
"Unable to open the Help file!" (DOS) "Cannot open Help File" (WINDOWS)	Occurs when DOS Configurator is executing from a directory that does not contain the file H1DOS.HLP and you have selected Help → Contents. To correct the error, exit the Configurator and copy the H1DOS.HLP file to the directory where you are executing the H1DOS.EXE file. Correct the Windows help error message by placing the h1help.hpj file into the same directory with the (**H1.exe**) H1 Windows executable program.
Upload Configuration From CP Error Messages	
"The request to upload the configuration file was unsuccessful."	This message appears when the Upload Configuration From CP Module function fails to upload the configuration, possibly because: • Serial port selection is invalid. Determine correct port number and change selection on the Transfer or Debug screen, then try the function again. • Cable connection between the CP module and the PC is bad. Check cable installation at both ends. • CP module is not powered on. Check power to I/O base. • CP module has just been reset and has not established communication. Wait for reset operation to complete (when both MOD GOOD and MOD READY LEDs are on) and try again. • An attempt was made to upload a configuration file from a Release 1.1 (or earlier) CP Module. Upload capability is only available for Release 2.0 (or later) CP modules.
"Bad LDB in CP module."	This message appears during an Upload Configuration From CP Module function when the upload is aborted because the CP Module contains a bad LDB. To correct the error, you must perform a Download Configuration to CP function using a valid configuration file that also replaces the bad LDB in the CP module.

Table B-1 Configurator Error Messages (continued)

Error Message	Possible Causes and Corrective Actions
Communication Error Messages	
"An error occurred while trying to communicate with the CP1434TF H1 network module."	• Serial port selection is invalid. Determine correct port number and change selection on the Transfer or Debug screen, then try the function again. • Cable connection between the CP module and the PC is bad. Check cable installation at both ends. • CP module is not powered on. Check power to I/O base. • CP module has just been reset and has not established communication. Wait for reset operation to complete (when both MOD GOOD and MOD READY LEDs are on) and try again. • A debug operation was selected at the same time that the CP's other port was communicating with another configurator. Retry the selection. • For an H1 Ethernet connection, the nodes must be allowed time to synchronize after cables are connected, or after a CP module reset, or after the Node selection is made on the configurator.
"The CP communication has been locked at another port. Please try again momentarily"	This message appears when communications between the CP module and the configurator fails because the CP module port has been locked. This error occurs when two configurators attempt to upload and/or download to the same CP module at the same time. Refer to Section 5.6.
"An error occurred while trying to locate the H1 TSR. Please verify that the TSR was loaded before Windows was loaded and try again."	This message appears when you select Port→H1 Ethernet Menu selection before loading the H1TC TSR. Refer to Section 3 for details about loading the TSR. This error may also occur when you load the configurator and the TSR is not loaded, if the configurator was using the H1TC TSR the previous time that the configurator was loaded.
TF Services Error Messages	
"You can't specify a name with unsupported characters."	The characters typed into the name field violate the ASCII subset supported. Refer to Appendix A for a list of valid characters.
"You have reached the maximum number of TF Services."	You have tried to insert a TF Service after reaching the maximum number of TF Services (31) allowed.
TSAPs and Ethernet Error Messages	
"You have specified an invalid Local Ethernet Address, taking the previous valid value."	• This message appears on the Main Configuration window when the Ethernet address is set to the same value as a TF Service entry or a Peer Service entry. Make the Local and Remote Ethernet addresses unique. • The Ethernet address contains invalid character(s). Refer to page 5-7. • The Ethernet address has fewer than 12 characters. Refer to page 5-7.
"The Remote Ethernet Address must be different than the Local Ethernet Address."	This message appears on the TF Service or Peer Service window when the service's Ethernet address is set to the same value as the Local Ethernet Address on the Main Configuration window. Change the value.
"The Remote Ethernet Address specified is invalid."	This message appears on the TF Service or Peer Service window when the Ethernet address contains invalid character(s). Refer to p. 5-7.

Table B-1 Configurator Error Messages (continued)

Error Message	Possible Causes and Corrective Actions
"Since the Local and the Remote TSAPs are unspecified, you must also have the Remote Ethernet Address as unspecified."	This message appears when the Local and Remote TSAPs are both blank but the Remote Ethernet address is set to a non-zero value. Reset the Remote Ethernet Address to all 0's.
"Since the Local TSAP is unspecified, you must also have the Remote TSAP and Remote Ethernet Address as unspecified."	This message appears when the Local TSAP is blank but the Remote TSAP and/or Remote Ethernet address is set to a non-zero value. Reset the Remote TSAP and/or Remote Ethernet Address to all 0's.
"Since the Remote TSAP is unspecified, you must also have the Remote Ethernet Address as unspecified."	This message appears when the Remote TSAP is blank and the Remote Ethernet address is set to a non-zero value. Reset the Remote Ethernet Address to all 0's.
"The combination of Local TSAP, remote TSAP, and Remote Ethernet Address already exists in a Peer Service."	You have attempted to enter a Peer Service (Passive or Receive) that already exists in another Peer Service. The combination of Ethernet addresses and TSAPs must be unique for each Peer Service. There is no multiplexing for Peer Services.
Peer Services Error Messages	
"The byte count for the local and remote address blocks must match."	The number of bytes (not necessarily the number of locations) specified for the Local PLC does not match the number of bytes specified for the Remote PLC. Change byte count to match (refer to Appendix A for examples).
"You can't specify a name with unsupported characters."	The characters typed into the name field violate ASCII subset supported. Refer to Appendix A for a list of valid characters.
"The number of locations for the remote address block must be a multiple of eight." *or* "The number of locations for block 'N' must be a multiple of eight." (N = 1 to 8)	A data type specified in the PLC referenced (block N indicates local PLC; remote address block indicates SIMATIC S5, SIMATIC, or 575-CP1433) violates the allowed byte boundary rules. Change block boundary to conform to specifications. Refer to Appendix A.
"You have incorrectly specified a remote address block."	• The data type specified is not available on the remote PLC device. Refer to Appendix A for valid data types. • The data type specified has an invalid parameter. Examples: X 0, 5 is invalid for TI505 or CP1433 because of 0 start address; MB 1, FF is invalid for S5 because it uses hex values for number of locations; X 1, 5 is invalid for S5 because X is not an S5 data type. • The data type specified is in an invalid format. Example: DX 0, 5 is invalid for S5 because a DX data type requires a Data Word offset (DX0 DW0, 5) in addition to the start address.

Table B-1 Configurator Error Messages (continued)

Error Message	Possible Causes and Corrective Actions
"Invalid local address block at location N." (N = 1 to 8)	• The data type specified is not available on the local PLC device. • The data type specified has an invalid parameter. Example: X 0, 5 is invalid for a TI505 because of the 0 start address. • The data type specified is in an invalid format. Example: DCP 5, 10 is invalid because DCP data types require a step number in addition to the starting address (e.g., DCP 5 S5, 10).
"The starting location for the remote address block is restricted to one greater that a multiple of eight."	To transfer packed discrete data between a local SIMATIC PLC and a remote SIMATIC CP1433 device, the specified starting address must be on a byte boundary, where start bits are 1-based. For example, valid starting addresses include 1, 9, 17, 25, etc.
"You have reached the maximum number of Peer Services."	You have tried to insert a Peer Service after reaching the maximum number of Peer Services (40) allowed.
"You must specify a valid job before you can complete a Peer Service."	This message appears when you try to select the OK button on the Peer Service window without first entering a Job Definition.
"The Job Start Bit you specified already exists in another Peer Service."	All Job Start Bits within the same configuration file must be unique.
Debug Error Messages	
"PC Timer resources are not available for debug operations."	This message appears if you have many other Windows applications, that use timers, running while you attempt to execute the configurator debug operation.
Print Error Messages	
"Print Aborted. Error creating temporary disk file."	This message appears during printing if there is no room on the current disk or if the disk is write-protected. The print operation creates and then deletes a temporary file on your disk when a print occurs.
Error Messages Related To Unspecified TF Service With The Name CP1434TF	
"The TF Service named CP1434TF on the disk file cannot be loaded as such. The TF Service name is changed to CP1434TF0001."	This message appears because a H1 configuration on disk or in the CP module was created with the Release 1.0 configurator and contained a TF Service with the name Association Name of CP1434TF. The CP module always has an unspecified TF Service with the same name, and (therefore) the name must be changed in order to work with the Release 2.0 configurator.
"The Connection Name cannot be named CP1434TF, since this is the name used for the permanent partially–unspecified TF Service that resides in the CP module."	This message appears when you attempt to enter a TF Service that has an Association Name of CP1434TF. A Download to CP Module operation always sends an unspecified TF Service name CP1434TF to the module and Association Names cannot be duplicated.

Table B-1 Configurator Error Messages (continued)

Error Message	Possible Causes and Corrective Actions
Copy Configuration Error Messages	
"Destination cannot locate a Source Application to copy from. The Application with the source data must be running before data can be copied. Make sure the source application is selected before selecting destination."	This message appears when the a destination (Configuration) is selected and a source (Configuration) has not been selected. The copy configuration cannot be completed because no source configuration window is currently selected.
"This application has already selected a Source or a Destination. Only one selection per application can be selected."	This message appears when you attempt to select a Source or Destination more than once in succession in the same dialog window.
"The source application cannot match the data type on this window. Please verify that both the source and destination TF Service windows are selected appropriately."	This message appears during a Copy Configuration when the source configuration window is not the same type as the destination window. For example, a Peer Service cannot be copied into a TF Service.
TF Variable Dialog Error Messages	
"The variable's type must match the type of memory contained in the address field."	Occurs when you attempt to enter a TF Variable type that is not matched to the appropriate memory type (specified in Address field). To correct this error: • Modify the memory Address field to a type of memory that is appropriate for the TF Variable type, or . . . • Modify the Variable type so that it matches the memory Address type. (Refer to Section A.3 for rules on strong data-type checking.)
"The total size of the structure must be a multiple of the size of the Data Type of the structure's top level."	Occurs when you attempt to enter a TF Variable structure type in which the combined contents of the structure cannot be placed on a multiple boundary of the memory type (specified in the Address field). To correct this error, modify the structure contents so that the summed total can be placed on a multiple of the memory type. (This may require using filler bits or bytes.) (Refer to Section A.3 for rules on strong data-type checking.)
"You attempted to exceed the maximum level of nesting."	Occurs on the TF Variable window when you try to insert more than two levels of nested variable data.
"You have reached the maximum number of allowed structure items."	Variable structures are limited to 63 internal data elements. A nested structure contains the sum of its internal elements plus 2 (for begin and end brackets). Any nested array counts as two elements.

Table B-1 Configurator Error Messages (continued)

Error Message	Possible Causes and Corrective Actions
"No Block 3 data was found. At least one Block 3 must be provided when using custom profiles. No custom profile(s) will be used."	This message appears when you have at least one file with a .PFL extension in the directory but none of the files specify a block 3 parameter as 1. One of the profile definitions must specify 1 to indicate which customized block 3 to use.
"A limit of five .pfl profile files can be used at one time. More than 5 valid ".PFL" files were found. Only five will be used."	This message appears when you have more than five files with a .PFL extension in the directory. A maximum of five customized profiles can be successfully specified in the directory.
"The last modification(s) made have not been INSERTed. Modified data in the modified control fields will be lost."	This message appears in the TF Variable dialog when you have modified the control fields but have not used the **INSERT** button to place the modified data into the Variable list box display, and then you press the **OK** button to exit the TF Variable dialog window. When this error is displayed, you can select **CANCEL** to keep the latest modifications and return to the dialog to perform the **INSERT**. If you select **OK** when this message is displayed, the latest modifications are not kept, and the TF Variable dialog is closed with the previously inserted data.
Custom Profile Error Messages	
"Simatic PCS file "XXXXXXXXXX" cannot be opened."	This message appears when you have a file with a .PFL extension in the directory but the file cannot be opened. Verify that the file: • is not write-protected, and • is an ASCII text file.
"Simatic PCS file "XXXXX" has incorrect byte count. This file data will not be included in the LDB."	This message appears when you have a file with a .PFL extension in the directory but the file either does not have the correct format or does not have all the necessary fields.
"Simatic PCS file "XXXXXXX" has an invalid or missing Profile Name. This file data will not be included in the LDB."	This message appears when you have a file with a .PFL extension in the directory but the file is missing a profile name string or has an invalid profile name string.
"Unexpected End Of File in Simatic PCS file "XXXXX". This file data will not be included in the LDB."	This message appears when you have a file named **XXXXX.PFL** in the directory but the file either does not have the correct format or does not have all the necessary fields. If all necessary fields are included in the file in the proper format, the byte count will be an exact number. Otherwise, the profile data will not be accepted by the configurator.
"Profile names must be unique. Simatic PCS file "XXXXX" duplicates the profile name "YYYYY" that is already being used. This duplicate custom profile file data will not be included in the LDB."	This message appears when you have more than one file with .PFL extensions in the directory and both files specify the same profile name of **YYYYY**. To correct the error, change one of the file's profile name to another name.

Table B-1 Configurator Error Messages (continued)

Error Message	Possible Causes and Corrective Actions
"Only one Block 3 is allowed per LDB Configuration. An extra Block 3 is specified in Simatic PCS file "XXXXX". This file data will not be included in the LDB."	This message appears when you have more than one file with .PFL extensions in the directory and both files have a 1 parameter for the block 3 parameter. Only one .PFL file may successfully specify a block 3 parameter = 1. The file named **XXXXX** was read after another file had already been read and accepted as the block3 data.
"No Block 3 data was found. At least one Block 3 must be provided when using custom profiles. No custom profile(s) will be used."	This message appears when you have at least one file with a .PFL extension in the directory but none of the files specify a block 3 parameter as 1. One of the profile definitions must specify 1 to indicate which customized block 3 to use.
"A limit of five .pfl profile files can be used at one time. More than 5 valid ".PFL" files were found. Only five will be used."	This message appears when you have more than five files with a .PFL extension in the directory. A maximum of five customized profiles can be successfully specified in the directory.
"Simatic PCS file "XXXXX" has an invalid or missing Profile ID. This file data will not be included in the LDB."	The custom profile data in the file named **XXXXX** has an invalid or missing profile ID number. A valid Profile ID number must be between 0x06 and 0xFF.
"Simatic PCS file "XXXXX" sets the maximum server count greater that the system limit of 76. The limit of 76 will be used."	The parameter in the custom profile definition in file **XXXXX** specifies an invalid parameter.
General Miscellaneous Error Messages	
"All changes will be lost and the Server Window will be closed.", or "All changes will be lost and the Job Definition Window will be closed.", or "All changes will be lost and the Peer Window will be closed.", or "All changes will be lost and the Server Window will be closed."	This message appears when the ESC key is pressed on a dialog window to warn you of accidental loss of data in case data has not been saved.

NOTE: Error messages other than those listed in this table may be displayed; however, they are self-explanatory.

B.3 Peer Service Error Codes

Table B-2 Error Codes Written to Status Word in V-Memory

Status Code (Hex)	Description
0	Job executed successfully, no error.
80xx	xx is task code error response from attached PLC; see PLC documentation. These errors usually indicate a problem in accessing data in the attached PLC caused by a software error in the CP rather than a user error.
9000	Invalid request to PLC.; a software error in the CP rather than a user error.
9001	Memory type request from PLC is not defined for any TI505 PLC. This error can only be caused by a Read/Write access from an S5 or 3rd party device that requests an undefined plcTT type, e.g., S5 Q/ZTYP = BS, S5 DBNR = FF (FF is not a defined plcTT type in any TI505 PLC). Otherwise, the Configurator guards against the use of undefined data types when configuring communications between TI505 PLCs. If the accessed plcTT type is unsupported or not configured in the attached PLC, error code 9003 occurs (see below).
9002	Reserved for invalid request for PLC mode. Currently, CP does not produce this error.
9003	Memory type requested from PLC is not supported or not configured. For example, the TI560 does not support loop data types. It also occurs if the requested data type is not configured in the PLC (e.g., unconfigured analog alarm data types). Access of data types undefined for any TI505 PLC results in error 9001. (Active station: F002)
9004	Starting memory address accessed in PLC is invalid. This occurs if memory type is defined, supported, and configured, but the starting address is out of range for the data type. For example, if the starting address is V27000 and only 52K bytes of V-memory are configured (allowing a maximum V-address of 26624), then this error occurs. If you reconfigured the PLC memory after installing and initializing the CP module, reset the CP module so that it can read the new memory configuration in the PLC. (Active station: F003)
9005	Memory type cannot be written since it is read-only. See the Access column of Table A-1. (Active station: F00C)
9006	PLC communication time-out. Due to extremely heavy load on the PLC or CP, the data access to the PLC took longer than expected. This error rarely occurs, but if it does, retry the job.
9007	Starting memory address OK, but the number of items requested are causing invalid memory access. For example, this error ocuurs if 2000 words of V-memory starting at V26000 are requested but only 52K bytes of V-memory are configured (V26624 is highest configured address). If you reconfigured PLC memory after installing and initializing the CP module, reset the CP module so that it can read the new memory configuration in the PLC. (Active: F005)
9008	Reserved for error “Slot into which CP module is placed is not configured.” This error does not explicitly appear for any job. An unconfigured base is only indicated on the Configurator Diagnostics display. It may also be indicated on the Debug display by the message “Waiting for WY bit to trigger Job” even when the PLC is setting the WY bit. If the base is not configured, the module is unable to detect the WY Job Start Bits required for Read Active, Write Active, Send, and Receive jobs; however, Read Passive and Write Passive jobs still respond, although possibly at a greatly reduced throughput.

Table B-2 Error Codes Written to Status Word in V-Memory (continued)

Status Code (Hex)	Description
A00x	The A00x error codes indicate an internal software error in the CP which should never occur during normal module operation.
B806	Active partner could not establish a successful connection with the corresponding Passive partner. This error can result from a number of possible causes: an unattached Ethernet cable, a configuration mismatch of the local vs. remote Ethernet address or a mismatch of the TSAPs at either end of the connection. Even though the error appears only at the active partner, the source of the error may be in the configuration of the passive partner, where the Debug display typically shows the message "Waiting for connection confirmation."
BD1D	A transient error indicating that the connection has broken down. It appears on a Read Passive, Write Passive, or Receive job if the active job has timed out; it is quickly replaced by C000. (Active station: E001)
Bxxx	Possibly a transient error when communicating with the remote partner. Retrying the job may clear the error. If error continues, it indicates an internal software problem in the CP.
C000	Connection has broken down unexpectedly with ISO reason 0 (see ISO Standard 8073). This error may occur at either the active or passive job and indicates a disconnect initiated by the opposite job partner. It is usually caused by an error in the partner rather than the CP showing this error. For example, if C000 is seen on a SEND job, then check the corresponding RECEIVE partner for other errors (9003 for example), since the RECEIVE job initiated the disconnect as an error indication to the SEND side.
C0C1	Connection has broken down unexpectedly with ISO reason C1. This error occurs at both ends when the Ethernet cable is removed. It may take up to 30 seconds for the error to appear. When the physical link is restored, the error clears.
C0xx	Connection has broken down unexpectedly with ISO reason xx. These errors may occur when attempting to interface with untested 3rd party remote devices or with a very heavily loaded Ethernet network. When they are transient in nature, the job may be retried. xx corresponds to one of the following values (see ISO Standard 8073 for more details): 80 – Normal connection termination by session entity 81 – Transport layer congested at time of connection request 82 – Connection negotiation failed 83 – Duplicate source reference for same pair of Network Service Access Point (NSAPs) 84 – Mismatched references 85 – Protocol error 87 – Reference overflow (no more references available) 88 – Connection request rejected on this network connection 8A – Header or parameter length invalid 01 – Congestion at TSAP 02 – Session entity is not attached to TSAP 03 – Address unknown

Table B-2 Error Codes Written to Status Word in V-Memory (continued)

D001	Unexpected expedited data indication received. Occurs only if an S5 or a 3rd party device attempts to send expedited layer 4 data (16 bytes maximum). The CP does not currently support the receipt or transmission of expedited data.
D002	Unexpected connection indication received. This error could occur if an active job receives a connection request; e.g., if two active jobs are incorrectly configured as partners.
D003	Unexpected confirmation received. Typically this indicates an internal software problem in the CP. It may also be transient in nature; retrying the job may clear the error.
D004	More data received on job than expected. This occurs on a RECEIVE job if the total number of bytes entered in the Configurator data list does not match the total number of bytes entered for the corresponding SEND job. (The Configurator does not enforce a byte balance between SEND and RECEIVE jobs since they are specified in separate *.H1 configuration files.) This error may also occur on a WRITE Passive or a READ Passive job when the partner is an S5 and the S5 programmer fails to enforce a byte balance between the source and destination parameter quantities in the data handling block.
D005	Less data received on job than expected. Same explanation as D004 above.
D006	Attempted to access an unopened SCI device. This error would indicate an internal software error in the module and should never occur.
D007	Unable to allocate sufficient memory in CP module to perform the job. This error should only occur in a very heavily loaded module. Retrying the job should clear the error. If the error is continuous, an internal CP software error is indicated.
D008	Mismatch of bytes processed and expected size during job execution.
D00D	Bad HTB header on read or write request. This error is usually seen on the passive side when a READ Passive job is paired with a WRITE Active job or if a WRITE Passive job is paired with a READ Active job.
E001	Send, Read/Write Active job timed out. This error occurs at the Active unit when the job does not complete in the specified time (1 to 655 seconds). (Passive station: BD1D)
F0xx	These errors appear only at the active side of READ or WRITE jobs, transmitted back by the corresponding passive job. Check also the passive side to determine the cause of the error. (If the remote passive partner is an S5, xx refers to the errors listed on page 6-34 of the *CP 143 with COM 143 Manual, Volume 1*.)
F001	Memory type accessed in the remote PLC is unknown. (Passive station: 9001)
F002	Memory type requested from PLC is not supported or not configured. (Passive station: 9003)
F003	Starting memory address accessed in PLC is invalid. (Passive station: 9004); Also indicates any error from a passive TI575 job.
F004	A PLC access time-out has occurred at the remote PLC. (Passive station: 9006)
F005	Starting memory address OK—excessive length causing invalid memory access. (Passive: 9007)
F006	Error reserved for unconfigured base at the remote PLC. (Passive station: 9008)
F007	Invalid request performed at the remote PLC. (Passive station: 9000)
F008	Undefined error occurred at the remote PLC (900F which is undefined and should never occur).
F009	General error code for all non-900x errors at the remote passive job. No specific information is implied: check the remote passive partner for the specific error.
F00B	Invalid request for PLC mode change occurred at the remote passive job.
F00C	Invalid PLC access, e.g., trying to write a read-only memory type. (Passive station: 9005)

B.4 Troubleshooting

Module Status

Table B-3 provides a summary of the module status according to the LED indicators under power-up or operating conditions and the action required to correct the error conditions.

Table B-3 Troubleshooting Chart

LED Status	Module Status	Corrective Action
MOD GOOD ☼ MOD READY ○	At power-up or reset of the CP module (during first 20 seconds): MOD GOOD flashing and MOD READY off indicate a module hardware error detected.	Turn off power to the module. Reconnect power to determine if the problem is recurrent. If problem recurs on successive power-ups or resets, turn off power and remove module from base. Check for correct positioning of jumper (refer to Chapter 2 for correct jumper position). Reinstall module and power up again. If error condition continues, module has a hardware fatal error. Return module for repair or replacement.
MOD GOOD ○ MOD READY ☼	At power-up or reset of the CP module (during first 20 seconds): MOD GOOD off and MOD READY flashing indicate a module software error detected.	The operating system software in the flash memory of the CP module is corrupted. The software can be reprogrammed with a utility program. If you already have an upgrade version of the software for the module, the utility program is included. Otherwise, contact your distributor to obtain the upgrade software needed to reprogram the module.
MOD GOOD ● MOD READY ☼	At power-up or reset of the CP module (after first 20 seconds): MOD GOOD on and MOD READY flashing indicate a module initialization error detected.	The module failed to initialize because network parameters of the module are invalid or not present. This causes Local Database on the Diagnostic screen to read “Bad”. (**Note:** A new module installed for the first time powers up this way until it has been programmed by the Configurator.) Connect the CP module to a PC with the Configurator installed. Create your network configuration file and download it to the module using the Transfer function. After the file has transferred, module automatically resets. If configuration file has already been downloaded, there may be a hardware error. Connect PC to CP module and select Debug. If the diagnostic screen displays a hardware failure, contact your distributor for technical assistance.
MOD GOOD ☼ MOD READY ●	At power-up or reset of the CP module (after first 20 seconds): MOD GOOD flashing and MOD READY on indicate a fault condition in the DC power supply detected.	Disconnect the cable from the CP module H1 Ethernet Bus Interface port, and reset the module. If the module resets successfully and no longer displays the LED pattern described, it indicates that the H1 port has a DC power overload. Take action to clear up power abnormalities on the network to ensure proper communication with the CP module. If the error condition persists, call your Siemens Industrial Automation, Inc. distributor for technical assistance.

○ Off	● On	☼ Flashing

Appendix C
Specifications

Operating temperature	0 to 60°C (32 to 140°F)
Storage temperature	–40 to +70°C (–40 to 158°F)
Shock	IEC 68-2-27; Test Ea; half sine, 15 g, 11 ms
Pollution degree	2, IEC 664, 664A
Noise immunity, conducted	IEC 801, Part 4, Level 3 MIL STD 461B, Part 4 CS01, CS02, CS06 IEC 255-4, Appendix E EMA DC33 NEMA ICS 2–230.45 IEC 255
Noise immunity, radiated	IEC 801 Part 3, Level 3 MIL STD 461B, Part 4 RS01, RS02
Electrostatic discharge	IEC 801, Part 2, Level 4, (15 kV)
Minimum torque for bezel screws	2.6 in-lb (0.3 N-m)
Maximum torque for bezel screws	4.12 in-lb (0.6 N-m)
Module power required from base	22 W of +5 VDC with jumper E1 installed 10 W of +5 VDC without jumper 0.1 W of –5 VDC with or without jumper
Relative humidity	5% to 95% noncondensing
Vibration	Sinusoidal IEC 68-2-6, Test Fc 0.15 mm peak-to-peak, 10–57 Hz; 1.0 g, 57–150 Hz Random IEC 68-2-34, Test Fdc, equivalent to NAVMAT P–9492 0.04 g^2/Hz, 80–350 Hz
Corrosion protection	All parts of corrosion-resistant material or plated or painted as corrosion protection
Agency approvals	Underwriters Laboratories: UL Listed (Industrial Control Equipment) Canadian Standards Association: CSA Certified (Process Control Equipment) Factory Mutual Approved; Class I, Div. 2 Hazardous Locations Verband Deutscher Elektrotechniker (VDE) 0160 Electrical Equipment (self-compliance) International Electrotechnical Commission Committee proposed standard (IEC-65A/WG6) for programmable controllers (self-compliance)

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