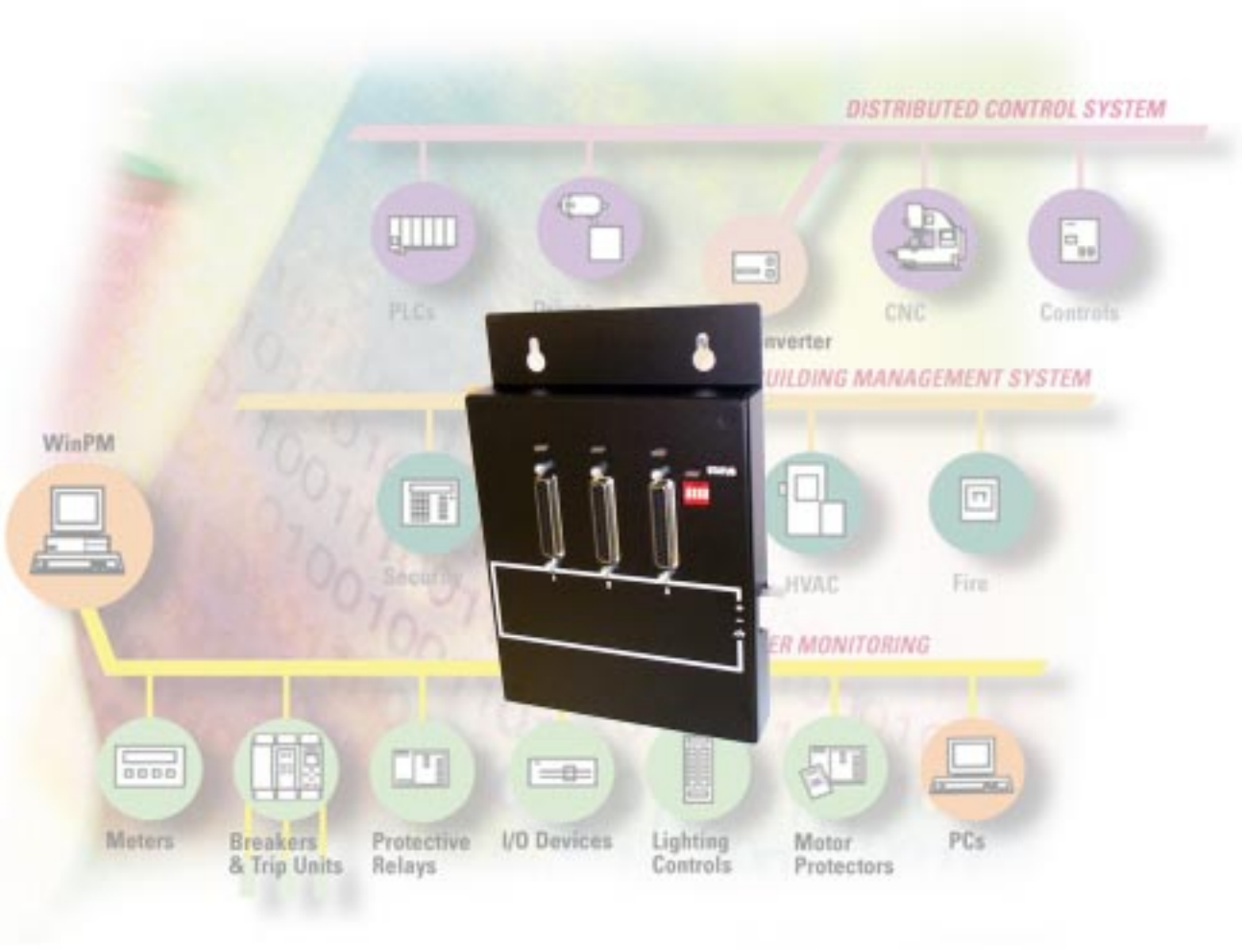
SIEMENS

DTU3005-B

Intelligent Data Transfer Device for Connection to PLCs and Modbus Networks
Operator's Manual



⚠ DANGER

Hazardous voltages and high-speed moving parts in electrical devices communicating with WinPM.

Can cause death, serious injury or property damage.

See safety instruction contained herein. **Restrict use to qualified personnel.**

The use of unauthorized parts in the repair of the equipment or tampering by unqualified personnel will result in dangerous conditions that can cause death, serious injury or property damage.

IMPORTANT

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenence of the equipment purchased. Siemens reserves the right to make changes at any time without notice or obligations. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material or both, the latter shall take precedence.

QUALIFIED PERSONNEL

For the purposes of this manual and product labels, "qualified personnel" is one who is familiar with the installation, construction, or operation of the equipment and the hazards involved. In addition, s/he has the following qualifications:

(a) **is trained and authorized** to energize, de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.

(b) **is trained** in the proper care and use of protective gear equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety procedures

(c) **is trained** in rendering first aid.

SUMMARY

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenence. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Energy & Automation, Inc. sales office.
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Table of Contents

Table of Contents

Siemens maintains control of all specifications for the SEAbus and SEAbus Plus protocols. A modification to a protocol for any type of device must be approved by Siemens Energy & Automation, Inc. to guarantee compatibility. Any changes made must be backward compatible so that existing products can coexist on the communications bus without having to support the newer features of the protocol

Siemens continuously strives to ensure backward compatibility, reliability, and easy implementation of both protocols to meet current market communications requirements. Siemens therefore reserves the right to make improvements including changes to specifications at any time without notice or obligation.

1 Introduction

1.1 Product Overview

The Panel-Tec DTU3005 is an intelligent, multiple-function data transfer unit that enables communications between Siemens communicating power meters, trip units, and protective relays, and PLCs or Modbus networks. The device is designed for the harsh industrial environment and is suited for use in switchgear. The device is shown below in **Figure 1.1**. The device is powered from an external power supply. Three ports allow for connection to the Siemens ACCESS devices and selected protective relays, a PLC or a Modbus RTU or ASCII master system, and a passthrough, which allows direct communications with port 1 or port 2 from port 3. Status lights indicate proper operation, and DIP switches allow access to programming and diagnostic modes.

The DTU3005 device supports a wide variety of PLCs and Siemens ACCESS devices. **Appendix A** lists the PLCs and protocols supported by the DTU3005. **Appendix B** lists the supported Siemens ACCESS devices and protective relays.

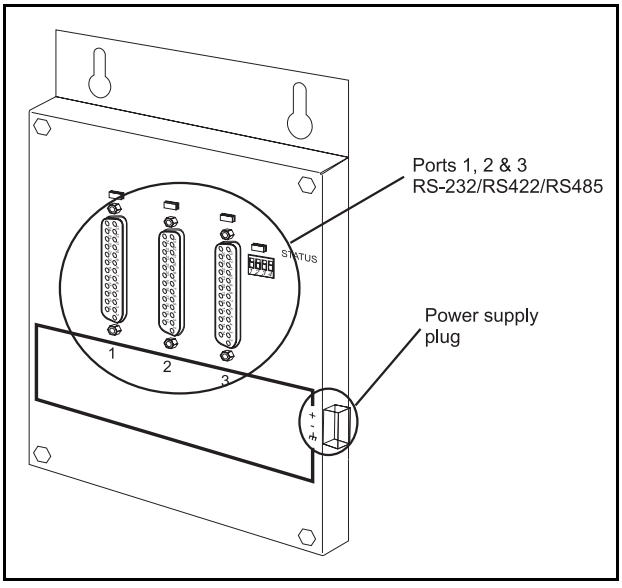


Figure 1.1 Panel-Tec DTU3005 View Showing 3 Ports and Power Supply

1.2 Software Overview

The DTU3005 Editor software is a MS-DOS based program for configuring the DTU3005 device. It provides for uploading and downloading configurations via the computer's serial port. You can edit and save configurations in project files on your computer's hard drive. **Chapters 2** through **8** discuss installing and using the editor software to configure your DTU3005 device.

1.3 Features

Device Features:

- Compact size (8" x 6" x 1")
- **Port 1 and Port 3 Features**
  - Transfer data directly to one of 25 PLCs supported
  - Baud rates up to 187,500
  - Addressable Modbus RTU slave capability
  - (Port 3) Passthrough Port for connection to WinPM
- **Port 2 Features**
  - Twelve Siemens ACCESS devices supported
  - Ten Siemens protective relays supported

Editor Software Features:

- MS-DOS based (also runs under Microsoft Windows)
- Menu driven
- Mouse supported (but not required)

1.4 Applications

The following are possible hardware configurations using the DTU3005 to connect to Siemens ACCESS devices.

1.4.1 PLC to SEAbus

The basic configuration is a PLC attached to port 1 of the DTU3005, and the Siemens ACCESS devices attached to port 2. This is shown below in **Figure 1.2**. Port 3 can be configured as a passthrough to the SEAbus devices. This allows a personal computer running Siemens WinPM™ or other supervisory software to connect directly to the SEAbus devices at the same time as the PLC. This is shown in **Figure 1.3**. An additional DTU3005 device can be attached to port 3. Up to 32 DTU3005 devices can be daisy chained together, each connected to up to 32 Siemens devices. This is shown in **Figure 1.4**.

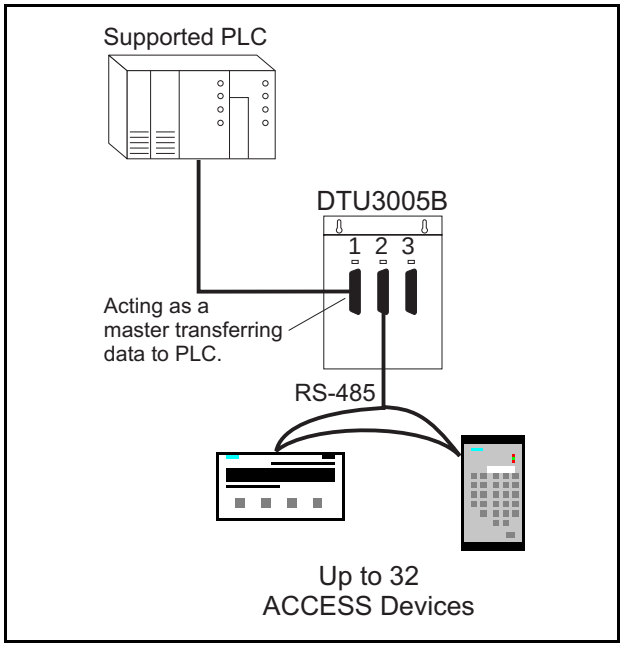


Figure 1.2 PLC to SEAbus Application

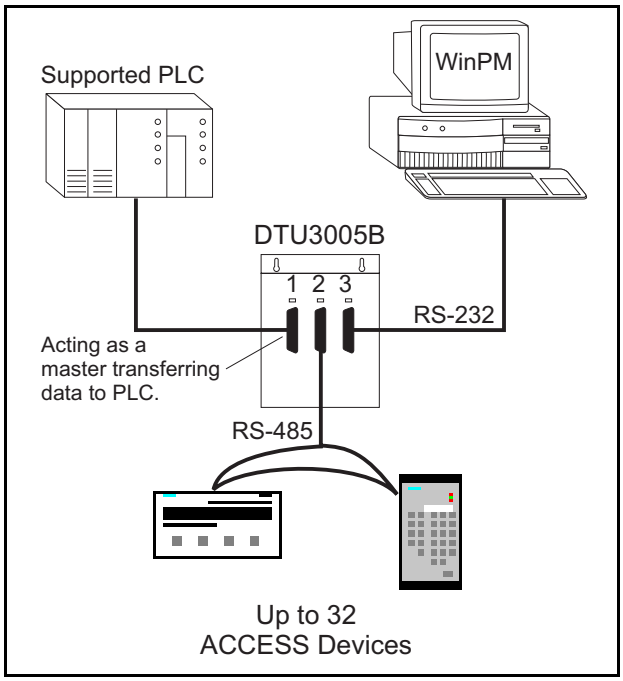


Figure 1.3 PLC to SEAbus with Passthrough

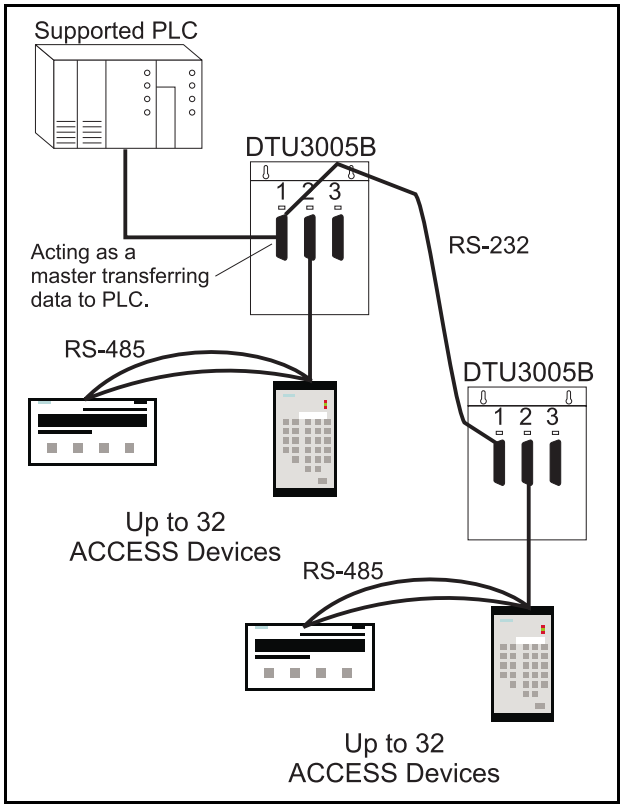


Figure 1.4 Daisy Chained DTU3005 Units

1.4.2 Modbus Master to SEAbus

The DTU3005 unit can be configured as a Modbus (RTU) slave. In this configuration, a Modbus master device (usually a SCADA system) is connected to port 1. The Modbus master uses the DTU3005 to monitor and/or control Siemens ACCESS devices. A typical Modbus application is shown below in **Figure 1.5**. The passthrough port (port 3) can be used to connect to a supervisory computer running WinPM software. It can also be used to connect to a second, independent Modbus Master device. This is shown in **Figure 1.6**. Up to 32 DTU3005B units can be daisy chained using a cable connected to port 1 of the three units. Each DTU3005B device should have a different Modbus device number. A daisy chained configuration is shown in **Figure 1.7**.

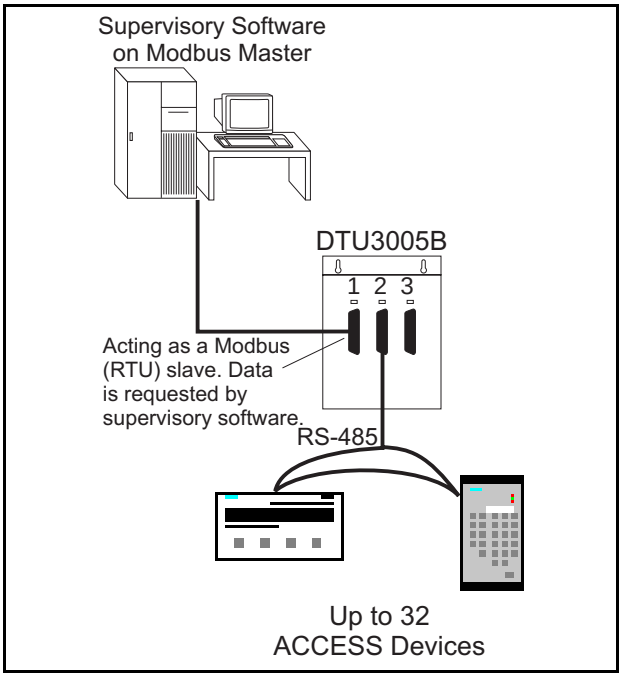


Figure 1.5 Modbus Master to SEAbus

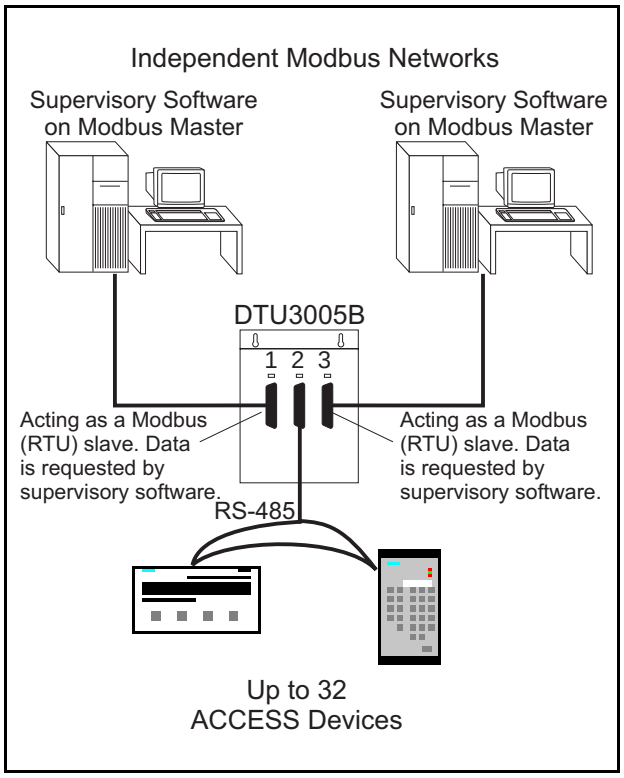


Figure 1.6 Two Independent Modbus Master Devices to SEAbus

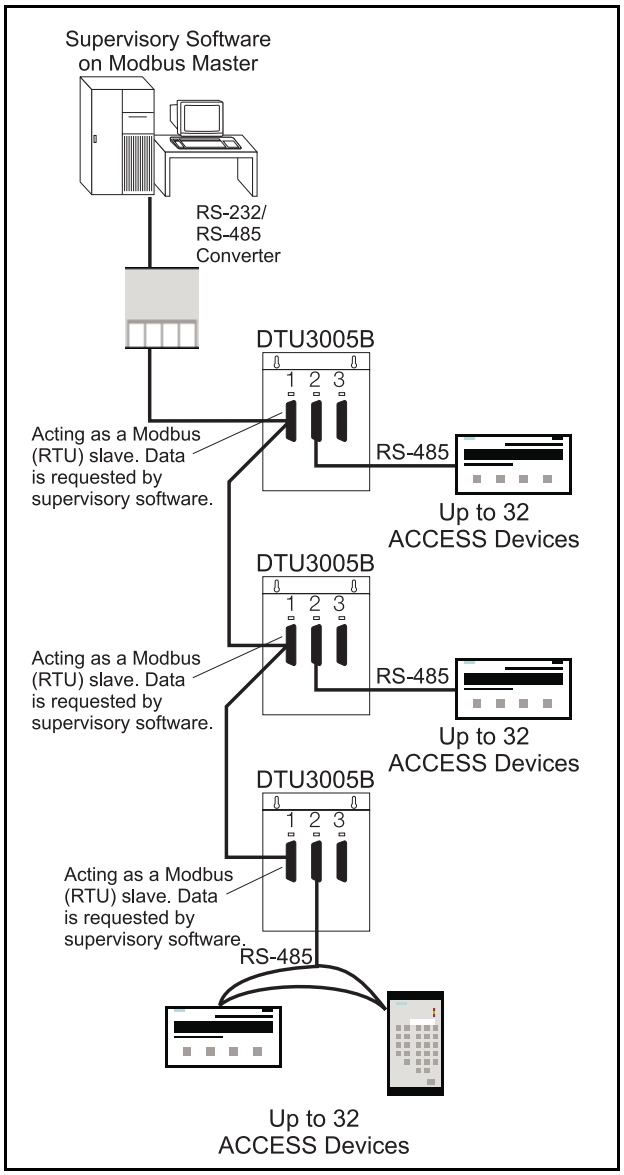


Figure 1.7 Connection to Modbus Master using a Multidrop Cable

Multi-Drop Modbus Master to SEAbus

By using a Siemens Isolated Multi-Drop Converter, you can connect your Modbus Master device to four DTU3005 devices. Each DTU3005 can connect to up to 32 Siemens ACCESS devices, as well as be daisy chained to up to 32 additional DTU3005 devices. An example configuration is shown below in **Figure 1.8**.

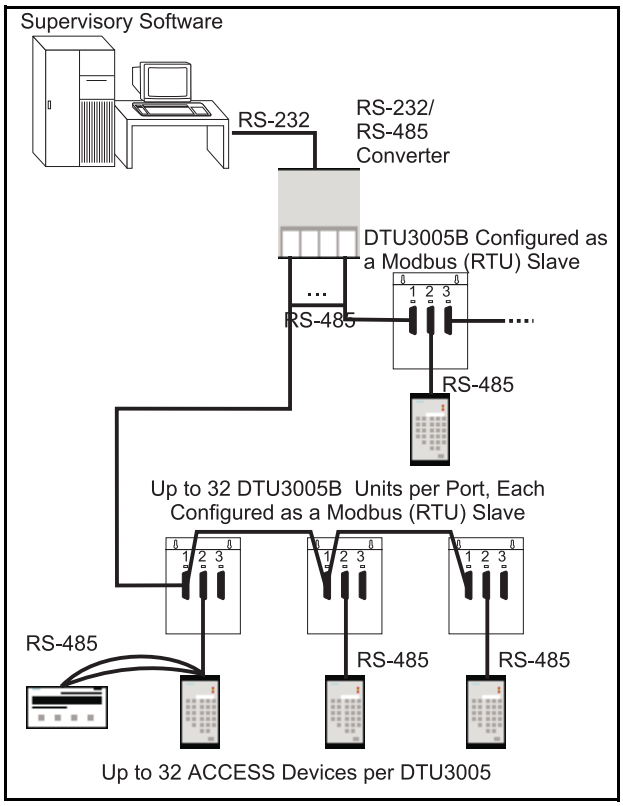


Figure 1.8 Multi-Drop Configuration

1.4.3 SEAbus Port Expander

The DTU3005 can be used as a SEAbus port expander for ACCESS devices, allowing two personal computers running WinPM (or other supervisory software) to communicate with up to 32 ACCESS devices. This configuration is shown below in **Figure 1.9**.

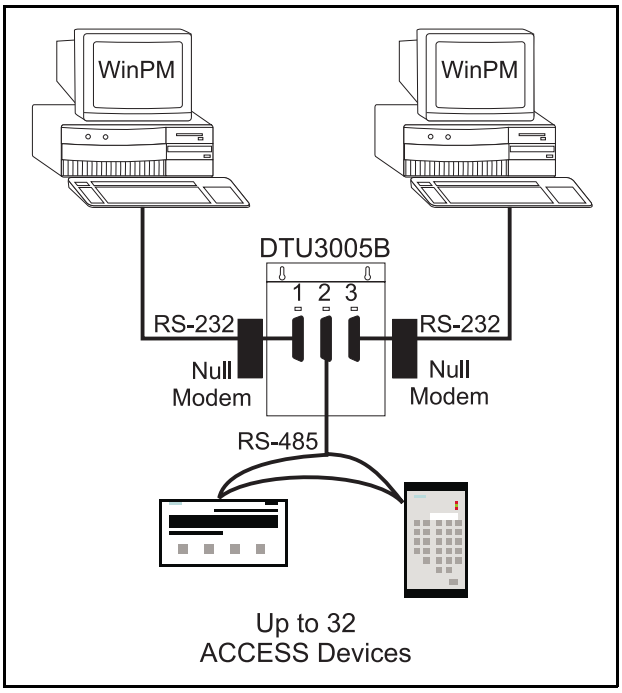


Figure 1.9 SEAbus Port Expander

2 Installing the Software

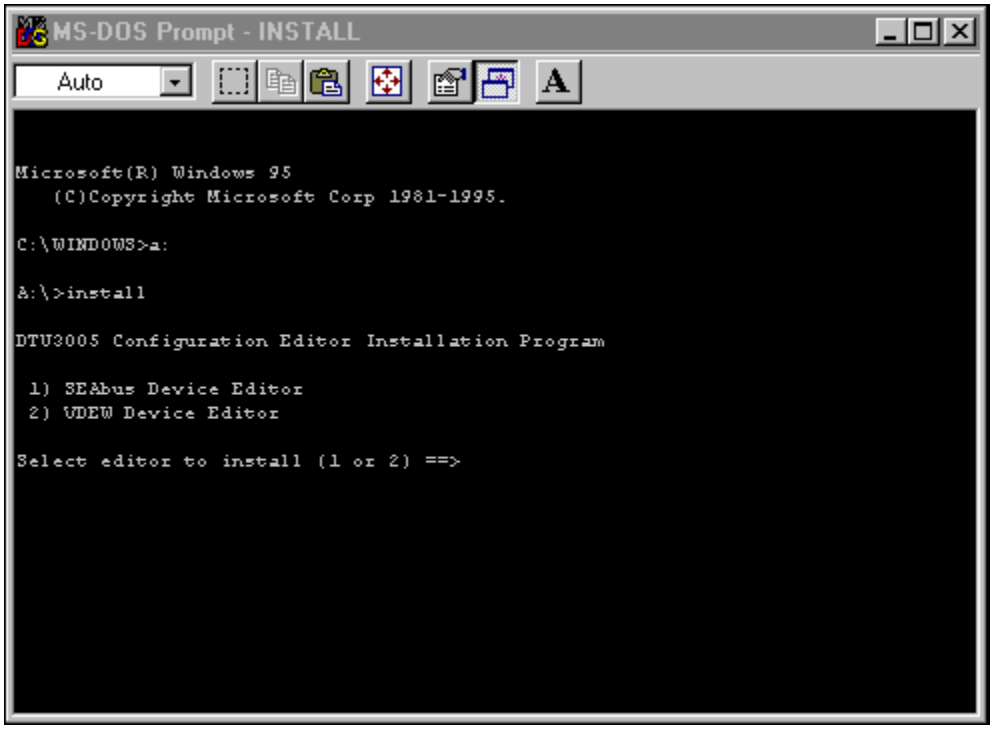
The DTU3005 Editor software can be installed from the DOS prompt onto a PC running Microsoft® Windows version 3.1, 95, or 98. The PC processor must be less than 300 MHz (or have a utility program installed to slow down the processor speed) for the Editor software to work properly.

Note: The DTU3005 Editor software does not work in a Windows NT environment.

If you are running Windows 3.1, double click the MS-DOS Prompt icon in the **Main** window of Program Manager. For Windows 95/98, select **MS-DOS Prompt** from the **Start** menu. To install the Editor software, insert the installation diskette into your computer and follow the steps listed below. The computer screen, showing the computer prompts and user responses, is shown below.

1. Change the current drive at the DOS prompt to the diskette drive. Type **`A:`** (or **`B:`** if that is your 3½" diskette drive), and then press **Enter**.

2. At the **`A:\>`** prompt, type **`install`**, and then press **Enter**. The installation prompts you to select which Editor software to install, as shown in the example screen below. Type **`1`** and press **Enter** to install the SEAbus Device Editor, or type **`2`** and press **Enter** to install the VDEW Device Editor.



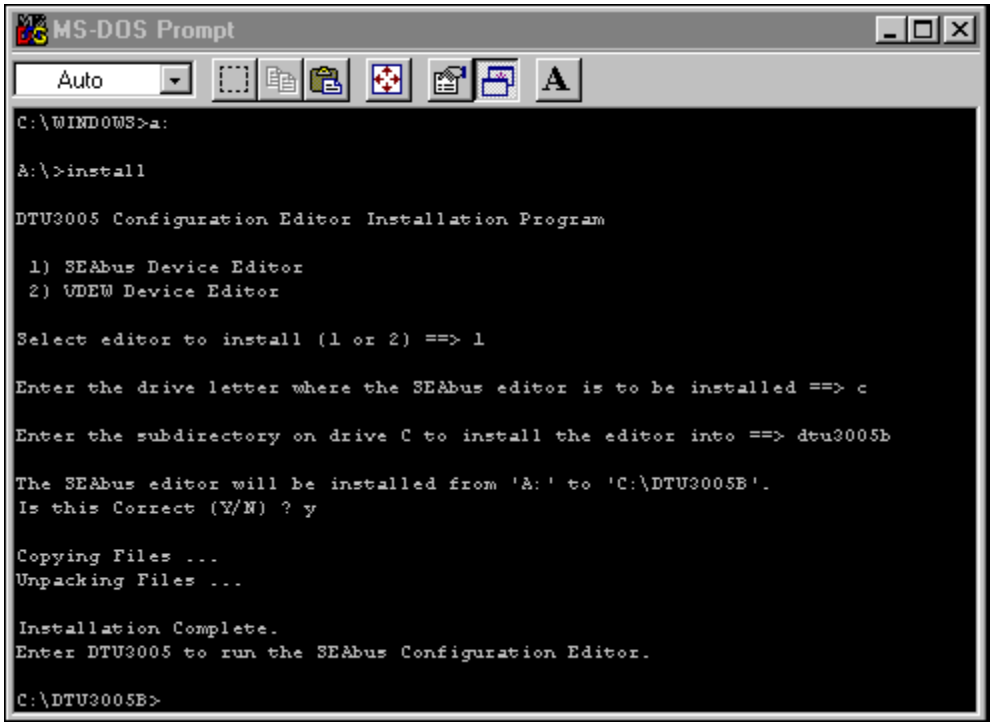
3. The program asks on which drive you want to install the Editor software. For most computers, this will be drive C. Type **`c`** and press **Enter**.

4. The installation program then asks to which subdirectory you want to install the DTU3005 Editor software. This is where the program and configuration files will be placed. The suggested directory name is **DTU3005B**. Type the directory name at the prompt and press **Enter**.

5. You will now verify your drive and directory choices. The installation program repeats your entries and asks if the information is correct. Enter **`Y`** if it is correct, and **`N`** if it is incorrect or you have changed your mind. Then press **Enter**.

6. The installation program copies and unpacks the editor program files onto your hard drive and

returns you to the DOS prompt as shown in the example screen below.



7. If you are running Windows, type **exit** to close the DOS window.

3 Starting the Software

To start the DTU3005 Editor software, follow these steps:

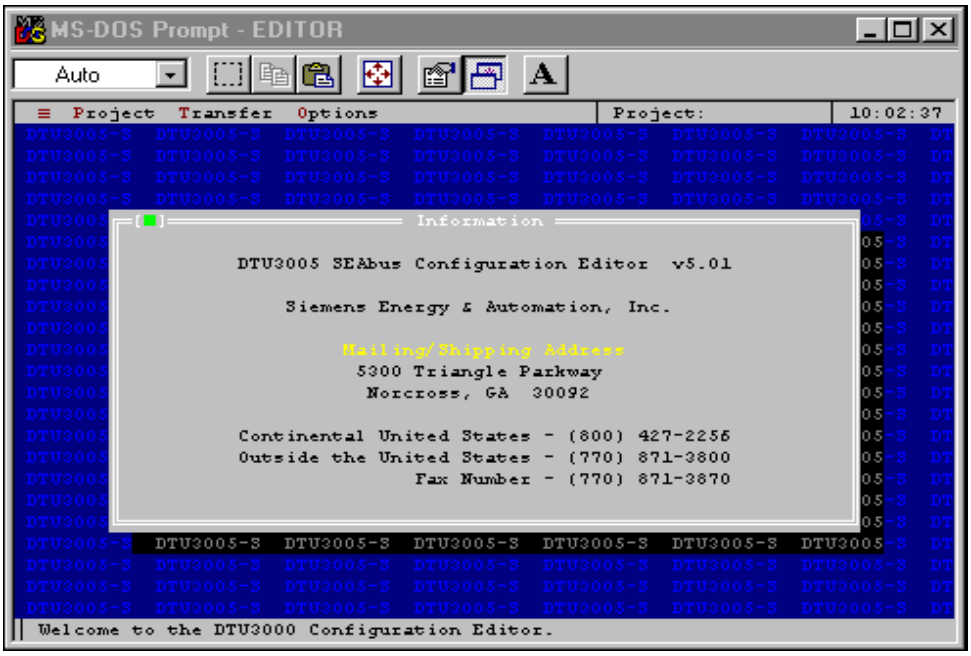
1. If you are running Windows 3.1, double click the **MS-DOS Prompt** icon in the Main window of Program Manager. For Windows 95/98, select **MS-DOS Prompt** from the **Start** menu.

2. At the DOS prompt, which is usually **C:\>** (or **C:\WINDOWS>** if you are running a DOS prompt from Windows) type **CD \DTU3005B**, where DTU3005B is the directory where the Editor software is installed. Press **Enter**.

3. At the new DOS prompt (which is **C:\DTU3005B>** if you installed the program to the suggested directory), type **DTU3005** and then press **Enter**.

4. The DTU3005 Editor software starts. An information screen appears as shown below.

5. Press **Enter** or **Esc** to close this information screen and start using the program.



3.1 Menu Navigation

Navigation of the program menus and dialog boxes can be performed with either the keyboard or a mouse. The Editor software uses the standard menu and dialog box user interface used by many other DOS and Windows programs. The mouse can be used to make menu selections, highlight and select items in a dialog box, and perform commands by clicking on dialog box buttons. Keyboard equivalents to mouse actions are described in **Table 3.1** below. Informational messages are displayed on the bottom line of the screen to give you help with keyboard navigation.

Note: To use a mouse in DOS, be sure the mouse driver is loaded before starting the Editor software. This is usually done automatically from a command in the CONFIG.SYS or AUTOEXEC.BAT startup files, or if you are running the program from Windows, by Windows itself. For information on how to load a mouse driver, refer to the instructions included with your mouse.

Table 3.1 Keyboard Shortcuts for Menu Navigation

Key	Description
Arrow keys	Moves the highlight in the direction of the arrow.
Enter	Performs the highlighted command.
Esc	Cancels a function, closes the menu or dialog box, and returns you to the previous menu or dialog box.
Tab and Shift+Tab	The **Tab** key moves forward one item at a time within a dialog box. **Shift+Tab** moves backward one item at a time.
Letter keys	The colored letter in each menu item indicates which key performs that command.
Spacebar	Selects or deselects a highlighted item.
Alt + Q	Quits the program.

3.2 Main Menu

The main menu is located on the top line of the screen. In addition to the menu selections, the name of the current project and the time of day is displayed on the top line. There are five main menu selections. They are

- ≡, or the **Program Information** menu. Selecting it displays the program information screen.
- The **Project** menu enables you to create, load, save, view and print project files. It also allows you to switch to a DOS prompt or quit the program. Its operation is described below in **Section 3.3** and **Section 3.4**.
- The **Edit** menu enables you to configure projects and is available only when a project is open. **Chapters 4, 5,** and **6** describe the process of configuring the different project types.
- The **Transfer** menu uploads and downloads project files to the DTU3005 unit. These procedures are described in **Chapter 7**.
- The **Options** menu allows you to change settings on where the program finds its project files, and which COM and LPT ports to use. Its operation is described in **Chapter 8**.

3.3 Using the Project Menu

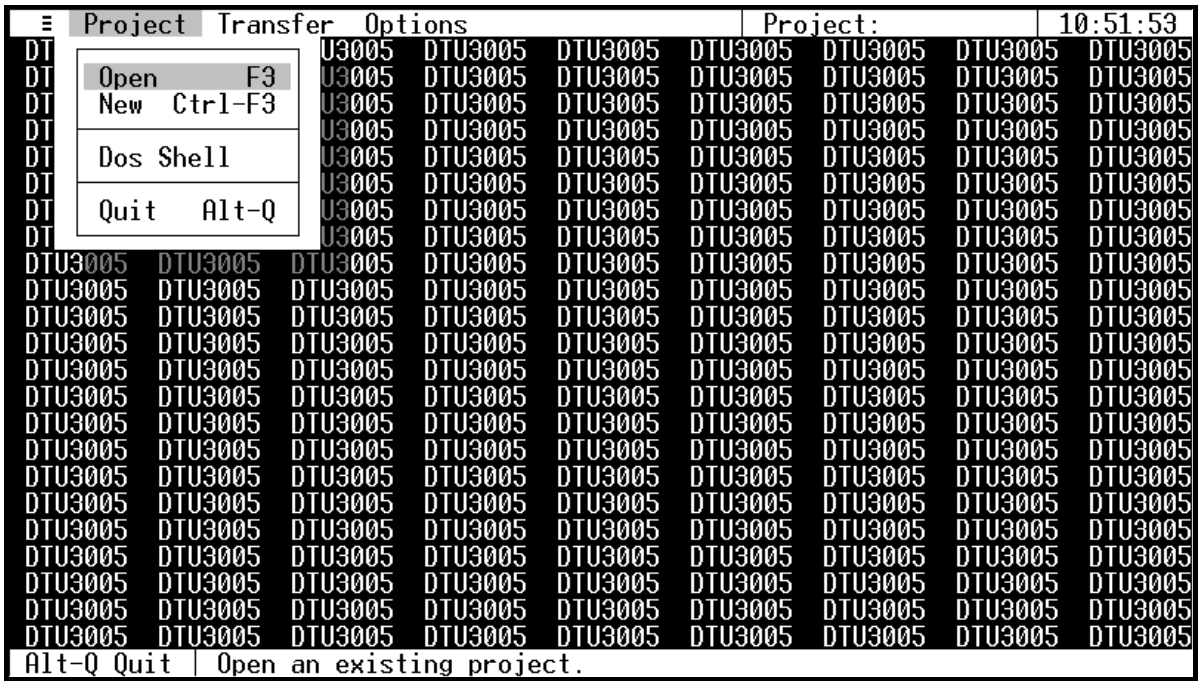
When you first start the DTU3005 Editor software, and no project file is loaded, the following menu selections are available in the **Project** menu (see example screen below):

- **Open**, allows you to open any saved project file.
- **New**, allows you to create a new project file.
- **Dos Shell**, allows you to switch to MS-DOS without closing the DTU3005 Editor software. To return to the program, type **`exit`** and then press the **Enter** key at the DOS prompt.
- **Quit**, allows you to exit the DTU3005 Editor software.

3.4 Starting a New Project

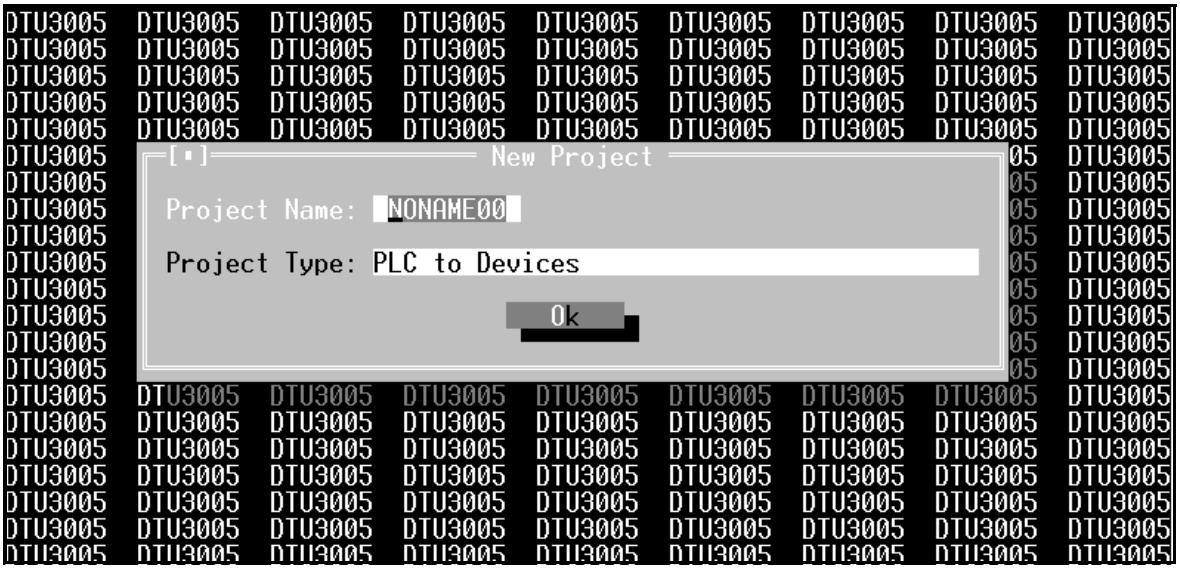
Projects contain the configuration information to be downloaded to the DTU3005 device. To create a new project:

1. Select the **Project** menu with the mouse, or use the arrow keys to highlight **Project** and display the **Project** menu:



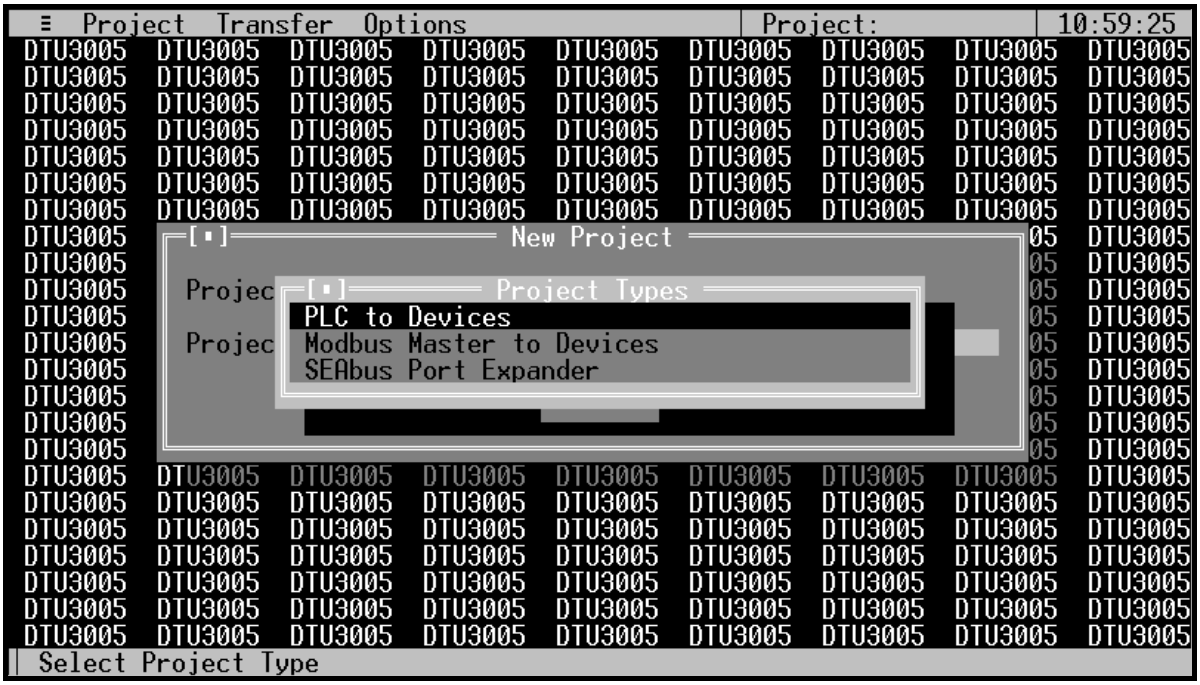
2. Select **New** with the mouse, use keyboard shortcut **Ctrl + F3**, or use the arrow keys to highlight **New** and press **Enter**. The **New Project** dialog box appears.

Note: All menus and dialog box selections are accessible from the keyboard or by using the mouse. From this point the manual will only say "select this" or "highlight this." Refer to **Section 3.1** for menu navigation instructions and keyboard shortcuts.



3. Type in a name for the project up to eight letters and numbers in the **Project Name:** field and press **Enter**. The **Project Type:** field will then be highlighted. Press the **spacebar** to display the project types, which are:

   - **PLCs to Devices**—allows a PLC to control and/or monitor up to 32 supported Siemens devices. See **Chapter 4** for configuring this project type.
   - **Modbus Master to Devices**—allows a Modbus speaking host system, personal computer running SCADA software, or PLC to read and write registers in up to 32 supported Siemens devices. See **Chapter 5** for configuring this project type.
   - **SEAbus Port Expander**—allows two Siemens ACCESS supervisory computers to connect up to 32 Siemens ACCESS devices. See **Chapter 6** for configuring this project type.



4. To select a project type, highlight the type and either press **Enter** or click the left mouse button. Then highlight the **Ok** button on the dialog box and either press **Enter** or click the left mouse button.

5. When the screen refreshes, the **Project** menu is displayed with additional menu options now available. These options apply to the open project file that is active (i.e., the project name appears in the top line of the screen).

   - **Close**—allows you to close a project file. (More than one project file can be open at any time.)

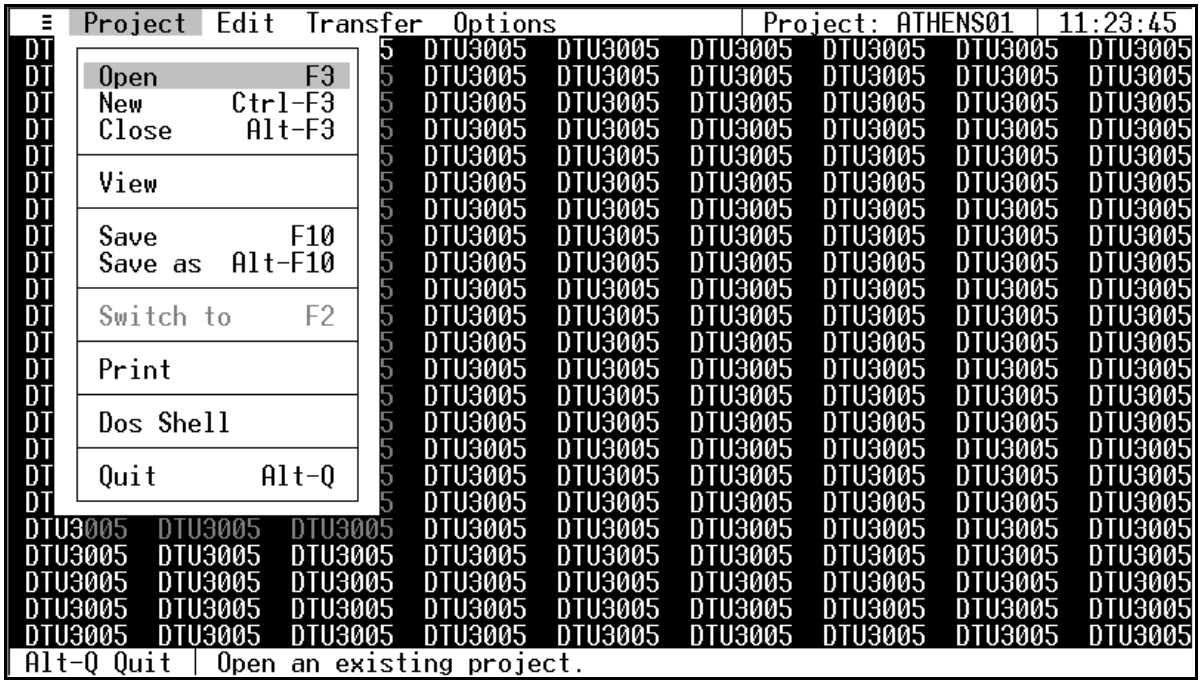
   - **View**—allows you to view a project information screen which shows the project file name, project file type, the selections for each of the DTU3005's ports, and the number of devices.

   - **Save**—allows you to save the current project file.

   - **Save As**—allows you to save the project file under a different file name.

   - **Switch To**—allows you to switch between the opened project files. (Multiple project files can be open at the same time.)

   - **Print**—allows you to print the project file's configuration information.



6. Select **Save**, or use the keyboard shortcut **F10** to save your new project. You are now ready to configure your project.

4 Creating Project Files—PLC to Devices

This chapter covers configuration of the DTU3005 for PLC communications with Siemens devices. Once you have created a PLC to Devices project (see **Chapter 3**), follow the directions in this chapter to configure the project file. Then see **Chapter 7** for directions on downloading the project to the DTU3005. See also **Appendix D** for wiring diagrams for your particular PLC, as required.

4.1 Application Description

The PLC to Devices application allows a PLC to control and monitor up to 32 SEAbus devices or Siemens protective relays. In this application, the DTU3005B initiates all communications with both the PLC and the Siemens devices.

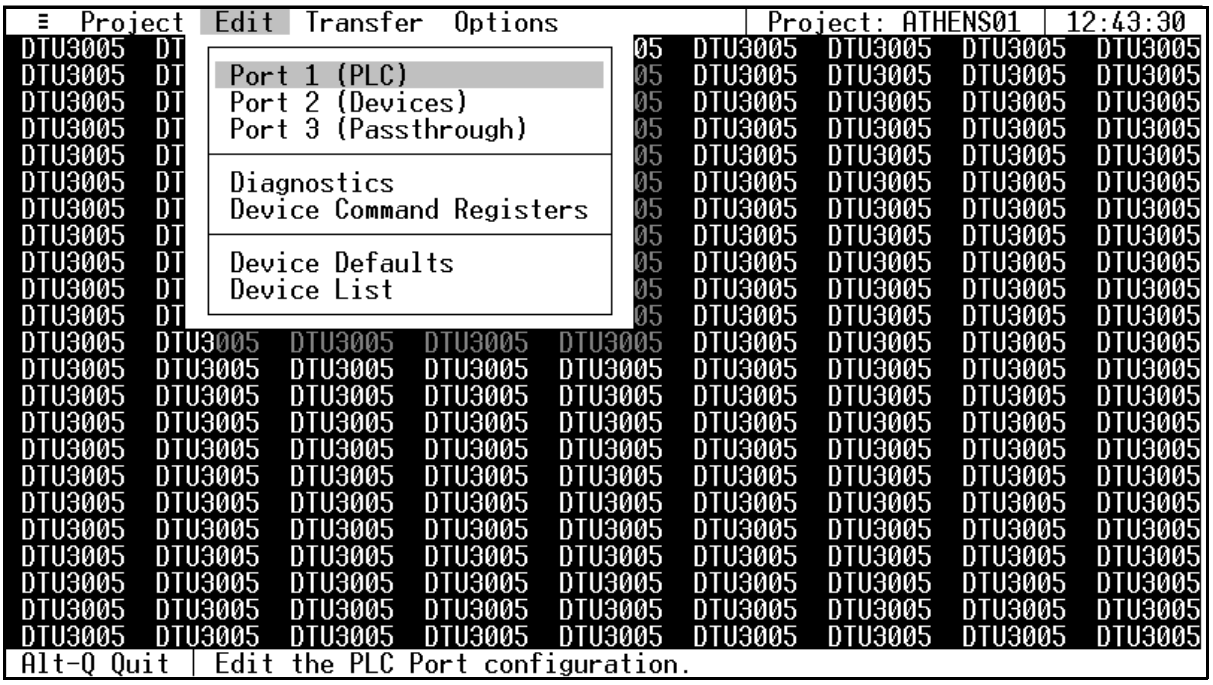
The DTU3005B uses an internal transfer table to transfer data to the PLC. The transfer table contains a block of selected real-time data parameters obtained from a device. The DTU3005B unit acts as a master to the PLC, and continuously transfers the table data to the selected block of registers on the PLC. A delay option is provided for each device's table entry to prevent unnecessarily slowing down the scan time of the PLC as well as to give some device data transfers higher priority than others.

No ladder logic is required on the PLC to use the basic feature of this application, which allows a limited amount of information to be transferred between the PLC and the devices. Ladder logic programming is required to use the command block function. The command block is used to send commands to the devices, such as operating or releasing relays, or resetting energy counters. See **Section 4.11** for information on configuring this feature on the DTU3005B. The format of the command registers for each device are described in **Appendix E**.

The DTU3005B can automatically update diagnostic information in the PLC. It allows the PLC to determine when a device is not communicating. See **Section 4.10** for information on enabling and configuring this feature. The format and content of the diagnostic registers are described in detail in **Appendix F**.

4.2 Configuring the Project File

Once you have created or opened the project file, select **Edit** from the main menu to display the following menu items:



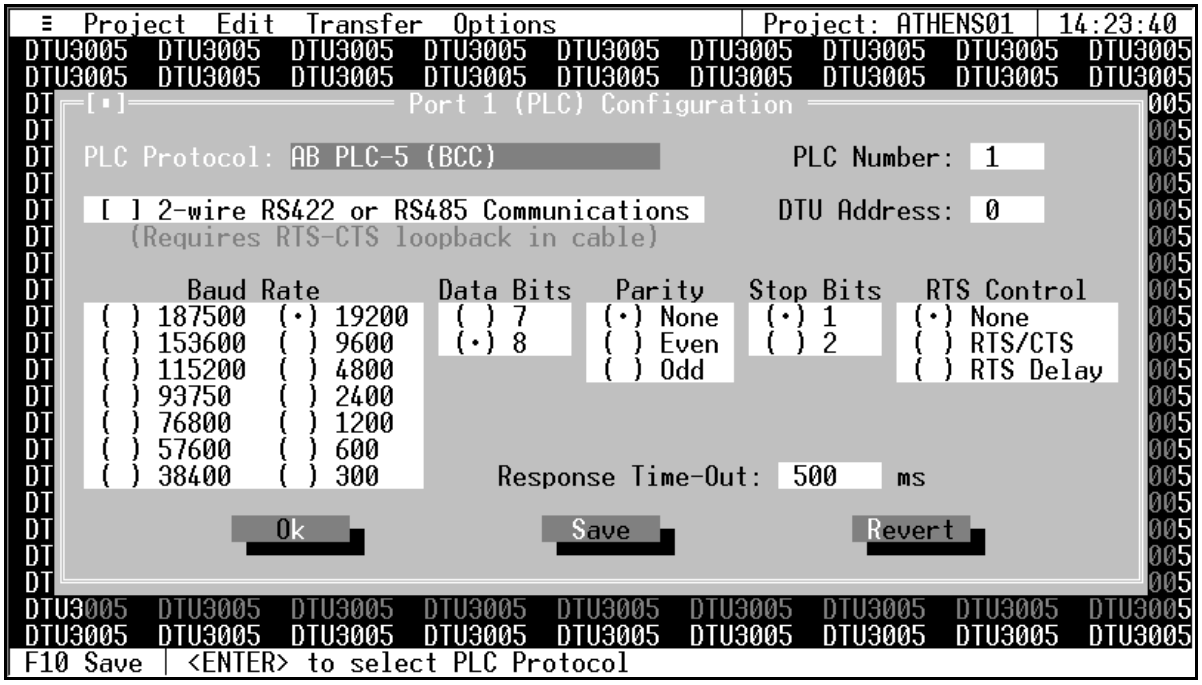
- **Port 1 (PLC)**—allows you to select the model and configure the communications settings for the PLC connected to port 1.
- **Port 2 (Devices)**—allows you to configure communications settings for SEAbus devices or Siemens Protective relays connected to port 2.
- **Port 3 (Passthrough)**—allows you to select whether port 3 is used as a passthrough to the devices or the PLC.
- **Diagnostics**—allows you to indicate if you want the DTU3005 to write communications diagnostic information to the PLC.

- **Device Command Registers**—allows you to indicate which PLC registers will be used for device commands.
- **Device Defaults—**allows you to set the default data registers for more than one device of a certain type, e.g., set the defaults for all 4720 power meters or all S7-I/O units. The data registers can still be customized for each device, as required. See **Section 4.7.2** for more information.
- **Device List**—allows you to indicate which SEAbus devices or Siemens protective relays are connected to port 2 and which PLC registers they are communicating with.

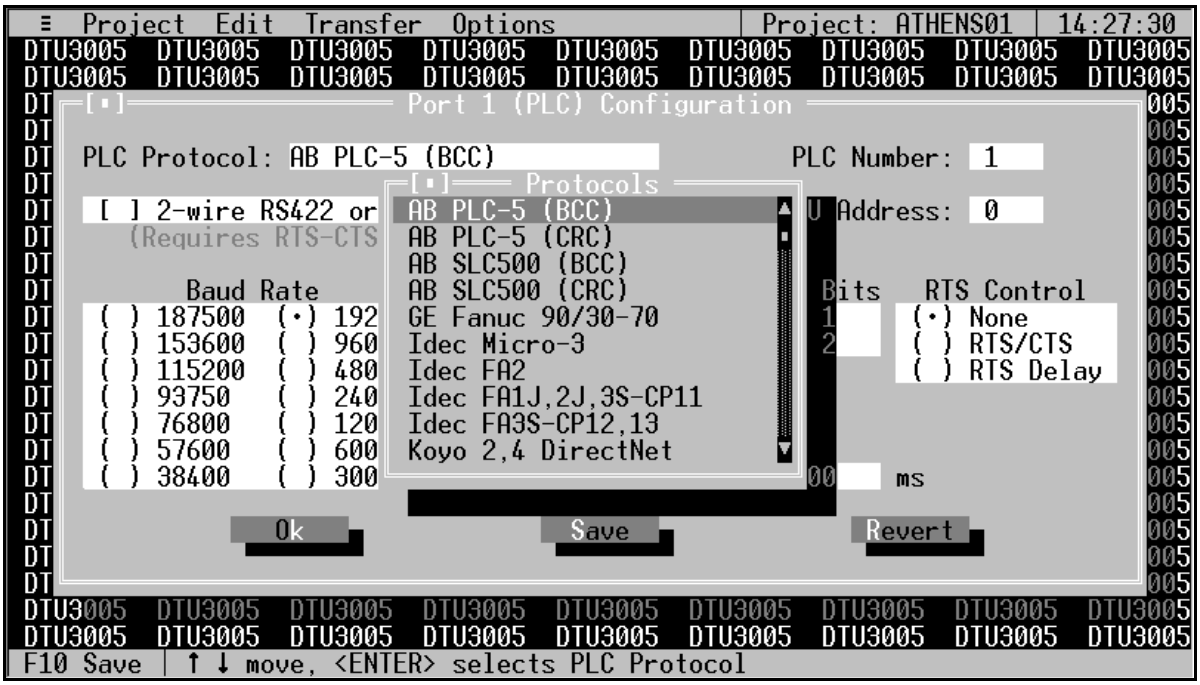
If the Device Protocol for port 2 is set to VDEW (see **Section 4.4**), then two additional menu items are available: **Global Command Registers** and **Device Text to Values Table**. See **Section 4.8** and **Section 4.9** for instructions on using these menu items.

4.3 PLC Setup—Port 1

You must have a PLC to Devices project file open to configure port 1 using the instructions in this section. Select **Port 1 (PLC)** from the **Edit** menu, and the Port 1 PLC Configuration screen appears.



To select the PLC connected to port 1, highlight **PLC Protocol** and press **Enter**. The PLC Protocols selection menu appears:



PLC Protocol

Use the **Down Arrow** and **Up Arrow** keys to scroll through the list of available PLC Protocols, since not all choices are visible at one time. To select a protocol, highlight the selection and press **Enter**.

PLC Number

After you have selected your PLC, the **PLC Number** selection box is highlighted. The PLC Number is used to identify which PLC the DTU is to communicate with (if the selected type of PLC is addressable). The PLC Number is often called a PLC Slave Address or Slave ID.

Type in the PLC Number and press **Enter**.

2-Wire RS422 or RS485 Communications

After you have entered the PLC Number, the **2-Wire RS422 or RS485 Communications** selection box is highlighted. This box will only need to be checked if the communications with your PLC is a 2-wire RS485 or RS422 interface. When 2-wire communications are being used, RTS must be looped back to CTS on the DTU side of the cable. This can be done on the RS232 side by looping pins 4 and 5 or on the RS422/485 side by looping 16 to 18 and 17 to 19. See **Appendix D** for wiring diagrams for your particular PLC, and whether it uses a 2-wire connection.

To select the checkbox, click on it with the mouse or, with the **2-Wire RS422 or RS485 Communications** selection highlighted, press the **spacebar**. An “X” will appear inside the brackets when it is selected.

Press the **Tab** or **Right Arrow** key to move to the next field without selecting this checkbox.

DTU Address

Some PLC protocols require each device on the PLC network to be assigned a unique address or ID. The **DTU Address** is the address assigned to the DTU on the PLC network. Highlight this field and type in the address number for the DTU3005B, then press **Enter**.

Communications Settings

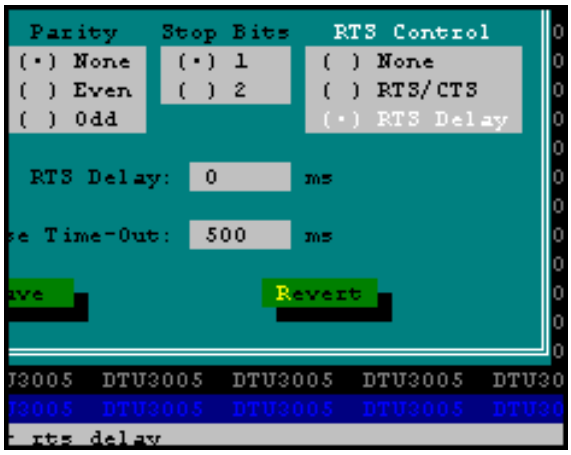
The communications settings are automatically set to the default values for each type of PLC when the PLC is first selected. Before changing any of these settings, consult your PLC manual for the correct settings. To move between the communications settings, press the **Tab** or **Enter** keys. To select a setting, use the **Up** or **Down Arrow** key to move to the desired setting and press the **spacebar** to change your selection.

RTS Control (Request to Send Control)

RTS Control selection is an option provided for modems or for PLCs that require RTS to be active only while the DTU is transmitting to the PLC.

- If **RTS/CTS** is selected, the DTU will activate RTS and wait until CTS is active before transmitting to the PLC.
- If **RTS Delay** is selected, the DTU will activate RTS and wait for the specified delay time to pass before transmitting to the PLC. When **RTS Delay** is selected, the

program displays an entry box for the RTS delay time. Enter the time in milliseconds.



Response Time-Out

The **Response Time-Out** tells the DTU how long to wait after transmitting a request to the PLC if no response has been received from the PLC. After this amount of time passes with no response being received, the DTU will assume that no response is coming and will retry the request. Enter the time in milliseconds.

Saving Port 1 Configuration Information

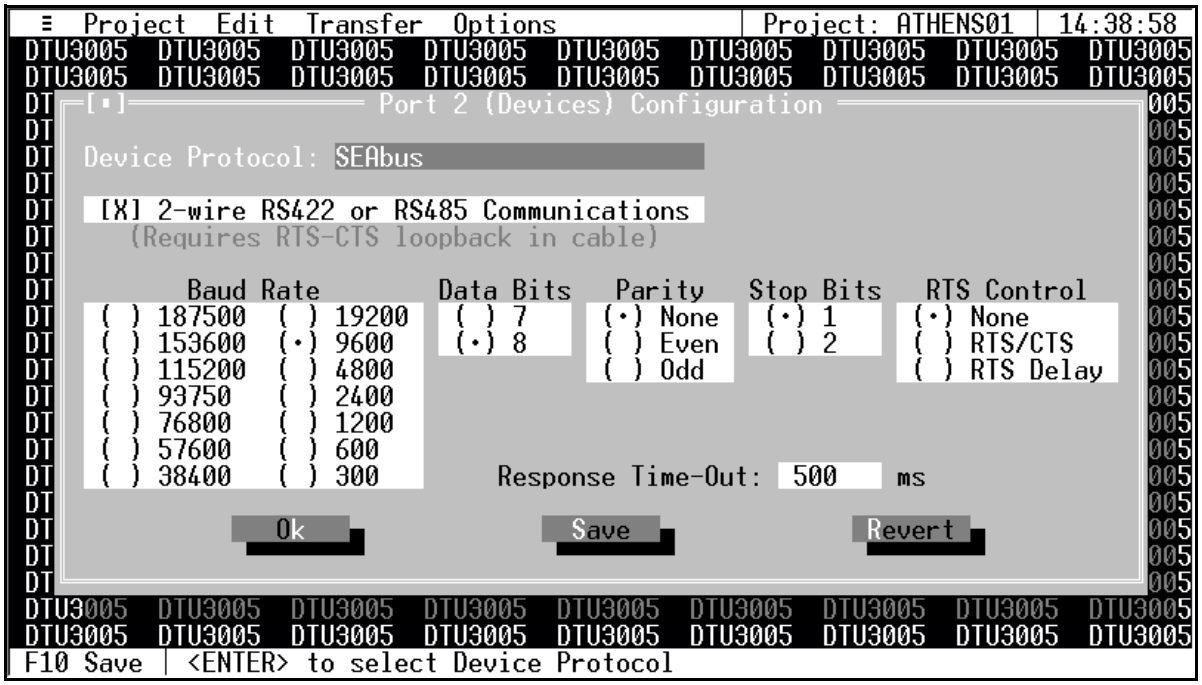
Once you have entered all the configuration information, select **Save** to save the configuration to the project file. Then select **Ok** or press the **Esc** key to close the configuration screen.

If you have changed the configuration and have not saved it to the project file, you will be prompted to either save or discard the changes. Select **Revert** to return to the last previously saved configuration without saving any changes.

4.4 Device Setup—Port 2

One or more Siemens devices may be connected to port 2. You must have a PLC to Devices project file open to configure port 2 using the instructions in this section.

Select **Port 2 (Devices)** from the **Edit** menu, and the Port 2 configuration screen appears.



Device Protocol

The **Device Protocol** indicates which Siemens devices can be connected to port 2. This protocol is based on which version of the DTU3005 Editor software was installed as described in **Chapter 2**.

- The **SEAbus** protocol (as shown in the example screen above) indicates connection to Siemens ACCESS communicating trip units, relays, power meters and other devices.
- The **VDEW** protocol indicates connection to Siemens protective relays using the VDEW protocol.

Note: Not all Siemens devices are supported. For a list of supported devices, see **Appendix B**.

Other Configuration Information

The remaining configuration selections are the same as those for port 1. Refer to **Section 4.3** for instructions on these fields.

Saving Port 2 Configuration Information

Once you have entered all the configuration information, select **Save** to save the configuration to the project file. Then select **Ok** or press the **Esc** key to close the configuration screen.

If you have changed the configuration and have not saved it to the project file, you will be prompted to either save or discard the changes.

Select **Revert** to return to the last previously saved configuration without saving any changes.

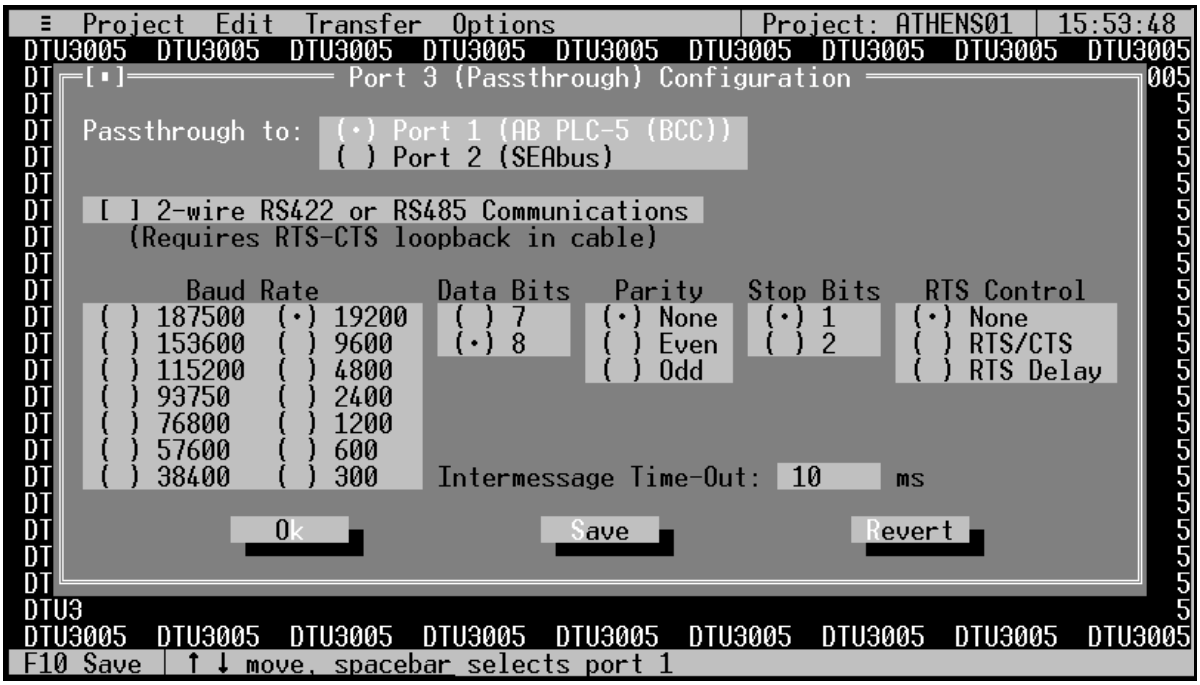
4.5 Passthrough Setup—Port 3

Port 3 is for passthrough communications. It allows direct communication with either the PLC on port 1 or the Siemens SEAbus devices on port 2. (Passthrough communications to port 2 are not available for VDEW devices.)

In passthrough mode, any messages received on port 3 of the DTU are simply "passed through" to the PLC (port 1) or devices (port 2). For example, passthrough communications enables a PC running WinPM, or other supervisory software connected to port 3 of the DTU3005, to communicate directly with the SEAbus devices connected to port 2.

You must have a PLC to Devices project file open to configure port 3 using the instructions in this section.

Select **Port 3 (Passthrough)** from the **Edit** menu, and the Port 3 configuration screen appears.



The first option on the configuration screen allows you to choose passthrough to port 1 or port 2. Select the appropriate port with the mouse, or use the **Up** or **Down Arrow** keys to highlight the selection and press **Enter**.

The remaining configuration selections except for Intermessage Time-out are the same as those for port 1. Refer to **Section 4.3** for instructions on these fields.

Intermessage Time-Out

The DTU3005 uses the intermessage time-out to determine when a complete message has been received on the passthrough port. Once the first character of a message has been received, if the amount of time specified by the intermessage time-out passes with no additional characters being received, the DTU3005 will consider the message to be complete and process it.

To change the intermessage time-out, select **Intermessage Time-Out** and type in the value in milliseconds, then press **Enter**.

Saving Port 3 Configuration Information

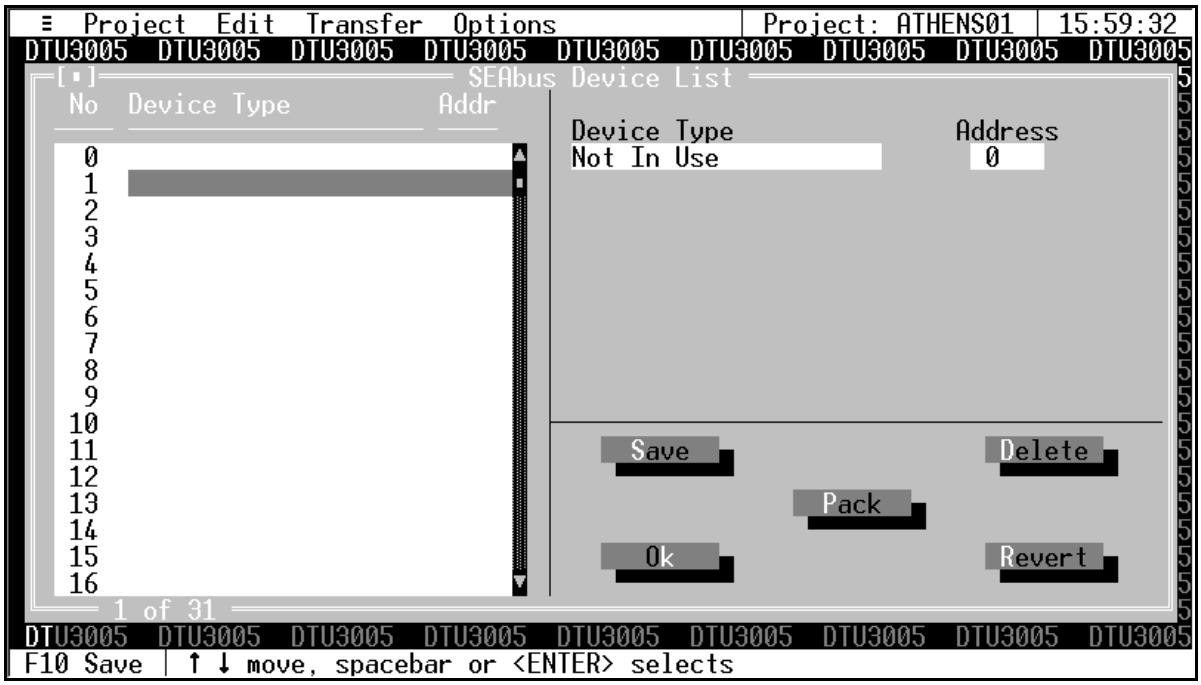
Once you have entered all the configuration information, select **Save** to save the configuration to the project file. Then select **Ok** or press the **Esc** key to close the configuration screen.

If you have changed the configuration and have not saved it to the project file, you will be prompted to either save or discard the changes. Select **Revert** to return to the last previously saved configuration without saving any changes.

4.6 Device List Setup

The Device List menu item enables you to indicate which registers on the PLC will receive data from the devices. In this screen, you will enter the device type and address for each Siemens device connected to port 2. You will also indicate to which registers on the PLC you want the DTU3005 to write device data.

Select **Device List** from the **Edit** menu to display the device list screen:



This screen is divided into two parts:

- On the left side of the screen is a list of the devices connected to port 2 (the list is initially empty). Up to 32 devices can be attached; however, only 17 of the devices are visible on the screen at one time. To see all the devices, click on the scroll bar with the mouse, or use the **Up** and **Down Arrow** and **Page Up** and **Page Down** keys.

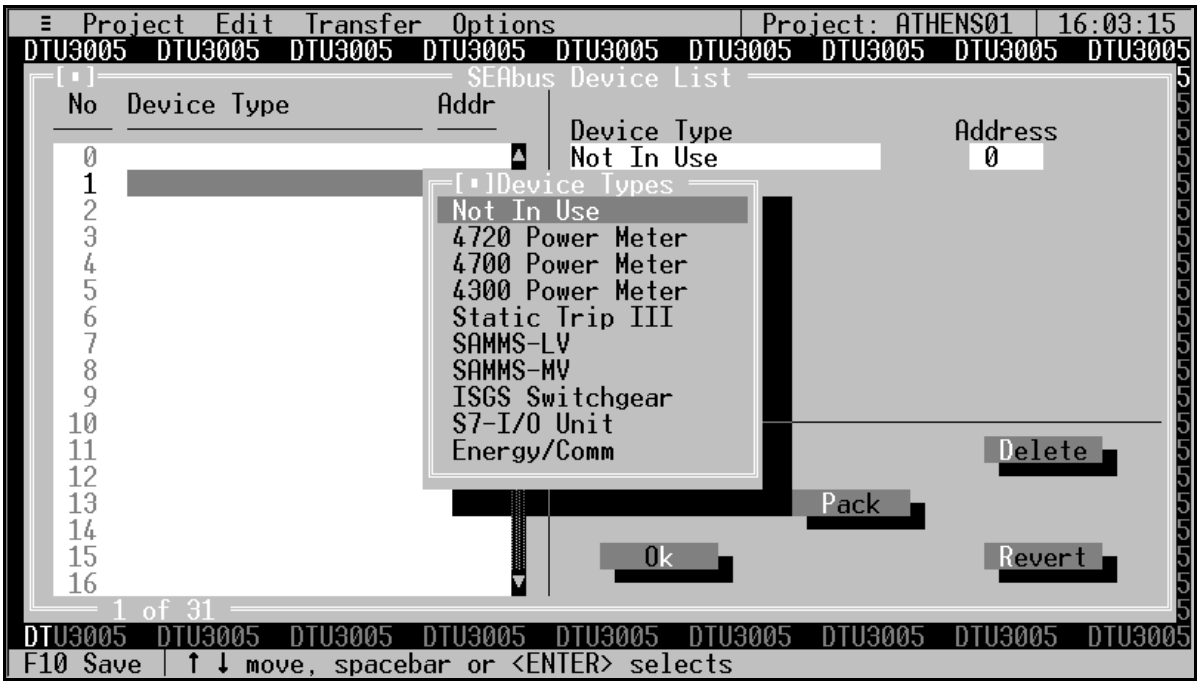
- The right side of the screen is used to configure the data register information for the selected device, as shown in the example screen on the next page. You can add or delete devices, or change device configuration by highlighting the **Device Type** on the left side of the screen, then using the fields and buttons on the right side of the screen.

Adding a Device

To add a device to the device list:

1. Highlight the first line where the **Device Type** and **Address** fields are blank—this should be the first available device number **No** field.

2. Press **Enter** or **Tab** to add a device. The cursor will move to the **Device Type** field on the right side of the screen. Press **Enter**, and the **Device Types** list displays:



3. Select the device from the list by pressing **Enter** or the **spacebar**. The highlight moves to the **Address** field, and the PLC register fields now display as shown in the example screen below.

4. With the **Address** field highlighted, enter the device's address. This number should be between 1 and 254, and match the number programmed into the device itself. Press the **Tab** key twice to go to the **Real-Time Data Registers** field.

5. Highlight the **File** field and enter the file number. This parameter is used only with Allen-Bradley PLCs to specify the file number in the PLC that contains the register values that are transferred to or from the device.

6. Enter the beginning register number in the **Real-Time Data Registers** field. Refer to **Appendix A** for valid register numbers for your PLC application. The DTU3005 Editor software supplies the last register number after you enter the first. In the example above, the 4700 Power Meter uses 41 registers for its data. When you enter 1 for the first register, the last register becomes 42. If you change the starting register to 10, the last register will automatically change to 51.

   Note: These registers indicate the exact location in the PLC where the DTU3005 will store the real-time data for this device.

7. Press **Shift+Tab**, or click the left mouse button to highlight the **File** field and enter the file number. This parameter is used only with Allen-Bradley PLCs to specify the file number in the PLC that contains the register values that are transferred to or from the device.

8. The device command registers are displayed below the real-time data registers. They are configured from the **Device Command Registers** menu selection on the **Edit** menu. See **Section 4.11** for information on setting these registers and programming the PLC to perform commands. Be sure that the register numbers are not also used by the device. This can cause unexpected operation of the device.

9. If you want to use a customized subset of the available data registers, see **Section 4.7.2** for instructions on creating a default set of custom registers for all devices of the same type. Type an "X" in the **Use customized real-time data ordering?** field to begin the custom data setup, or press **Tab** to go to the next field.

10. Enter the **Real-Time Data Delay Time** in its field. This is the delay from the time that the DTU3005 receives data from the device to the time the DTU3005 transfers the data to the PLCs registers.

11. Select **Save** to save the device information to the project file, and then select **Ok** or press **Esc** to exit the device list configuration screen. If at any time you want to return to the last saved version of the device list, select **Revert** without saving any changes.

Removing a Device

To remove a device from the device list, highlight the device on the left side of the screen and press **Tab** or **Enter**. Then change the device type to **Not In Use**.

Additional Options for Data Registers

The Device List screen has three additional options for working with a device's data registers:

- Select **Set Reg** to place the data registers into contiguous register numbers and minimize the size to the data register block. This option also sets the initial register number to 1.

- The **Set All** command performs the same function as Set Reg, but allows you to set the initial register number. See **Appendix A** for information on acceptable register number ranges for each PLC model.

- Select **Pack** to minimize the size of the command register block, removing registers for deleted devices.

Saving the Device List Configuration

Once you have entered the device information for all the devices attached to port 2, select **Save** to save the device information to the project file. Then select **Ok** or press **Esc** to close the device list configuration screen.

If you have changed the device information and have not saved it to the project file, you will be prompted to either save or discard the changes.

Select **Revert** to return to the last previously saved configuration without saving any changes.

4.7 Configuring Custom Device Registers

You can configure which data items from the SEAbus or VDEW devices are transferred from the DTU3005 device to the PLC or Modbus master. In this way, the DTU3005 acts as a data concentrator, in addition to converting the SEAbus and VDEW protocol data. You can configure the custom data items so that every device of the same type sends the same data items (see **Section 4.7.2**), or have each device send particular data items of interest (see **Section 4.7.1**). SEAbus devices can be configured to send 16 words of device data. VDEW devices can be configured to send from 1 to 64 words.

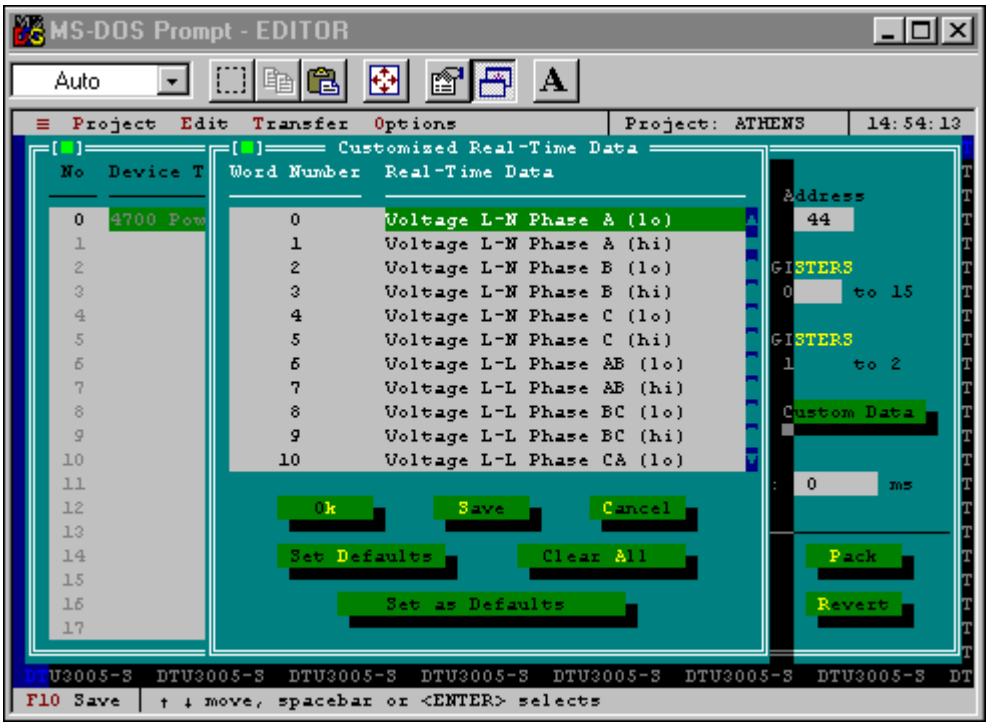
4.7.1 Configuring Custom Registers for a Single Device

To configure custom registers for a single device:

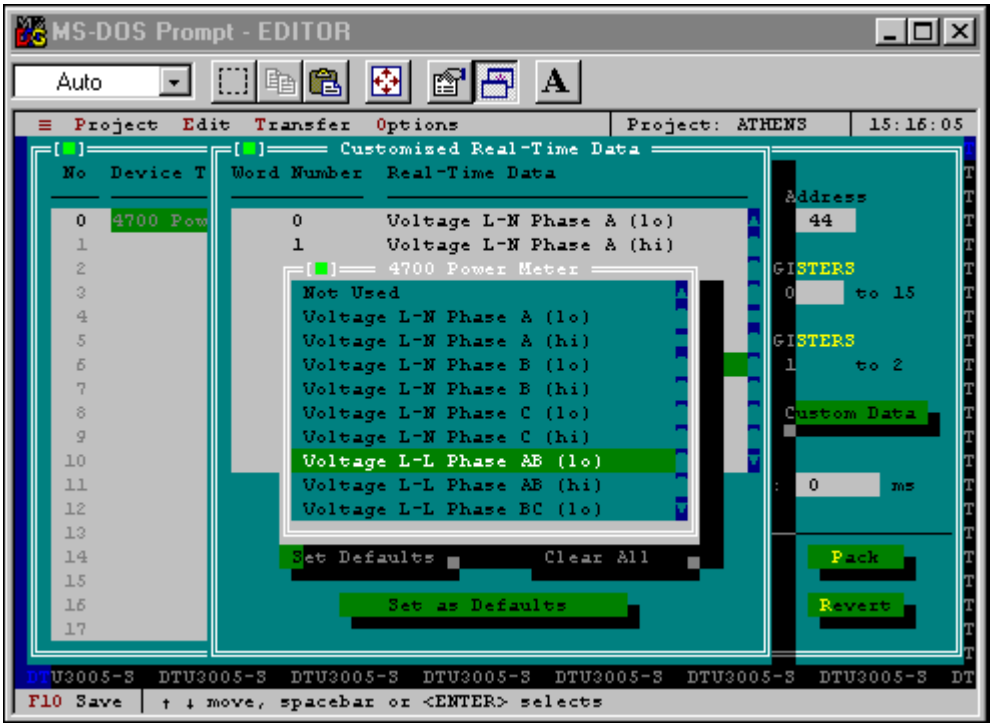
1. Select **Device List** from the **Edit** menu.

2. Highlight the device that you wish to configure and press **Enter**.

3. Highlight the **Use customized real-time data ordering?** check box. Press the **spacebar** to place an "X" in the check box. Then select **Custom Data** to display the Customized Real-Time Data dialog box.



4. Select a data register on the list and press **Enter** to see a list of available real time data. These data items are identical to the standard data items listed in **Appendix E**. Not all data items are visible on the screen at one time. Use the mouse and the scroll bar, or the **Page Up** and **Page Down** keys to view all of the data items.



5. Select the data word (16 bit data) from the list and press **Enter**. Continue to set the other data words in the same manner. Many data items consist of two words (32 bit data). It is important that you configure both words in order to transmit useful information to the DTU3005's registers.

6. Use these options as follows:

   a. Select **Set Defaults** to copy the default custom device registers to the list. See **Section 4.7.2** for instructions on setting custom device registers by device type.

   b. Select **Clear All** to delete all register names from the list.

   c. Select **Set as Defaults** to save the current custom register list as the default custom register list. This will not change the custom registers of other devices of the same type. See **Section 4.7.1** for instructions on setting custom device registers for a single device.

4. Select **Save** to save your custom register list and then **Ok** to exit this dialog box. Select **Cancel** to exit this dialog box without making changes.

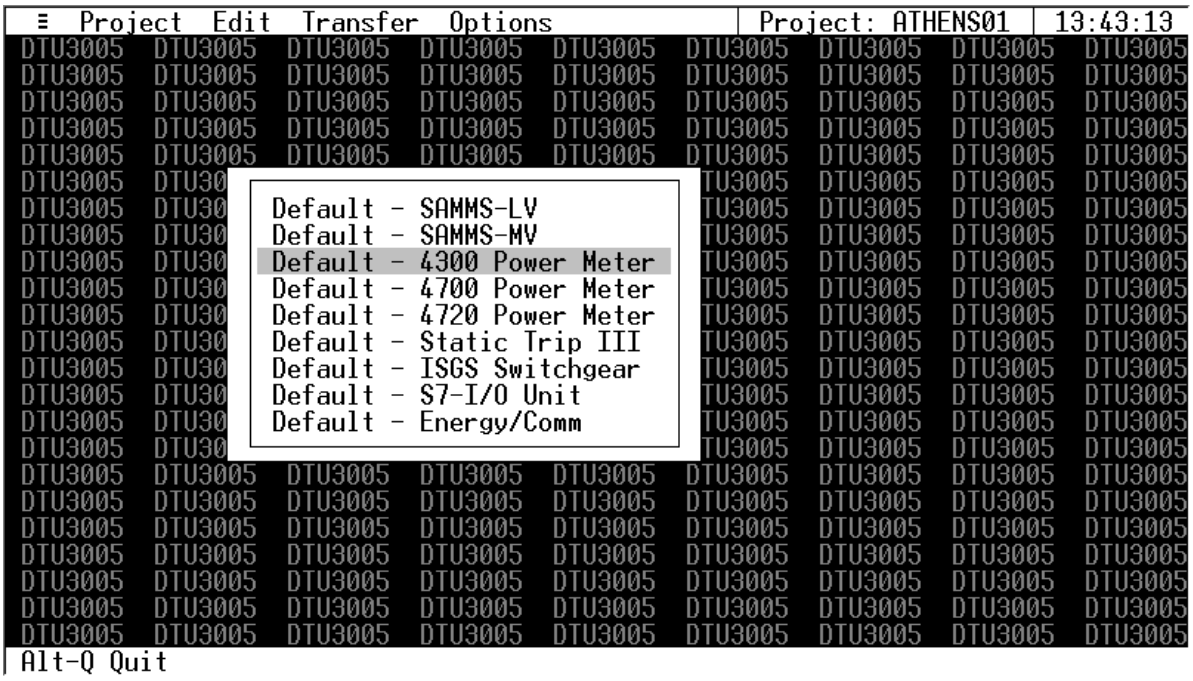
To conserve registers when using VDEW devices, you should set all unused registers to "Not Used" and place them at the end of the list. The DTU3005 will then only allocate registers for those containing device data. (This does not apply to SEAbus devices, for which the DTU3005 allocates 16 registers regardless if they are used or not.)

4.7.2 Configuring Default Custom Device Registers by Device

If you are configuring custom device registers for more than one device of a certain type, you may configure the default custom registers from the Edit Menu **Device Defaults** command. After configuring the default device registers, you may use them for any or all devices, or further customize individual registers for any of your devices. SEAbus devices can have 16 custom registers. VDEW devices may have between 1 and 64 custom registers.

To configure default custom registers for a particular device type:

1. Select **Device Defaults** from the **Edit** menu. A list of devices appears. If you have configured port 2 for SEAbus devices, only SEAbus devices will appear on the menu. Likewise, if you have configured port 2 for VDEW devices, only VDEW devices will appear on the menu.



2. Select the device you wish to configure. The default custom register configuration menu appears. The first time you select this command, the first 16 registers (64 for VDEW devices) from the device's standard data register list appear on the default real-time data list. Not all of the entries are visible on the menu. Use the scroll bar or the **Page Up** and **Page Down** keys to view all the entries.

3. Select a data item and press **Enter** to see a list of device real time data that can be assigned to that data word. Select **Not Used** if you do not want that data word to be used. Not all of the entries are visible on the menu. Use the scroll bar or the **Page Up** and **Page Down** keys to view all the entries. Select **Clear All** to set all data words to "Not Used." Select **Set to Base** to restore the data words to the first 16 registers (64 for VDEW devices) from the device's standard data register list.

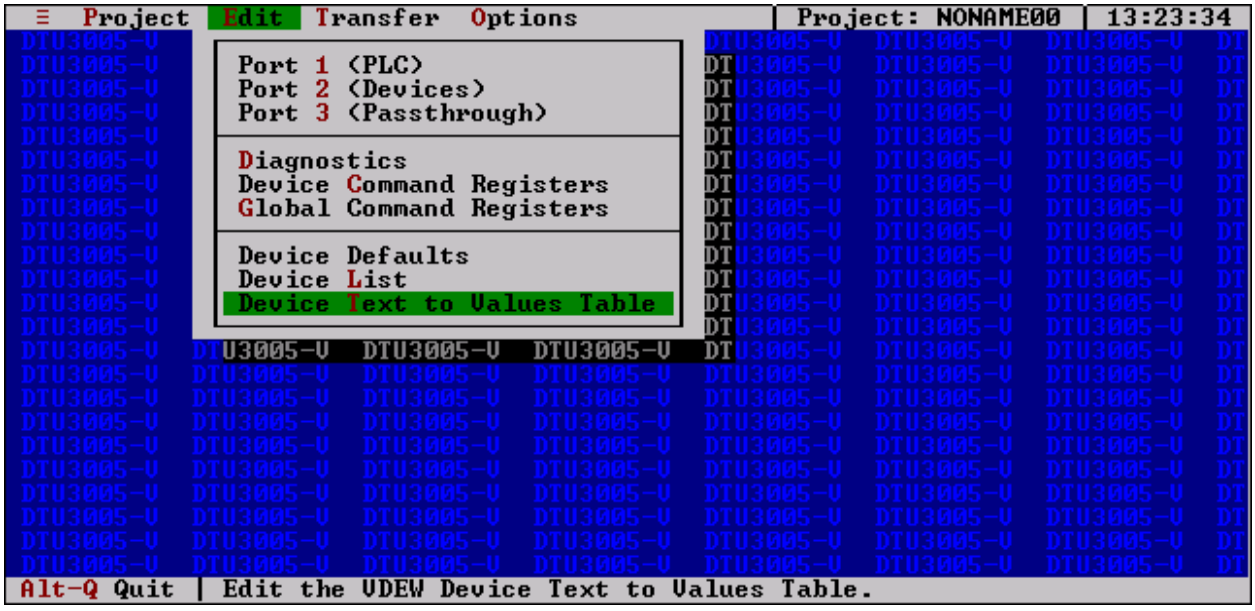
4. Select **Save** to save your configuration or **Revert** to restore the last previously saved configuration for that device. When you are finished configuring the default data registers for that device, select **Ok** to close this screen.

To conserve registers when using VDEW devices, you should set all unused registers to “Not Used” and place them at the end of the list. The DTU3005 will then only allocate registers for those containing device data. (This does not apply to SEAbus devices, for which the DTU3005 allocates 16 registers regardless if they are used or not.)

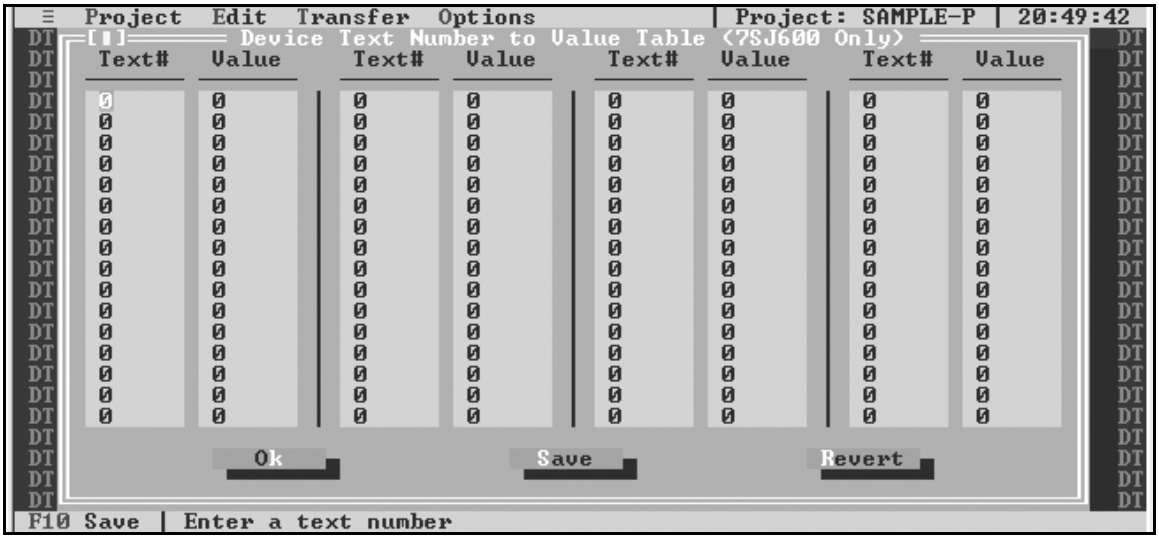
4.8 Device Text Setup (7SJ600 Only)

The Device Text to Values Table menu item is only available for configuring the 7SJ600 relay. It is used to convert status codes returned from select parameters in the 7SJ600 relay (only) to values in a format useful to the system connected to port 2 of the DTU3005. This affects the status readouts from the device's binary inputs, signal and trip rated contacts, and the LEDs.

To edit this table, select **Device Text to Values Table** from the **Edit** menu. This selection is only available when the device protocol for port 2 is set for “VDEW.”



Once open, 64 conversions can be defined. To define a conversion, enter the 7SJ600 relay status code in the **Text #** column and enter the corresponding output value desired in the **Value** column.



The relevant status codes (Text #) are listed below.

Table 4.1 7SJ600 Relay Information

For Requesting Status of the 7SJ600 Relay's Three Binary Inputs							
Text Number/Status Code (default value returned if not converted)	**Description of Returned Binary Input Status Codes: I1 indicates Input 1; I2,3 indicates Inputs 2 and 3**	**Suggested Value (Using This Conversion Table)**					
		Value	**Inputs**	**I3**	**I2**	**I1**	
		0	0	0	0	0	
1342	I1,2 Inactive : I3 Active	4	0	1	0	0	
1343	I1,3 Inactive : I2 Active	2	0	0	1	0	
1344	I1 Inactive : I2,3 Active	6	0	1	1	0	
1345	I2,3 Inactive : I1 Active	1	0	0	0	1	
1346	I2 Inactive : I1,3 Active	5	0	1	0	1	
1347	I3 Inactive : I1,2 Active	3	0	0	1	1	
1348	I1,2,3 Active	7	0	1	1	1	
For Requesting Status of the 7SJ600 Relay's Two Trip Contacts and Two Signal Contacts							
Text Number/Status Code (default value returned if not converted)	**Description of Returned Trip and Signal Relay Status Codes: S1,2 indicates Signal Relays 1 and 2; T1,2 indicates Trip Relays 1 and 2**	**Suggested Value (Using This Conversion Table)**					
		Value	**Outputs**	**S2**	**S1**	**T2**	**T1**
			Bits 15 . . . 4	**3**	**2**	**1**	**0**
1349	S1,2 T1,2 Open	0	0	0	0	0	0
1350	S1,2 T1 Open : T2 Closed	2	0	0	0	1	0
1351	S1,2 T2 open : T1 Closed	1	0	0	0	0	1
1352	S1,2 Open : T1,2 Closed	3	0	0	0	1	1
1353	S1 T1,2 Open : S2 Closed	8	0	1	0	0	0
1354	S1 T1 Open : S2 T2 Closed	10	0	1	0	1	0
1355	S1 T2 Open : S2 T1 Closed	9	0	1	0	0	1
1356	S1 Open : S2 T1,2 Closed	11	0	1	0	1	1
1357	S2 T1,2 Open : S1 Closed	4	0	0	1	0	0
1358	S2 T1 Open : S1 T2 Closed	6	0	0	1	1	0
1359	S2 T2 Open : S1 T1 Closed	5	0	0	1	0	1
1360	S2 Open : S1 T1,2 Closed	7	0	0	1	1	1
1361	T1,2 Open : S1,2 Closed	12	0	1	1	0	0
1362	T1 Open : S1,2 T2 Closed	14	0	1	1	1	0
1363	T2 Open : S1,2 T1 Closed	13	0	1	1	0	1
1364	S1,2 T1,2 Closed	15	0	1	1	1	1
For Requesting Status of the 7SJ600 Relay's Four Programmable LEDs							
Text Number/Status Code (default value returned if not converted)	**Description of Returned LED Status Codes: L1,2 indicates LEDs 1 and 2**	**Suggested Value (Using This Conversion Table)**					
		Value	**Outputs**	**L4**	**L3**	**L2**	**L1**
			Bits 15 . . . 4	**3**	**2**	**1**	**0**
1365	L1,2,3,4 Off	0	0	0	0	0	0
1366	L4 On : L1,2,3 Off	8	0	1	0	0	0
1367	L3 On : L1,2,4 Off	4	0	0	1	0	0
1368	L3,4 On : L1,2 Off	12	0	1	1	0	0
1369	L2 On : L1,3,4 Off	2	0	0	0	1	0
1370	L2,4 On : L1,3 Off	10	0	1	0	1	0
1371	L2,3 On : L1,4 Off	6	0	0	1	1	0

Table 4.1 7SJ600 Relay Information (Continued)

1372	L2,3,4 On : L1 Off	14	0	1	1	1	0
1373	L1 On : L2,3,4 Off	1	0	0	0	0	1
1374	L1,4 On : L2,3 Off	9	0	1	0	0	1
1375	L1,3 On : L2,4 Off	5	0	0	1	0	1
1376	L1,3,4 On : L2 Off	13	0	1	1	0	1
1377	L1,2 On : L3,4 Off	3	0	0	0	1	1
1378	L1,2,4 On : L3 Off	11	0	1	0	1	1
1379	L1,2,3 On : L4 Off	7	0	0	1	1	1
1380	L1,2,3,4 On	15	0	1	1	1	1

Once you are finished entering data, select **Save** to save your configuration, then select **Ok** to exit the dialog box. Select **Revert** to bring back the previous settings.

4.9 Global Command Registers

This option allows you to specify global commands for all the devices specified in the Device List. It is available only for VDEW devices.

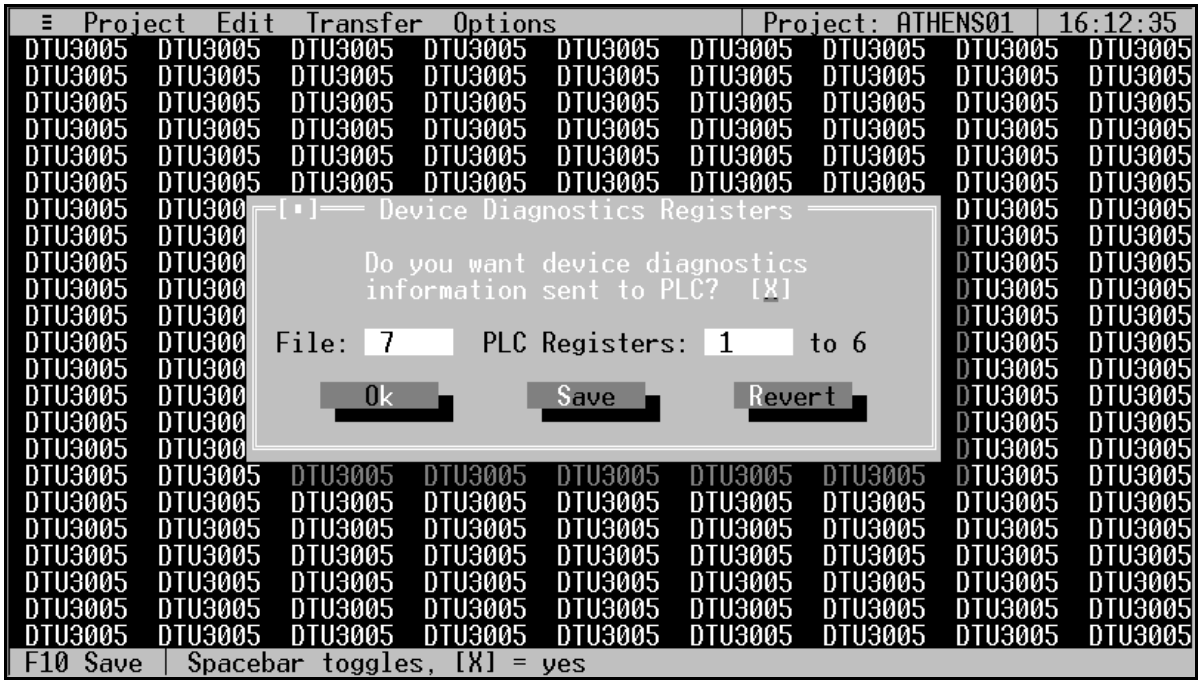
The Global Command Registers consist of six registers. These registers allow the PLC to transmit commands to all the devices in the Device List. To send a command, all the PLC needs to do is to place the command values into the appropriate PLC registers, which the DTU3005 unit reads and then processes.

4.10 Device Diagnostic Registers

This option programs the DTU3005 to send communications diagnostic information to a set of registers on the PLC. The information can be used to troubleshoot problems with the devices and the communications network.

The format and content of the diagnostic registers are described in detail in **Appendix F**.

1. To configure the device diagnostic registers, select **Diagnostics** from the **Edit** menu. The following screen displays:



2. To enable the sending of diagnostic information to the PLC, select the **Do you want device diagnostics information sent to PLC?** checkbox with the mouse or the **spacebar**. Then enter the starting register number in the **PLC Registers**: field. The register block is 6 bytes long. Be sure that the registers you specified are not being used by other devices.

3. Press **Shift+Tab**, or click the left mouse button to highlight the **File** field and enter the file number. This

parameter is used only with Allen-Bradley PLCs. It specifies the file number in the PLC that contains the register values that are transferred to or from the device.

4. Select **Save** to save the information to the project file, and then select **Ok** or press **Esc** to exit the device diagnostic registers screen. If at any time you want to return to the last saved version of the device diagnostics registers, select **Revert** without saving any changes.

4.11 Device Command Registers

The device command registers consist of two consecutive registers for each device entered in the device list. These registers allow the PLC to transmit commands to each of the devices. To send a command, all the PLC needs to do is to place the command values into the appropriate PLC registers, which the DTU3005B unit reads and then processes.

The first register contains the command, and the second register contains the data associated with the command. The format of the command registers for each device are described in **Appendix E**. All the command registers are placed in contiguous locations in the PLC's registers and are assigned by the DTU3005 to each device in the order that they are listed in the device list.

To use the command registers for a particular device, the PLC program must do the following, in order:

1. First, set the command word to 0 or -1 (FFFF hexadecimal).

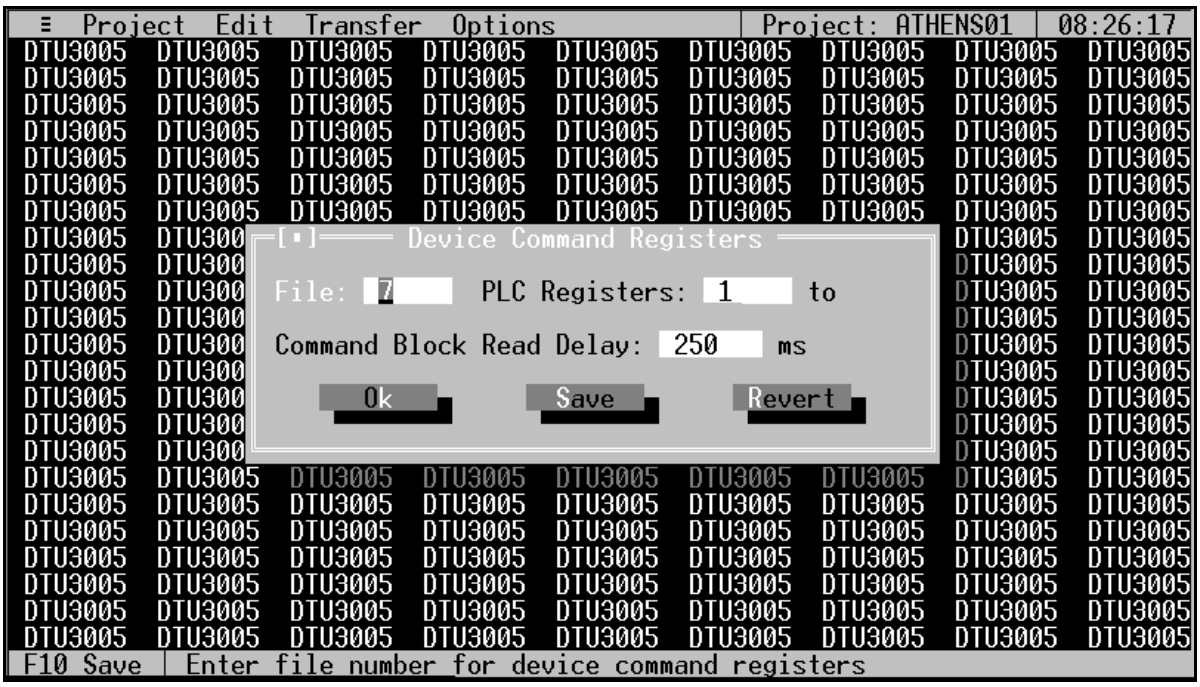
2. Set the data word to the appropriate value.

3. Set the command word to the appropriate value.

4. After the command is set the PLC must wait for the DTU3005B unit to change the command word to either 0 (to indicate successful processing of the command), or -1 (to indicate an error).

To indicate the location of the command registers on the PLC, follow these steps:

1. Select **Device Command Registers** from the **Edit** menu. The Device Command Registers screen appears:



2. Enter the starting register address in the **PLC Registers** field. The DTU3005 Editor software will determine the proper number of registers for the number of devices entered in the device list and indicate the final register number. These registers must be different from those used for device data and diagnostics. Refer to **Appendix A** for a list of valid register numbers for your PLC. Failure to use different register addresses will cause communication errors, and may cause unexpected operation of the devices.

3. Press **Shift+Tab**, or click the left mouse button to highlight the **File** field and enter the file number. This parameter is used only with Allen-Bradley PLCs to specify the file number in the PLC that contains the register values that are transferred to or from the device.

4. Enter the value for the **Command Block Read Delay**. This is the delay between times that the DTU3005 reads the data from the PLC's command registers. This controls the frequency that the registers are read to allow for critical PLC scan times.

5. Select **Save** to save the device information to the project file, and then select **Ok** or press **Esc** to exit the device command registers screen. If at any time you want to return to the last saved version of the device command registers, select **Revert** without saving any changes.

4.12 Saving the Project File

Now you have completed configuring the DTU3005 for PLC to device communications. Select **Save** from the **Project** menu and press **Enter**, or press **F10** to save the project file to disk. The next step is to transfer the project to the DTU3005 unit. This topic is covered in **Chapter 7**.

5 Creating Project Files—Modbus Master to Devices

This chapter covers configuration of the DTU3005 for Modbus master device communications with Siemens devices. Once you have created a Modbus Master to Devices project (see **Chapter 3**), follow the directions in this chapter to configure the project file. Then see **Chapter 7** for directions on downloading the project to the DTU3005.

5.1 Application Description

The Modbus Master to Devices application allows a Modbus master (usually a SCADA system) to control and monitor up to 32 SEAbus devices or Siemens protective relays. In this application, the DTU3005B acts as a slave, and all communications with the Modbus Master are initiated by the master device itself. The DTU3005B converts Modbus requests received into requests to access and control data on the Siemens devices. Registers are assigned for each device in the Holding Register range (40000 to 49999, where register 40001 is the first to be used). The Modbus Master accesses real-time data from the Siemens devices by reading these registers, and sends commands by writing to these registers. Refer to **Figure 5.1** for a matrix representation of these registers.

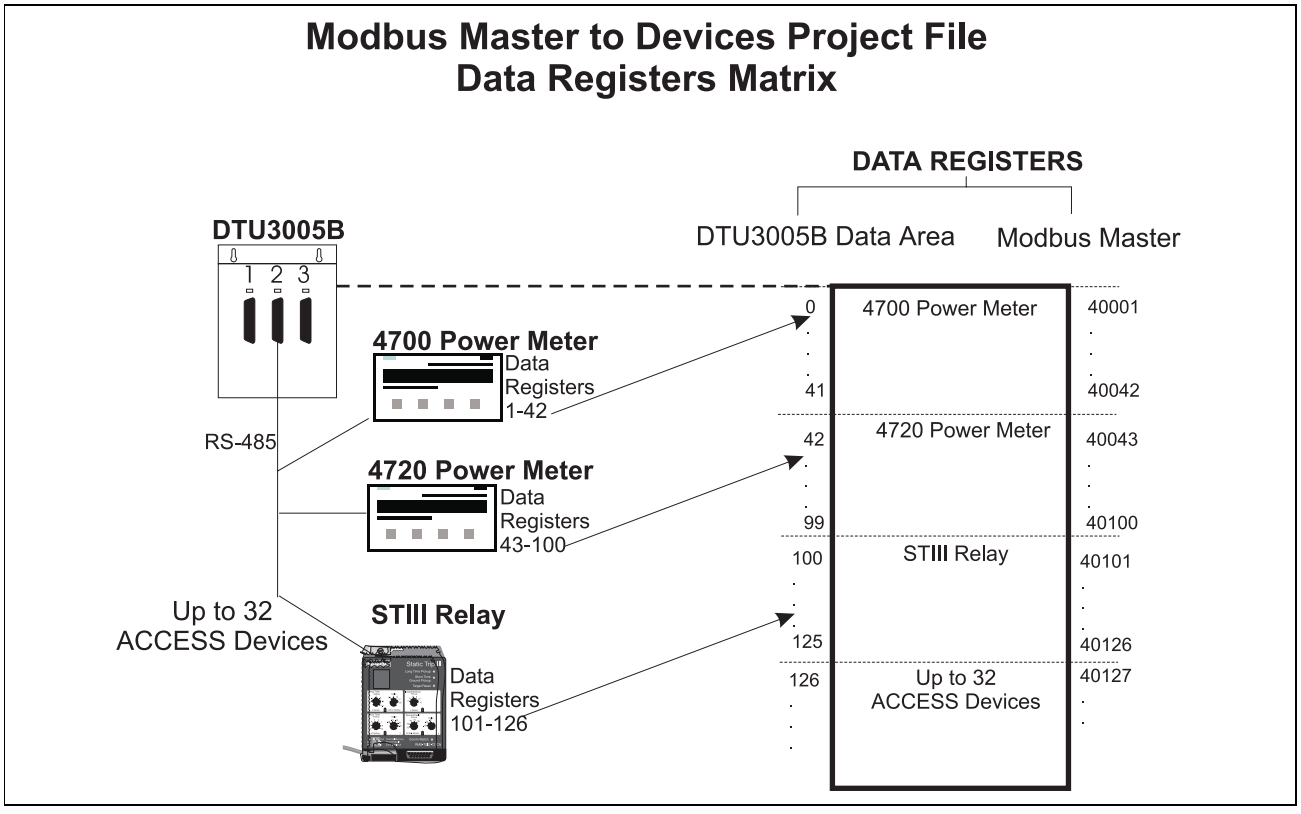
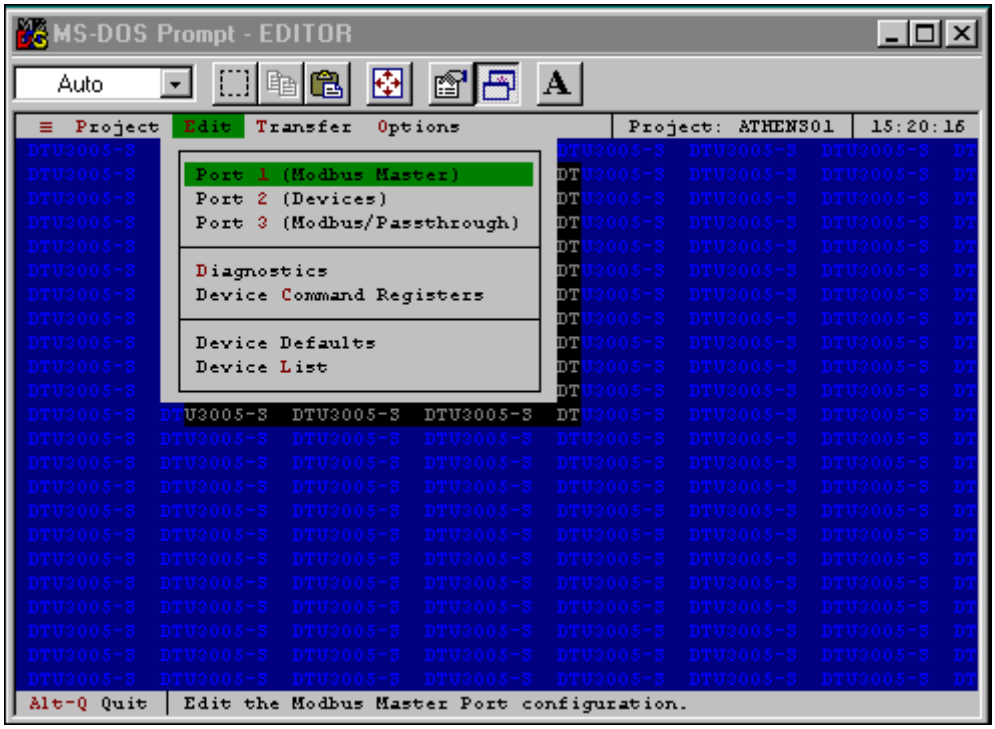


Figure 5.1 Modbus Master to Devices Project—Data Registers Matrix

5.2 Configuring the Project File

Once you have created or opened the project file, select **Edit** from the main menu. When the Device Protocol for port 2 is set to SEAbus (see **Section 5.4**), the following menu items appear:

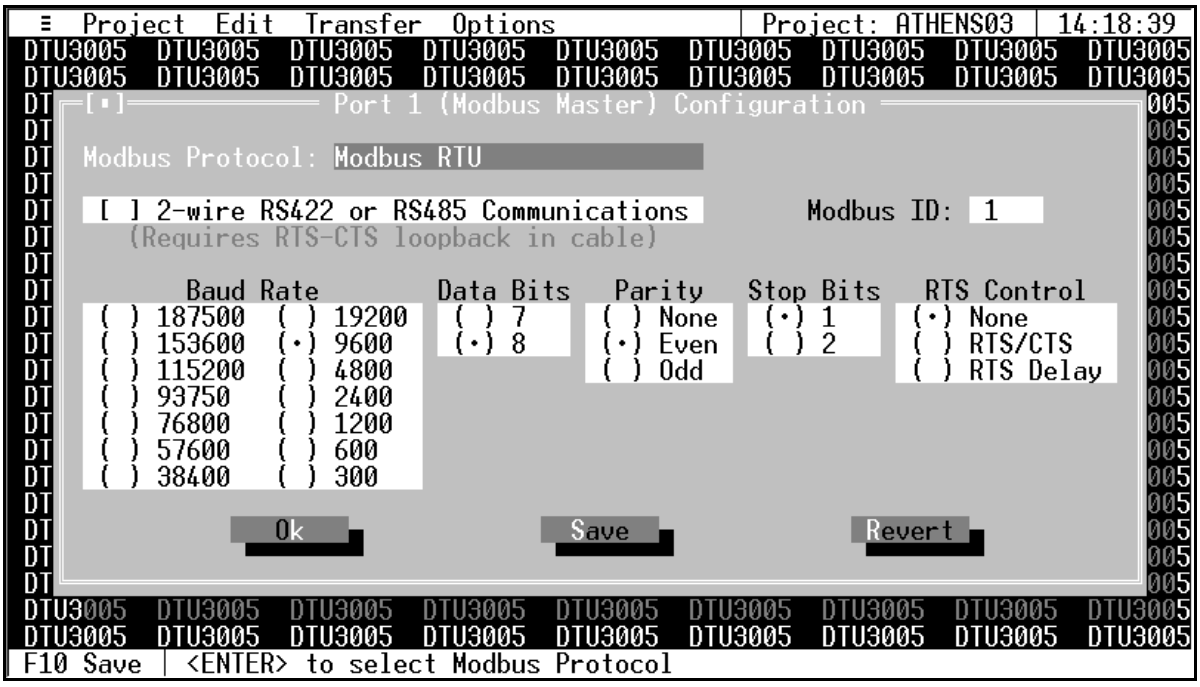
- **Port 1 (Modbus Master)**—allows you to select the protocol (RTU or ASCII) and configure the communications settings for the Modbus Master device connected to port 1.
- **Port 2 (Devices)**—allows you to configure communications settings for SEAbus devices or Siemens Protective relays connected to port 2.
- **Port 3 (Modbus/Passthrough)**—allows you to select whether port 3 is used as a passthrough to the devices on port 2, or used for connection to a second Modbus Master device.
- **Diagnostics**—allows you to indicate if you want the DTU3005 to write communications diagnostic information to the Modbus Master.
- **Device Command Registers**—allows you to indicate which PLC registers will be used for device commands.
- **Device Defaults**—allows you to set the default data registers for more than one device of a certain type, e.g., set the defaults for all 4720 power meters or all S7-I/O units. The data registers can still be customized for each device, as required. See **Section 5.7.2** for more information.
- **Device List**—allows you to indicate which SEAbus devices or Siemens protective relays are connected to port 2 and which PLC registers they are communicating with.



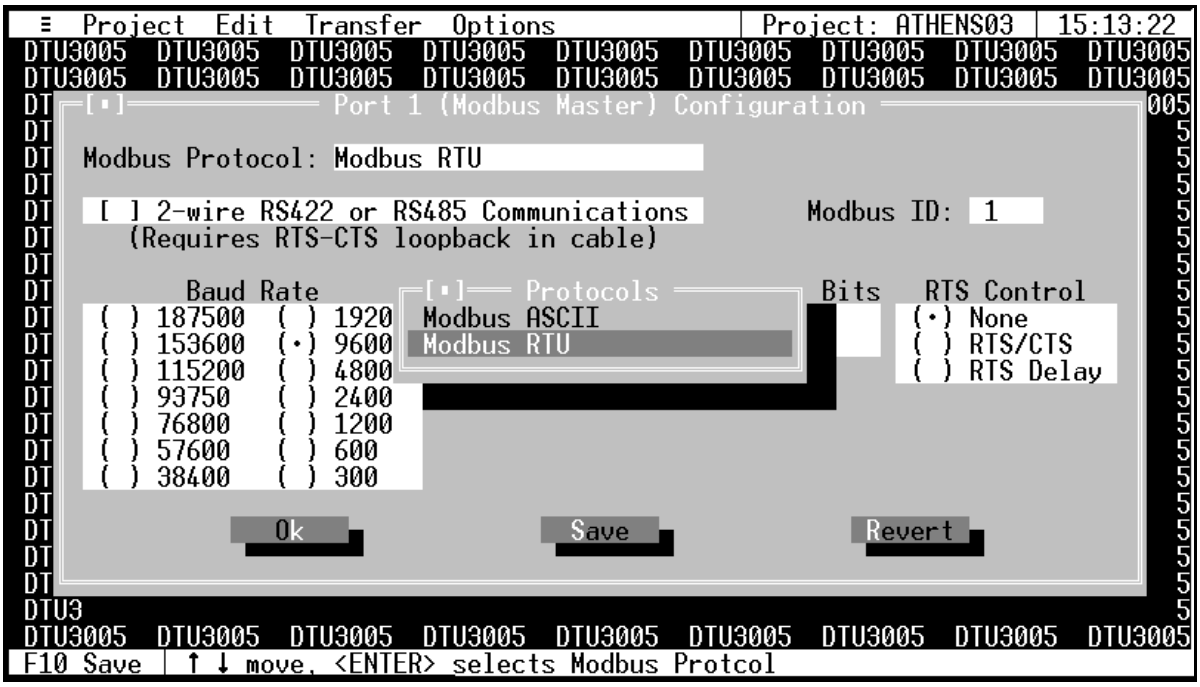
Note: If the Device Protocol for port 2 is set to VDEW (see **Section 5.4**), then two additional menu items are available: **Global Command Registers** and **Device Text to Values Table**. See **Section 5.8** and **Section** for instructions on using these menu items. In addition, the port 3 menu item is changed to **Port 3 (Modbus Master)** because the passthrough feature is not supported with VDEW devices. The instructions in **Section 5.3** are applicable to port 1 and to port 3 for VDEW devices.

5.3 Modbus Setup—Port 1

You must have a Modbus Master to Devices project file open to configure port 1 using the instructions in this section. Select **Port 1 (Modbus Master)** from the **Edit** menu, and the Port 1 Modbus Master configuration screen appears.



To select the protocol for the Modbus Master device connected to port 1, highlight **Modbus Protocol** and press **Enter**. The Modbus Master Protocol selection menu appears:



Select either ASCII or RTU as your Modbus protocol, then press the **Tab** key to highlight the **Modbus ID** selection box. The Modbus ID is used to identify the address of the DTU. Type in the Modbus ID number and press **Enter**.

2-Wire RS422 or RS485 Communications

After you have entered the Modbus ID number, highlight the **2-Wire RS422 or RS485 Communications** selection box. This box will only need to be checked if the communications with your Modbus Master device uses a 2-wire RS485 or RS422 interface (see **Figure 5.2**). When 2-wire communications are being used, RTS must be looped back to CTS on the DTU side of the cable. This can be done on the RS232 side by looping pins 4 and 5 or on the RS422/485 side by looping 16 to 18 and 17 to 19. See **Appendix D** for wiring diagrams for your particular PLC, and whether it uses a 2-wire connection.

To select the checkbox, click on it with the mouse or, with the **2-Wire RS422 or RS485 Communications** selection highlighted, press the **spacebar**. An "X" will appear inside the brackets when it is selected.

Press the **Tab** or **Right Arrow** key to move to the next field without selecting this checkbox.

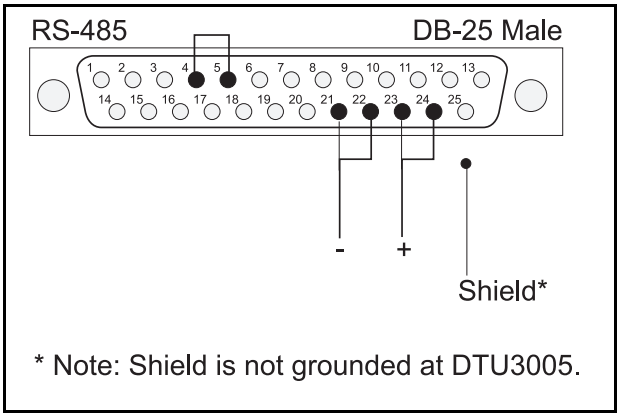


Figure 5.2 RS-485 Connector (two-wire)

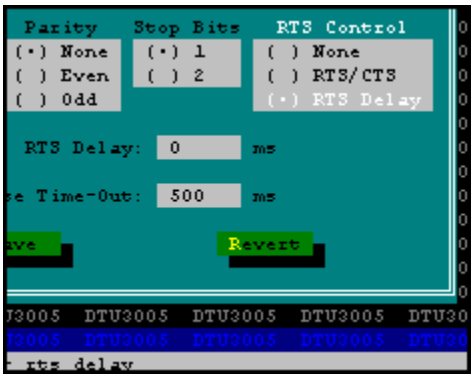
Communications Settings

Before changing any of these settings, consult your device manual for the correct settings. To move between the communications settings, press the **Tab** or **Enter** keys. To select a setting, use the **Up** or **Down Arrow** key to move to the desired setting and press the **spacebar** to change your selection.

RTS Control (Request to Send Control)

RTS Control selection is an option provided for modems or for Modbus Master devices that require RTS to be active only while the DTU is transmitting to the PLC.

- If **RTS/CTS** is selected, the DTU will activate RTS and wait until CTS is active before transmitting to the PLC.
- If **RTS Delay** is selected, the DTU will activate RTS and wait for the specified delay time to pass before transmitting to the PLC. When **RTS Delay** is selected, the program displays an entry box for the RTS delay time. Enter the time in milliseconds.



Response Time-Out

The **Response Time-Out** tells the DTU how long to wait after transmitting a request to the PLC if no response has been received from the PLC. After this amount of time passes with no response being received, the DTU will assume that no response is coming and will retry the request. Enter the time in milliseconds.

Saving Port 1 Configuration Information

Once you have entered all the configuration information, select **Save** to save the configuration to the project file. Then select **Ok** or press the **Esc** key to close the configuration screen.

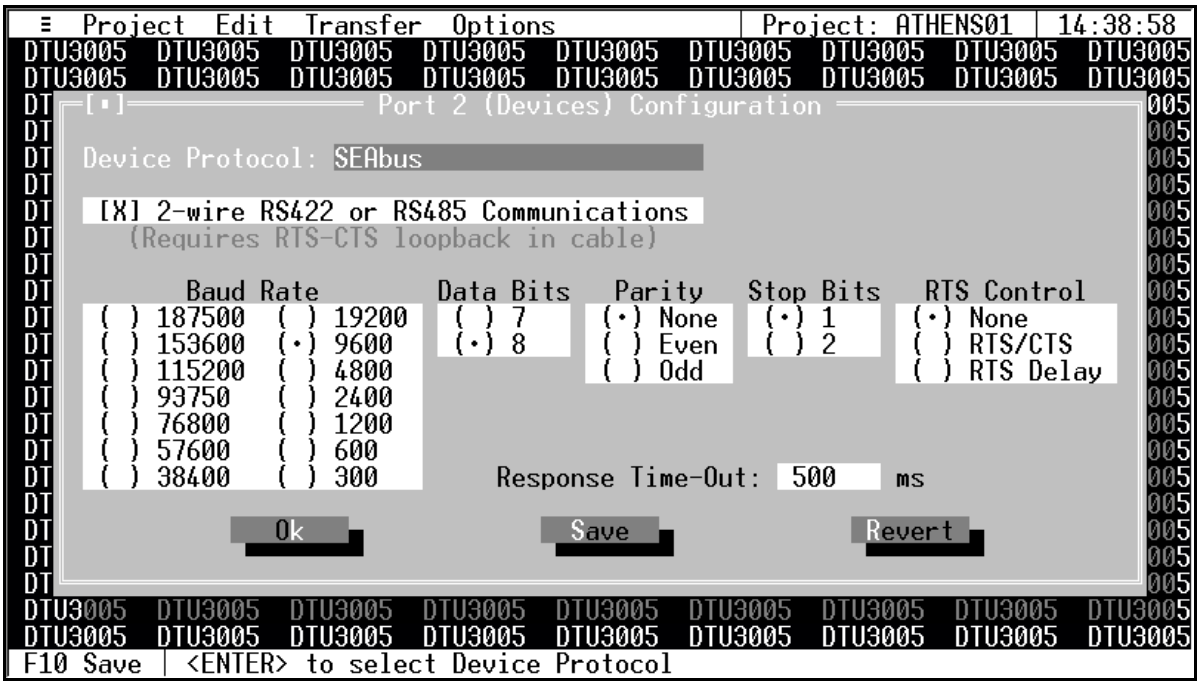
If you have changed the configuration and have not saved it to the project file, you will be prompted to either save or discard the changes.

Select **Revert** to return to the last previously saved configuration without saving any changes.

5.4 Device Setup—Port 2

One or more Siemens devices may be connected to port 2. You must have a Modbus Master to Devices project file open to configure port 2 using the instructions in this section.

Select **Port 2 (Devices)** from the **Edit** menu, and the Port 2 configuration screen appears.



Device Protocol

The **Device Protocol** indicates which Siemens devices can be connected to port 2. This protocol is based on which version of the DTU3005 Editor software was installed as described in **Chapter 2**.

- The **SEAbus** protocol (as shown in the example screen above) indicates connection to Siemens ACCESS communicating trip units, relays, power meters and other devices.
- The **VDEW** protocol indicates connection to Siemens protective relays using the VDEW protocol.

Note: Not all Siemens devices are supported. For a list of supported devices, see **Appendix B**.

Other Configuration Information

The remaining configuration selections are the same as those for port 1. Refer to **Section 5.3** for instructions on these fields.

Saving Port 2 Configuration Information

Once you have entered all the configuration information, select **Save** to save the configuration to the project file. Then select **Ok** or press the **Esc** key to close the configuration screen.

If you have changed the configuration and have not saved it to the project file, you will be prompted to either save or discard the changes.

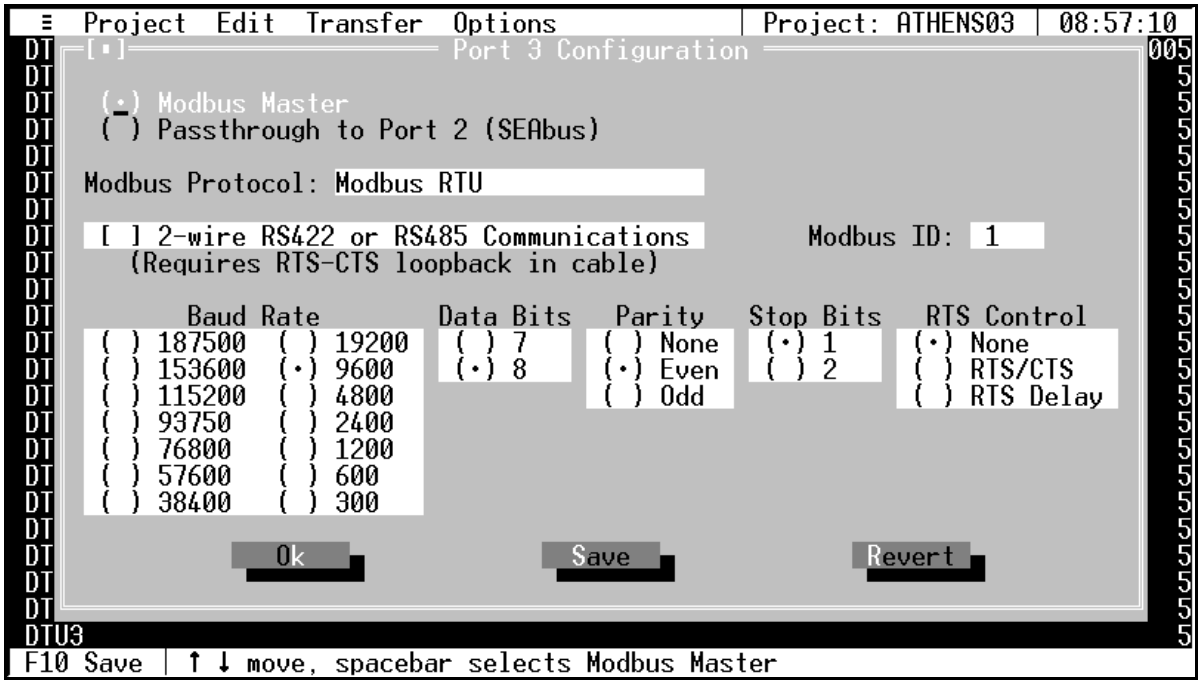
Select **Revert** to return to the last previously saved configuration without saving any changes.

5.5 Modbus/Passthrough Setup—Port 3

Port 3 can be used for passthrough communications to your Siemens SEAbus devices or for connection to a second Modbus Master device. Passthrough communications enables a PC running WinPM, or other supervisory software connected to port 3 of the DTU3005 to communicate directly with the SEAbus devices connected to port 2. In passthrough mode, any messages received on port 3 of the DTU are simply "passed through" to the devices.

Passthrough communications are not available for VDEW devices; see **Section 5.3** for **Port 3 (Modbus Master)** configuration of VDEW devices.

You must have a Modbus Master to Devices project file open to configure port 3 using the instructions in this section. Select **Port 3 (Modbus/Passthrough)** from the **Edit** menu, and the Port 3 configuration screen appears.



The first option on the configuration screen allows you to choose connection to a second Modbus Master device or passthrough to port 2. Select the appropriate configuration with the mouse, or use the **Up** or **Down Arrow** keys to highlight the selection and press the **spacebar**.

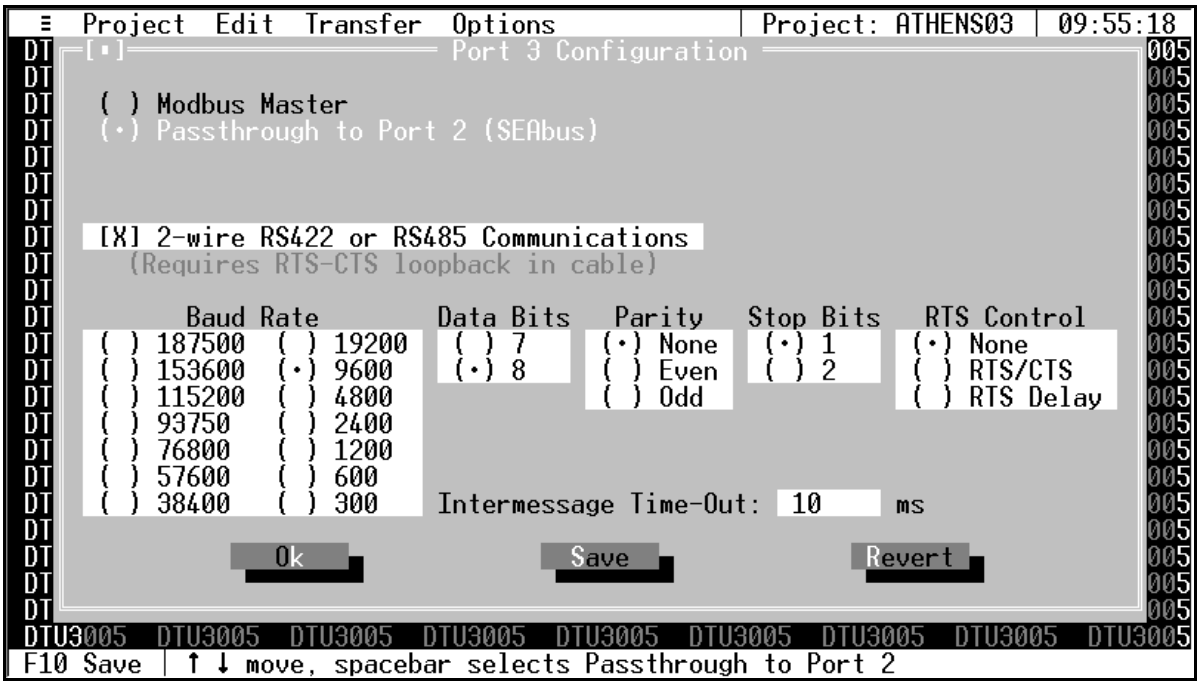
Modbus Master

If you select **Modbus Master**, the screen appears as shown above. Select the Modbus protocol by selecting the **Modbus Protocol** list box, highlighting either ASCII or RTU, and pressing **Enter**. After you have selected your protocol, press the **Tab** key to highlight the **Modbus ID** selection box. The Modbus ID is used to identify which Modbus Master device the DTU is to communicate with. Type in the Modbus ID number and press **Enter**.

The remaining configuration selections are for the communications parameters and have the same choices as those for port 1. Refer to **Section 5.3** for instructions on these fields.

Passthrough to Port 2 (SEAbus)

If you select **Passthrough to Port 2 (SEAbus)**, the screen appears as shown below.



2-Wire RS422 or RS485 Communications

After you have selected **Passthrough to Port 2 (SEAbus)**, press **Tab** or select **2-Wire RS422 or RS485 Communications**. This box will only need to be checked if the communications with your SEAbus devices use a 2-wire RS485 or RS422 interface. This is the usual method of connecting SEAbus devices. When 2-wire communications are being used, RTS must be looped back to CTS on the DTU side of the cable. This can be done on the RS232 side by looping pins 4 and 5 or on the RS422/485 side by looping 16 to 18 and 17 to 19. See **Appendix D** for wiring diagrams for your particular PLC, and whether it uses a 2-wire connection.

To select the checkbox, click on it with the mouse or, with the **2-Wire RS422 or RS485 Communications** selection highlighted, press the **spacebar**. An "X" will appear inside the brackets when it is selected.

Press the **Tab** or **Right Arrow** key to move to the next field without selecting this checkbox.

Intermessage Time-Out

The DTU3005 uses the intermessage time-out to determine when a complete message has been received on the passthrough port. Once the first character of a message has been received, if the amount of time specified by the intermessage time-out passes with no additional characters being received, the DTU3005 will consider the message to be complete and process it.

To change the intermessage time-out, select **Intermessage Time-Out** and enter the value in milliseconds, then press **Enter**.

Saving Port 3 Configuration Information

Once you have entered all the configuration information, select **Save** to save the configuration to the project file. Then select **Ok** or press the **Esc** key to close the configuration screen.

If you have changed the configuration and have not saved it to the project file, you will be prompted to either save or discard the changes.

Select **Revert** to return to the last previously saved configuration without saving any changes.

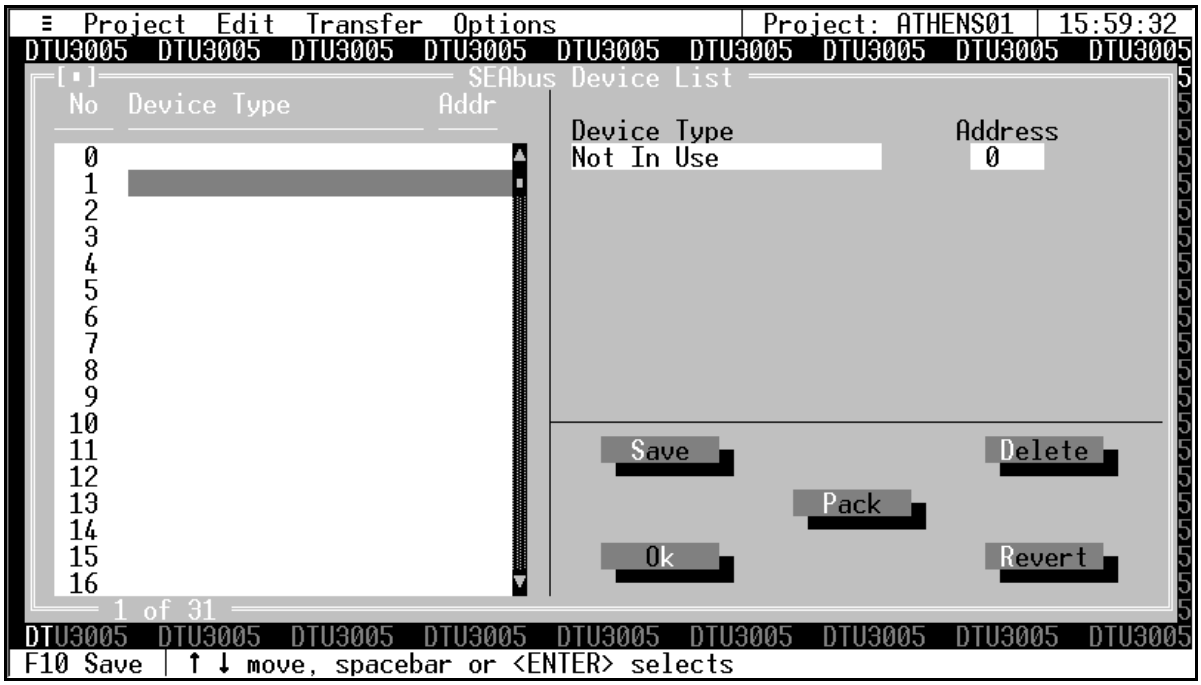
Other Configuration Information

The remaining configuration selections are the same as those for port 1. Refer to **Section 5.3** for instructions on these fields.

5.6 Device List Setup

The device list menu item enables you to indicate which registers on the PLC will receive data from the devices. In this menu, you will enter the device type and address for each Siemens device connected to port 2. You will also indicate to which registers on the PLC you want the DTU3005 to write device data.

Select **Device List** from the **Edit** menu to display the device list screen:



This screen is divided into two parts:

- On the left side of the screen is a list of the devices connected to port 2 (the list is initially empty). Up to 32 devices can be attached; however, only 17 of the devices are visible on the screen at one time. To see all the devices, click on the scroll bar with the mouse, or use the **Up** and **Down Arrow** and **Page Up** and **Page Down** keys.

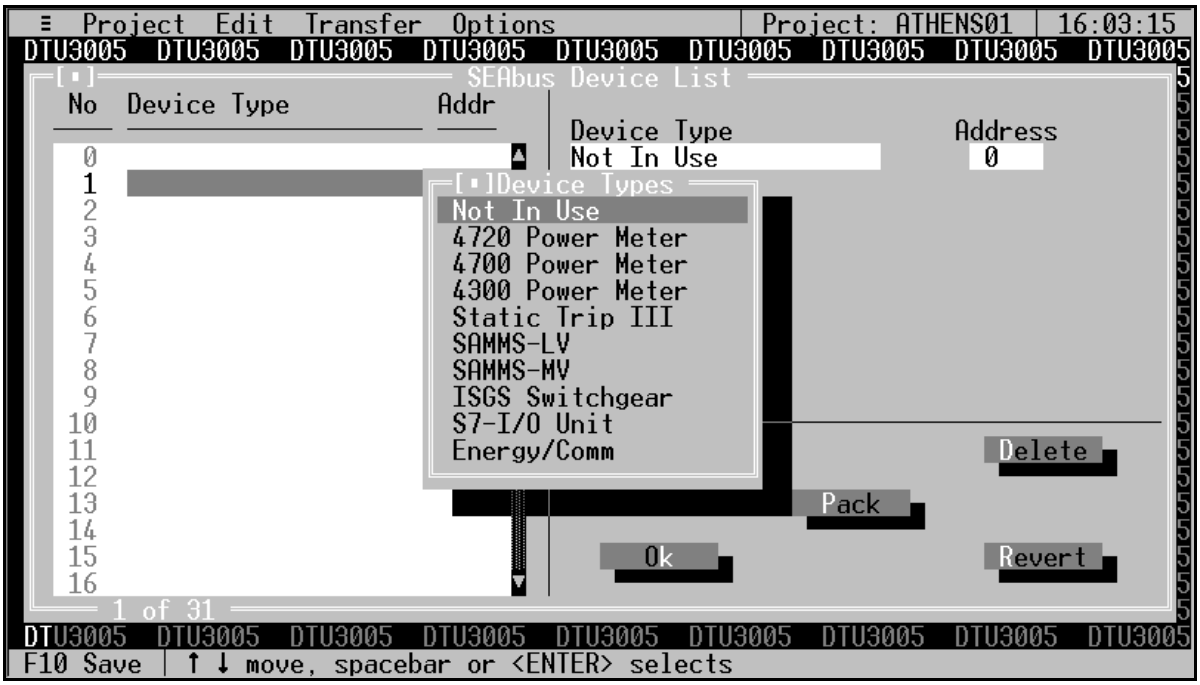
- The right side of the screen is used to configure the data register information for the selected device, as shown in the example screen on the next page. You can add or delete devices, or change device configuration by highlighting the **Device Type** on the left side of the screen, then using the fields and buttons on the right side of the screen.

Adding a Device

To add a device to the device list:

1. Highlight the first line where the **Device Type** and **Address** fields are blank—this should be the first available device number **No** field.

2. Press **Enter** or **Tab** to add a device. The cursor will move to the **Device Type** field on the right side of the screen. Press **Enter**, and the **Device Types** list displays:



3. Select the device from the list by pressing **Enter** or the **spacebar**. The highlight moves to the **Address** field, and the PLC register fields now display as shown in the example screen below.

4. With the **Address** field highlighted, enter the device's address. This number should be between 1 and 254, and match the number programmed into the device itself. Press the **Tab** key twice to go to the **Real-Time Data Registers** field.

5. Enter the beginning register number in the **Real-Time Data Registers** field. Refer to **Appendix A** for valid register numbers for your PLC application. The DTU3005 Editor software supplies the last register number after you enter the first. In the example above, the 4700 Power Meter uses 41 registers for its data. When you enter 1 for the first register, the last register becomes 42. If you

change the starting register to 10, the last register will automatically change to 51.

Note: The Modbus Master must read these register numbers to be able to access the real-time data for this device.

6. Press **Shift+Tab**, or click the left mouse button to highlight the **File** field and enter the file number. This parameter is used only with Allen-Bradley PLCs to specify the file number in the PLC that contains the register values that are transferred to or from the device.

7. The device command registers are displayed below the real-time data registers. They are configured from the **Device Command Registers** menu selection on the **Edit** menu. See **Section 5.11** for information on setting these registers and programming the PLC to perform commands. Be sure that the register numbers are not also used by the device. This can cause unexpected operation of the device.

8. If you want to use a customized subset of the available data registers, see **Section 5.7.2** for instructions on creating a default set of custom registers for all devices of the same type. Type an "X" in the **Use customized real-time data ordering?** field to begin the custom data setup, or press **Tab** to go to the next field.

9. Enter the **Real-Time Data Delay Time** in its field. This is the delay from the time that the DTU3005 receives data from the device to the time the DTU3005 transfers the data to the PLCs registers.

10. Select **Save** to save the device information to the project file, and then select **Ok** or press **Esc** to exit the device list configuration screen. If at any time you want to return to the last saved version of the device list, select **Revert** without saving any changes.

Removing a Device

To remove a device from the device list, highlight the device on the left side of the screen and press **Tab** or **Enter**. Then change the device type to **Not In Use**.

Additional Options for Data Registers

The Device List screen has three additional options for working with a device's data registers:

- Select **Set Reg** to place the data registers into contiguous register numbers and minimize the size to the data register block. This option also sets the initial register number to 1.

- The **Set All** command performs the same function but allows you to set the initial register number. See **Appendix A** for information on acceptable register number ranges for each PLC model.

- Select **Pack** to minimize the size of the command register block, removing registers for deleted devices.

Saving the Device List Configuration

Once you have entered the device information for all the devices attached to port 2, select **Save** to save the device information to the project file. Then select **Ok** or press **Esc** to close the device list configuration screen.

If you have changed the device information and have not saved it to the project file, you will be prompted to either save or discard the changes.

Select **Revert** to return to the last previously saved configuration without saving any changes.

5.7 Configuring Custom Device Registers

You can configure which data items from the SEAbus or VDEW devices are transferred from the DTU3005 device to the PLC or Modbus master. In this way, the DTU3005 acts as a data concentrator, in addition to converting the SEAbus and VDEW protocol data. You can configure the custom data items so that every device of the same type sends the same data items (see **Section 5.7.2**), or have each device send particular data items of interest (see **Section 5.7.1**). SEAbus devices can be configured to send 16 words of device data. VDEW devices can be configured to send from 1 to 64 words.

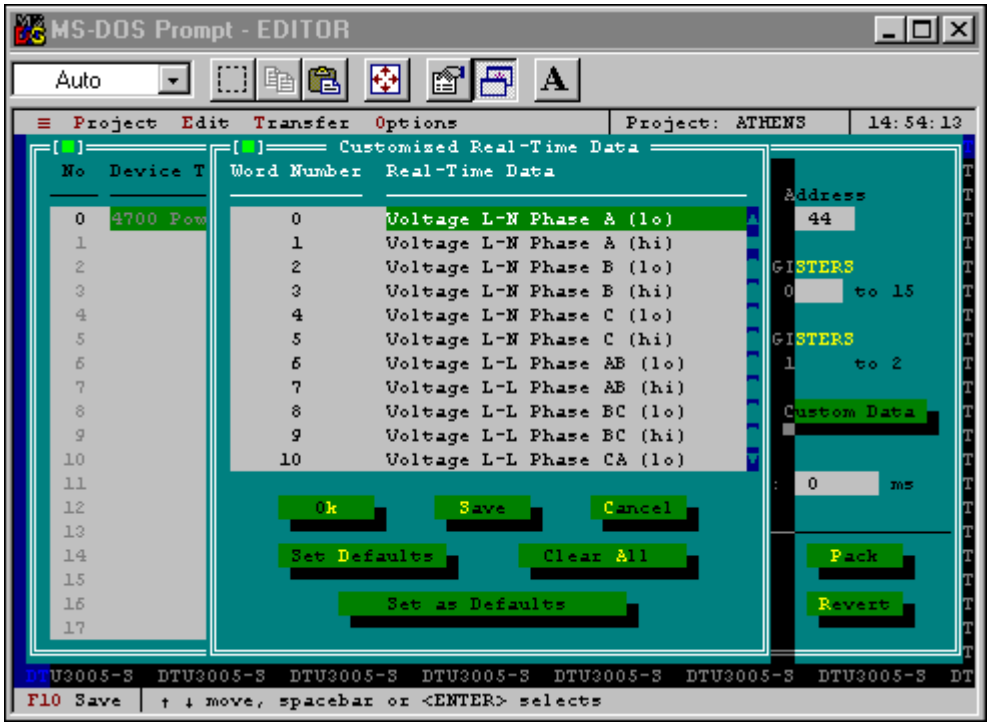
5.7.1 Configuring Custom Registers for a Single Device

To configure custom registers for a single device:

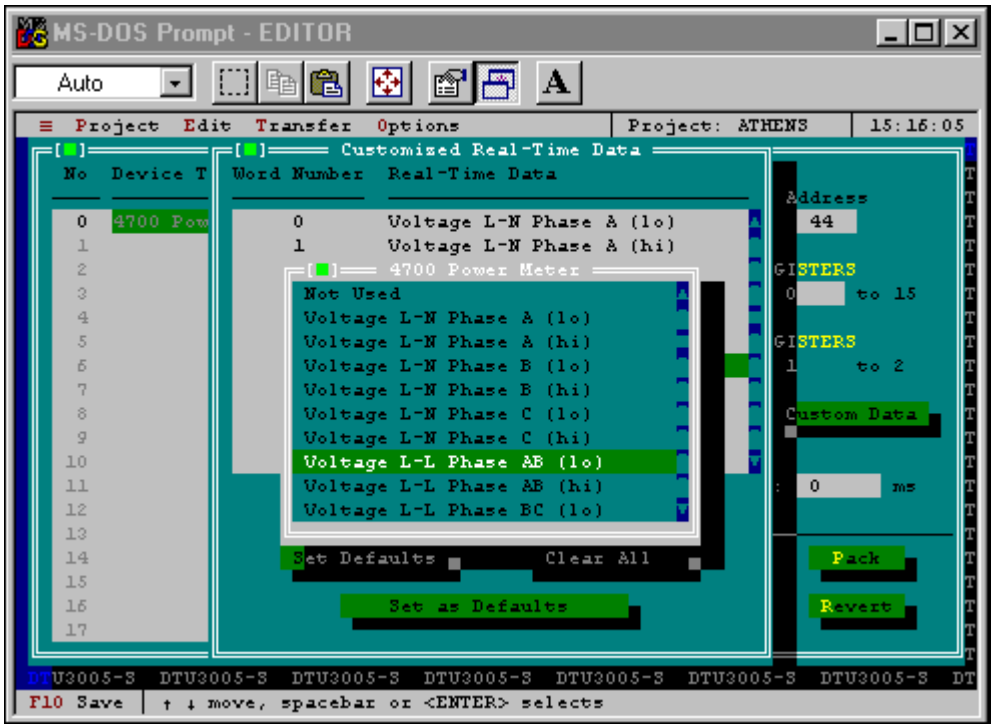
1. Select **Device List** from the **Edit** menu.

2. Highlight the device that you wish to configure and press **Enter**.

3. Highlight the **Use customized real-time data ordering?** check box. Press the **spacebar** to place an "X" in the check box. Then select **Custom Data** to display the Customized Real-Time Data dialog box.



4. Select a data register on the list and press **Enter** to see a list of available real time data. The data items are identical to the standard data items listed in **Appendix E**. Not all data items are visible on the screen at one time. Use the mouse and the scroll bar, or the **Page Up** and **Page Down** keys to view all of the data items.



5. Select the data word (16 bit data) from the list and press **Enter**. Continue to set the other data words in the same manner. Many data items consist of two words (32 bit data). It is important that you configure both words in order to transmit useful information to the DTU3005's registers.

6. Use these options as follows:

   a. Select **Set Defaults** to copy the default custom device registers to the list. See **Section 5.7.2** for instructions on setting custom device registers by device type.

   b. Select **Clear All** to delete all register names from the list.

   c. Select **Set as Defaults** to save the current custom register list as the default custom register list. This will not change the custom registers of other devices of the same type. See **Section 5.7.1** for instructions on setting custom device registers for a single device.

4. Select **Save** to save your custom register list and then **Ok** to exit this dialog box. Select **Cancel** to exit this dialog box without making changes.

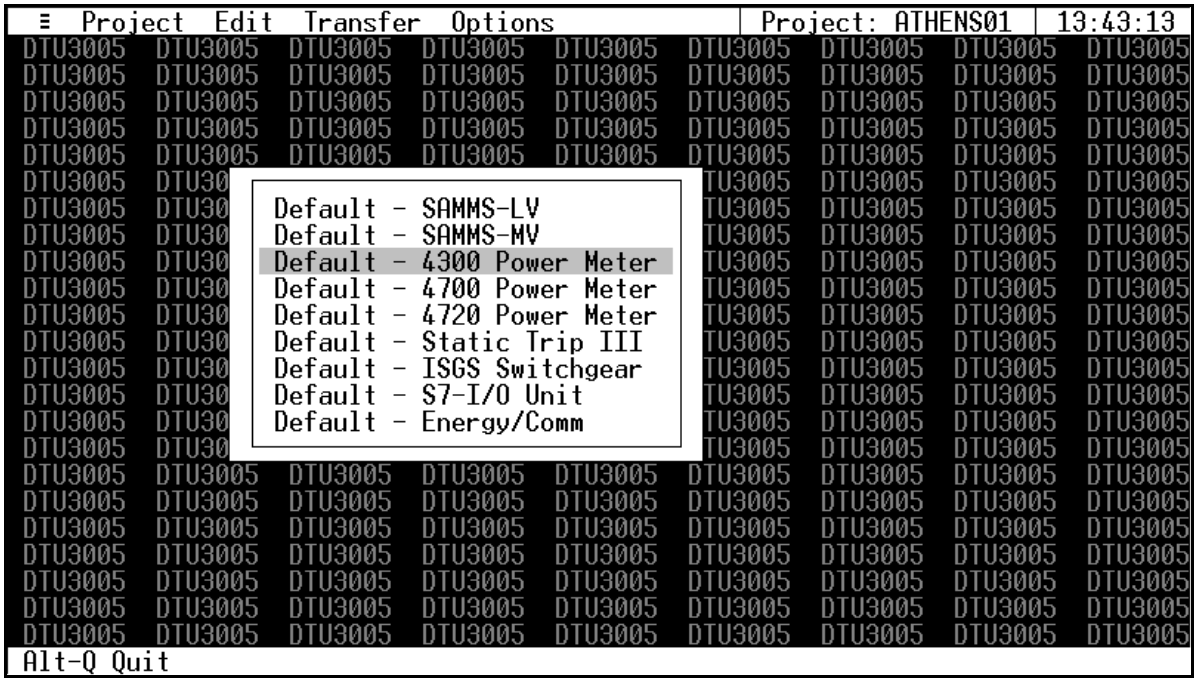
To conserve registers when using VDEW devices, you should set all unused registers to "Not Used" and place them at the end of the list. The DTU3005 will only allocate registers for those containing device data. (This does not apply to SEAbus devices, for which the DTU3005 allocates 16 registers regardless if they are used or not.)

5.7.2 Configuring Default Custom Device Registers

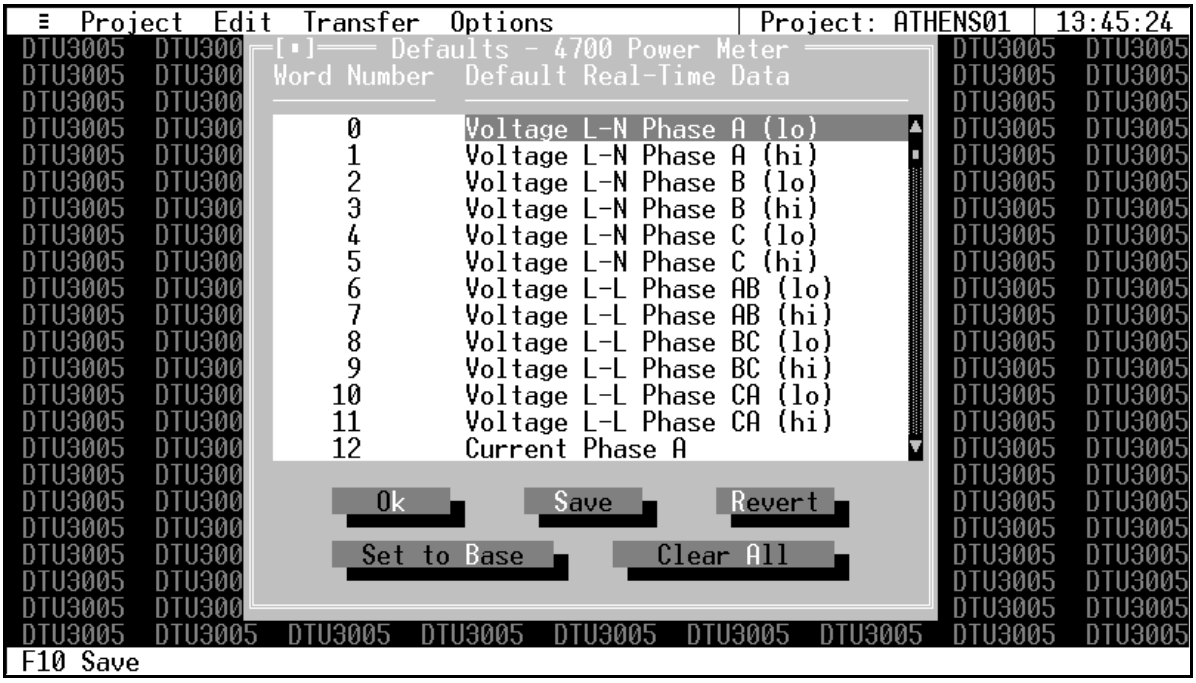
If you are configuring custom device registers for more than one device of a certain type, you may configure the default custom registers from the Edit menu **Device Defaults** command. After configuring the default device registers, you may use them for any or all devices, or further customize individual registers for any of your devices. SEAbus devices can have 16 custom registers. VDEW devices may have between 1 and 64 custom registers.

To configure default custom registers for a particular device type:

1. Select **Device Defaults** from the **Edit** menu. A list of devices appears. If you have configured port 2 for SEAbus devices, only SEAbus devices will



2. Select the device you wish to configure. The default custom register configuration menu appears. The first time you select this command, the first 16 registers (64 for VDEW devices) from the device's standard data register list appear on the default real-time data list. Not all of the entries are visible on the menu. Use the scroll bar or the **Page Up** and **Page Down** keys to view all the entries.



3. Select a data item and press **Enter** to see a list of device data items that can be assigned to that data word. Select **Not Used** if you do not want that data word to be used. Not all of the entries are visible on the menu. Use the scroll bar or the **Page Up** and **Page Down** keys to view all the entries. Select **Clear All** to set all data words to "Not Used." Select **Set to Base** to restore the data words to the first 16 registers (64 for VDEW devices) from the device's standard data register list.

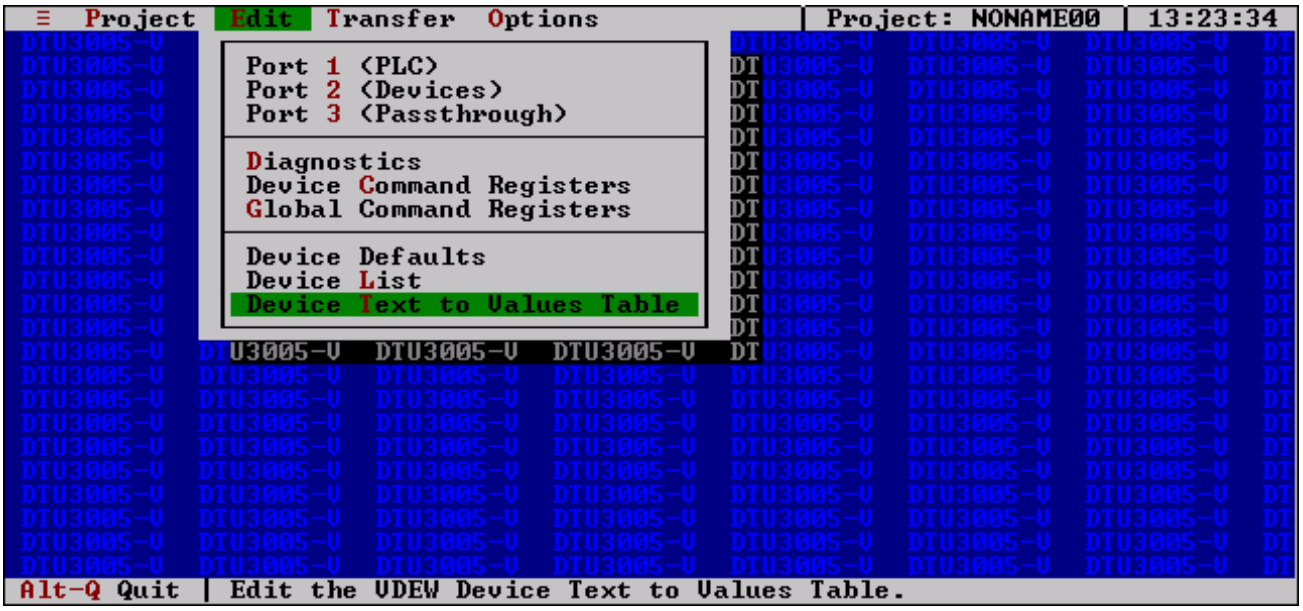
4. Select **Save** to save your configuration or **Revert** to restore the last previously saved configuration for that device. When you are finished configuring the default data registers for that device, select **Ok** to close this screen.

To conserve registers when using VDEW devices, you should set all unused registers to "Not Used" and place them at the end of the list. The DTU3005 will only allocate registers for those containing device data. (This does not apply to SEAbus devices, for which the DTU3005 allocates 16 registers regardless if they are used or not.)

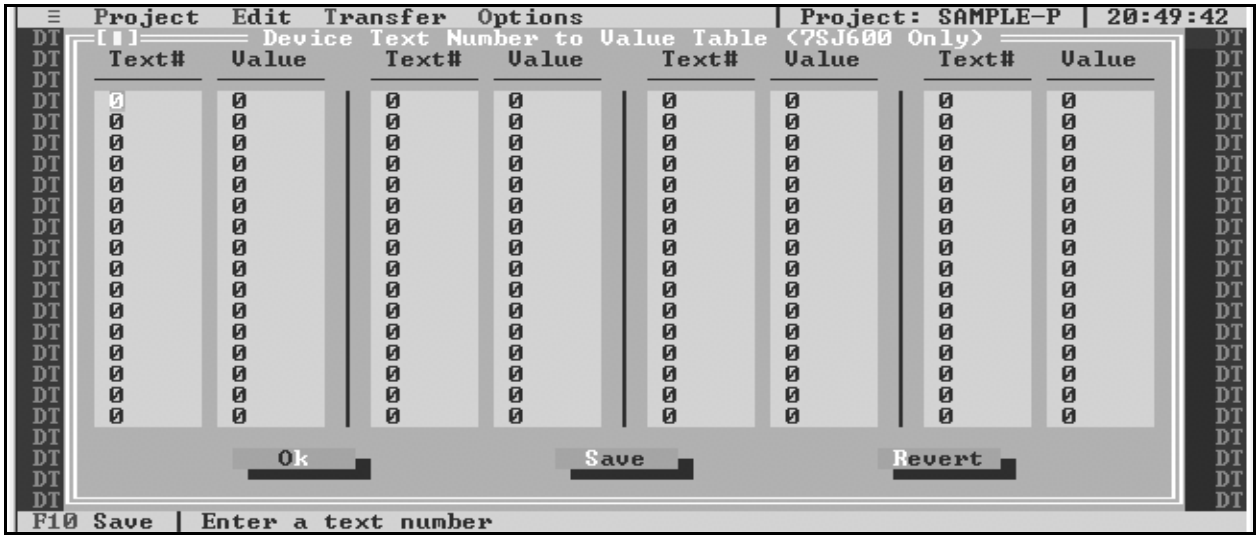
5.8 Device Text Setup (7SJ600 Only)

The Device Text to Values Table menu item is only available for configuring the 7SJ600 relay. It is used to convert status codes returned from select parameters in the 7SJ600 relay (only) to values in a format useful to the system connected to port 2 of the DTU3005. This affects the status readouts from the device's binary inputs, signal and trip rated contacts, and the LEDs.

To edit this table, select **Device Text to Values Table** from the **Edit** menu. This selection is only available when the device protocol for port 2 is set for "VDEW."



Once open, 64 conversions can be defined. To define a conversion, enter the 7SJ600 relay status code in the **Text #** column and enter the corresponding output value desired in the **Value** column.



The relevant status codes (Text #) are listed below.

Table 5.1 7SJ600 Relay Information

For Requesting Status of the 7SJ600 Relay's Three Binary Inputs							
Text Number/Status Code (default value returned if not converted)	**Description of Returned Binary Input Status Codes: I1 indicates Input 1; I2,3 indicates Inputs 2 and 3**	**Suggested Value (Using This Conversion Table)**					
		Value	**Inputs**	**I3**	**I2**	**I1**	
		0	0	0	0	0	
1342	I1,2 Inactive : I3 Active	4	0	1	0	0	
1343	I1,3 Inactive : I2 Active	2	0	0	1	0	
1344	I1 Inactive : I2,3 Active	6	0	1	1	0	
1345	I2,3 Inactive : I1 Active	1	0	0	0	1	
1346	I2 Inactive : I1,3 Active	5	0	1	0	1	
1347	I3 Inactive : I1,2 Active	3	0	0	1	1	
1348	I1,2,3 Active	7	0	1	1	1	
For Requesting Status of the 7SJ600 Relay's Two Trip Contacts and Two Signal Contacts							
Text Number/Status Code (default value returned if not converted)	**Description of Returned Trip and Signal Relay Status Codes: S1,2 indicates Signal Relays 1 and 2; T1,2 indicates Trip Relays 1 and 2**	**Suggested Value (Using This Conversion Table)**					
		Value	**Outputs**	**S2**	**S1**	**T2**	**T1**
			Bits 15 . . . 4	**3**	**2**	**1**	**0**
1349	S1,2 T1,2 Open	0	0	0	0	0	0
1350	S1,2 T1 Open : T2 Closed	2	0	0	0	1	0
1351	S1,2 T2 open : T1 Closed	1	0	0	0	0	1
1352	S1,2 Open : T1,2 Closed	3	0	0	0	1	1
1353	S1 T1,2 Open : S2 Closed	8	0	1	0	0	0
1354	S1 T1 Open : S2 T2 Closed	10	0	1	0	1	0
1355	S1 T2 Open : S2 T1 Closed	9	0	1	0	0	1
1356	S1 Open : S2 T1,2 Closed	11	0	1	0	1	1
1357	S2 T1,2 Open : S1 Closed	4	0	0	1	0	0
1358	S2 T1 Open : S1 T2 Closed	6	0	0	1	1	0
1359	S2 T2 Open : S1 T1 Closed	5	0	0	1	0	1
1360	S2 Open : S1 T1,2 Closed	7	0	0	1	1	1
1361	T1,2 Open : S1,2 Closed	12	0	1	1	0	0
1362	T1 Open : S1,2 T2 Closed	14	0	1	1	1	0
1363	T2 Open : S1,2 T1 Closed	13	0	1	1	0	1
1364	S1,2 T1,2 Closed	15	0	1	1	1	1
For Requesting Status of the 7SJ600 Relay's Four Programmable LEDs							
Text Number/Status Code (default value returned if not converted)	**Description of Returned LED Status Codes: L1,2 indicates LEDs 1 and 2**	**Suggested Value (Using This Conversion Table)**					
		Value	**Outputs**	**L4**	**L3**	**L2**	**L1**
			Bits 15 . . . 4	**3**	**2**	**1**	**0**
1365	L1,2,3,4 Off	0	0	0	0	0	0
1366	L4 On : L1,2,3 Off	8	0	1	0	0	0
1367	L3 On : L1,2,4 Off	4	0	0	1	0	0
1368	L3,4 On : L1,2 Off	12	0	1	1	0	0
1369	L2 On : L1,3,4 Off	2	0	0	0	1	0
1370	L2,4 On : L1,3 Off	10	0	1	0	1	0
1371	L2,3 On : L1,4 Off	6	0	0	1	1	0

Table 5.1 7SJ600 Relay Information (Continued)

1372	L2,3,4 On : L1 Off	14	0	1	1	1	0
1373	L1 On : L2,3,4 Off	1	0	0	0	0	1
1374	L1,4 On : L2,3 Off	9	0	1	0	0	1
1375	L1,3 On : L2,4 Off	5	0	0	1	0	1
1376	L1,3,4 On : L2 Off	13	0	1	1	0	1
1377	L1,2 On : L3,4 Off	3	0	0	0	1	1
1378	L1,2,4 On : L3 Off	11	0	1	0	1	1
1379	L1,2,3 On : L4 Off	7	0	0	1	1	1
1380	L1,2,3,4 On	15	0	1	1	1	1

Once you are finished entering data, select **Save** to save your configuration, then select **Ok** to exit the dialog box. Select **Revert** to bring back the previous settings.

5.9 Global Command Registers

This option allows you to specify global commands for all the devices specified in the Device List. It is only available for VDEW devices.

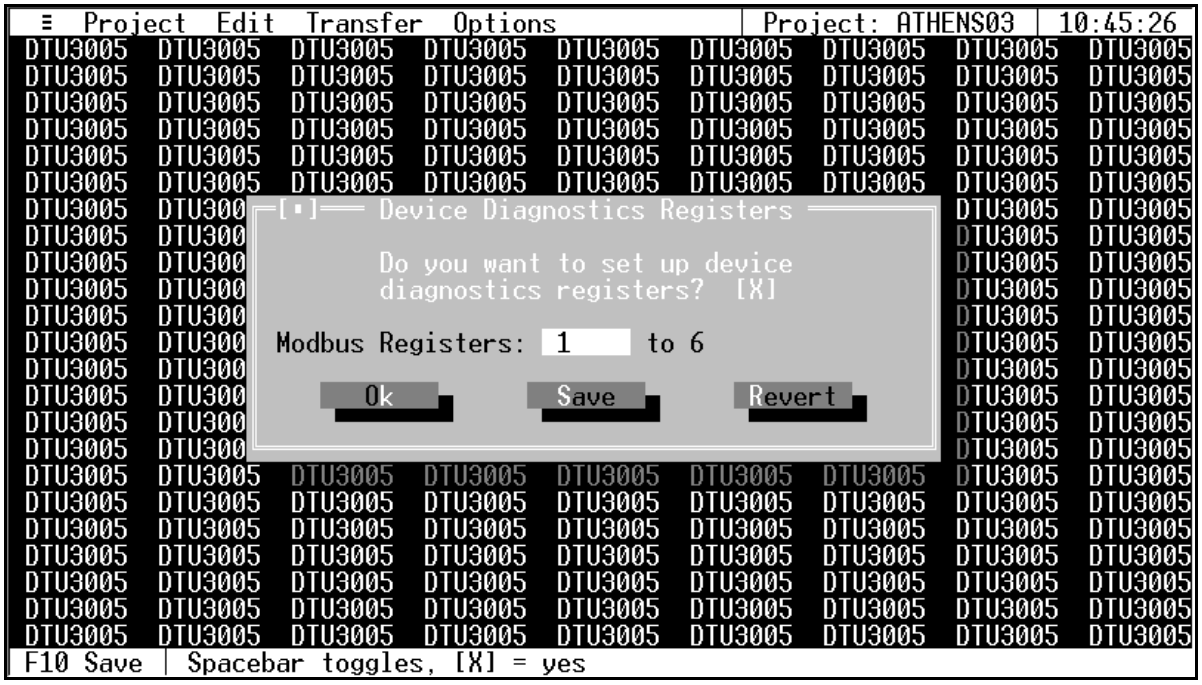
The Global Command Registers consist of six registers. These registers allow the PLC to transmit commands to all the devices in the Device List. To send a command, all the PLC needs to do is to place the command values into the appropriate PLC registers, which the DTU3005 unit reads and then processes.

5.10 Device Diagnostic Registers

This option programs the DTU3005 to send communications diagnostic information to a set of registers that can be read by the Modbus Master device. This option allows the Modbus Master to collect diagnostic information by reading the registers assigned here. The information can be used to troubleshoot problems with the devices and the communications network.

The format and content of the diagnostic registers are described in detail in **Appendix F**.

1. To configure the device diagnostic registers, select **Diagnostics** from the **Edit** menu. The following screen displays:



2. To enable the sending of diagnostic information to the Modbus Master, select the **Do you want to set up device diagnostics registers?** checkbox with the mouse or the **spacebar**. Then enter the starting register number in the **Modbus Registers**: field. The register block is 6 bytes long. These are written to the holding register area (40000 to 49999). Thus entering a 1 in this field represents

register 40001, etc. Be sure that the registers you specified are not being used by other devices.

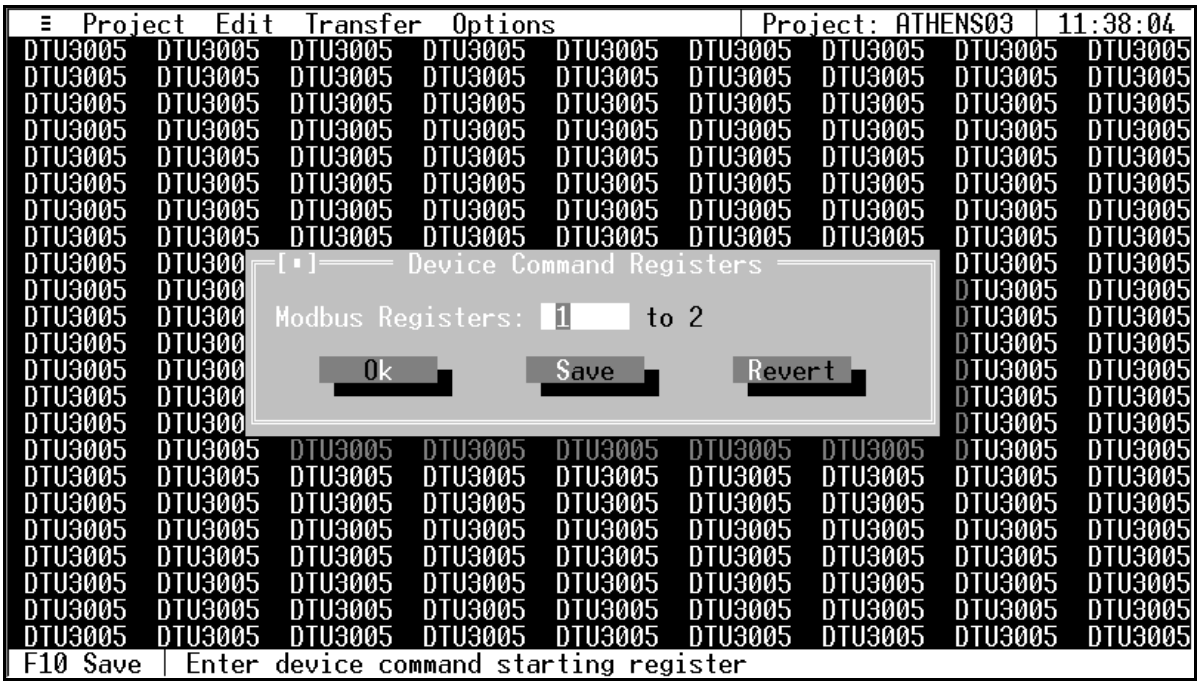
3. Select **Save** to save the information to the project file, and then select **Ok** or press **Esc** to exit the device diagnostic registers screen. If at any time you want to return to the last saved version of the device diagnostics registers, select **Revert** without saving any changes.

5.11 Device Command Registers

The device command registers consist of two consecutive registers for each device entered in the device list. These registers allow the Modbus Master device to transmit commands to each of the devices by writing to the appropriate register. The first register contains the command, and the second register contains the data associated with the command. The format of the command registers for each device are described in **Appendix E**.

All the command registers are placed in contiguous locations and are assigned to each device in the order that they are listed in the device list. To indicate the location of the command registers, follow these steps:

1. Select **Device Command Registers** from the **Edit** menu. The Device Command Registers screen appears:



2. Enter the starting register address in the **Modbus Registers** field. The DTU3005 Editor software will determine the proper number of registers for the number of devices entered in the device list and indicate the final register number. The registers used are the holding registers (40000 to 49999). Thus entering a register number of 1 will represent register 40001, etc. These registers must be different from those used for device data and diagnostics. Failure to use different register addresses will cause communication errors, and may cause unexpected operation of the devices.

3. Select **Save** to save the information to the project file, and then select **Ok** or press **Esc** to exit the device command registers screen. If at any time you want to return to the last saved version of the device diagnostics register, select **Revert** without saving any changes.

5.12 Saving the Project File

Now you have completed configuring the DTU3005 for Modbus Master to Devices communications. Select **Save** from the **Project** menu and press **Enter**, or press **F10** to save the project file to disk. The next step is to transfer the project to the DTU3005 unit. This topic is covered in **Chapter 7**.

6 Creating Project Files—SEAbus Port Expander

This chapter covers configuration of the DTU3005 as a SEAbus port expander. Once you have created a SEAbus port expander project (see **Chapter 3**), follow the directions in this chapter to configure the project file. Then see **Chapter 7** for directions on downloading the project to the DTU3005.

When configured as a SEAbus port expander, the DTU3005 allows two computers running supervisory software, such as WinPM, to connect to the same Siemens SEAbus devices. Up to 32 devices may be attached to port 2 of the DTU3005 by an RS-485 connection. This configuration is shown below in **Figure 6.1**.

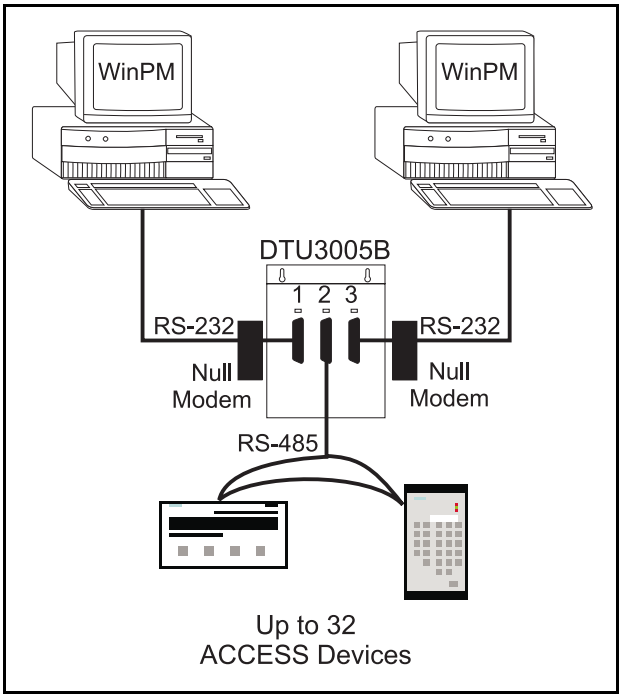
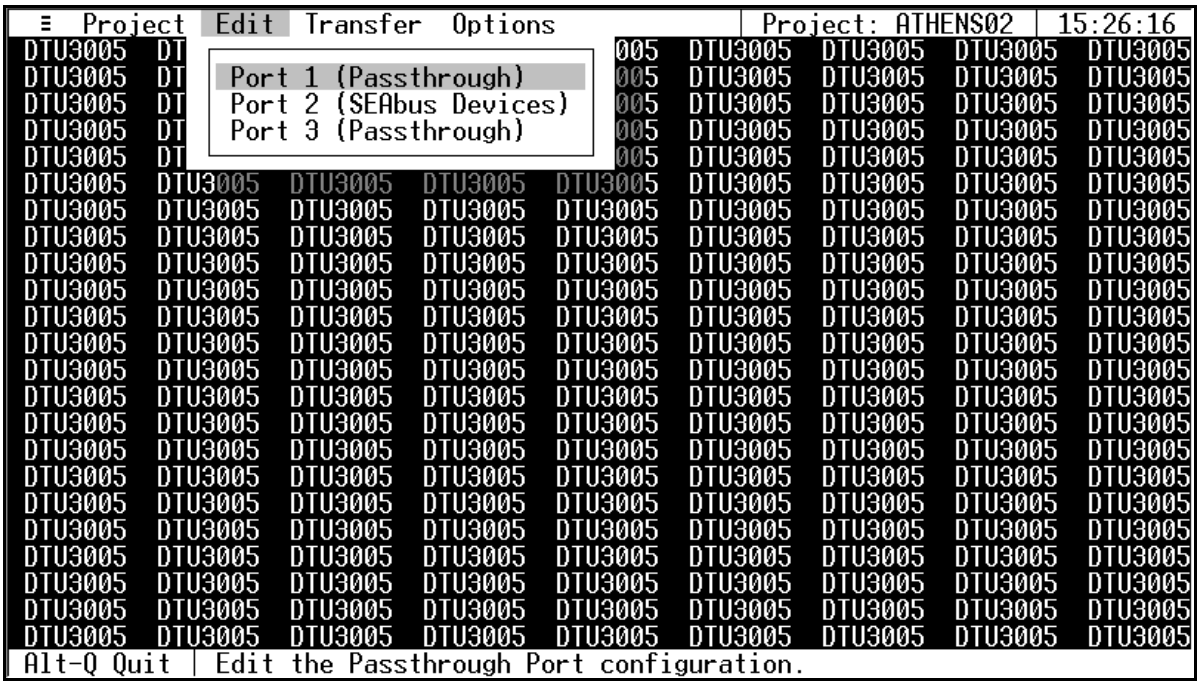


Figure 6.1 Dual Passthrough Application

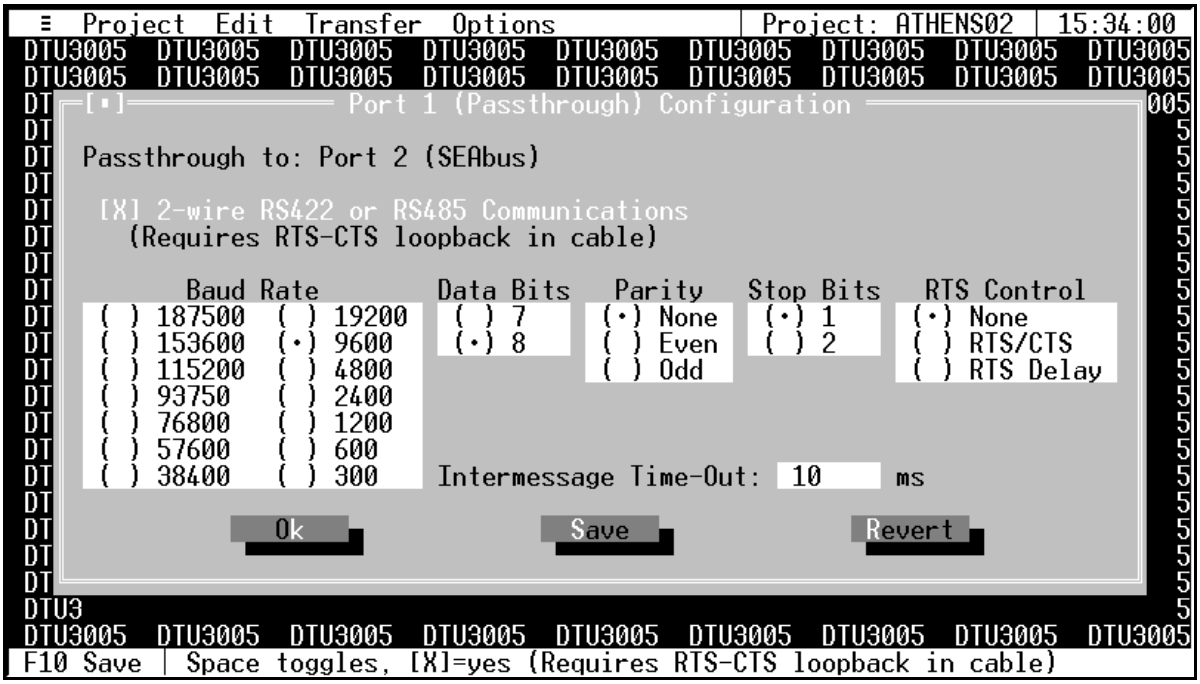
Once you have created or opened the project file, select **Edit** from the main menu and the following menu items appear:

- **Port 1 (Passthrough)**—allows you to configure the communications settings for the supervisory computer connected to port 1.
- **Port 2 (SEAbus Devices)**—allows you to configure communications settings for SEAbus devices connected to port 2.
- **Port 3 (Passthrough)**—allows you to configure the communications settings for the supervisory computer connected to port 3.



6.1 Passthrough Setup—Port 1

You must have a SEAbus Port Expander project file open to configure port 1 using the instructions in this section. Select **Port 1 (Passthrough)** from the **Edit** menu, and the Port 1 (Passthrough) configuration screen appears.



2-Wire RS422 or RS485 Communications

The **2-Wire RS422 or RS485 Communications** selection box will only need to be checked if the communications with your supervisory computer is a 2-wire RS485 or RS422 interface. An example of this is if you are using a RS-232/485 converter to extend the distance between your computer and the DTU3005.

When 2-wire communications are being used, RTS must be looped back to CTS on the DTU side of the cable. This can be done on the RS232 side by looping pins 4 and 5 or on the RS422/485 side by looping 16 to 18 and 17 to 19. See **Appendix D** for wiring diagrams for your particular PLC, and whether it uses a 2-wire connection.

To select the checkbox, click on it with the mouse or, with the **2-Wire RS422 or RS485 Communications** selection highlighted, press the **spacebar**. An "X" will appear inside the brackets when it is selected.

Press the **Tab** or **Right Arrow** key to move to the next field without selecting this checkbox.

Communications Settings

Before changing any of these settings, consult your computer, modem, or RS-232/485 converter manual for the correct settings. To move between the communications settings, press the **Tab** or **Enter** keys. To select a setting, use the **Up** or **Down Arrow** key to move to the desired setting and press the **spacebar** to change your selection.

RTS Control (Request to Send Control)

RTS Control selection is an option provided for modems or for RS-232/485 converters that require RTS to be active only while the DTU is transmitting to the computer.

- If **RTS/CTS** is selected, the DTU will activate RTS and wait until CTS is active before transmitting to the computer attached to port 1.
- If **RTS Delay** is selected, the DTU will activate RTS and wait for the specified delay time to pass before transmitting. When **RTS Delay** is selected, the program displays an entry box for the RTS delay time. Enter the time in milliseconds.

Intermessage Time-Out

The DTU3005 uses the intermessage time-out to determine when a complete message has been received on the passthrough port. Once the first character of a message has been received, if the amount of time specified by the intermessage time-out passes with no additional characters being received, the DTU3005 will consider the message to be complete and process it.

To change the intermessage time-out, select **Intermessage Time-Out** and enter the value in milliseconds. Then press the **Enter** key.

Saving Port 1 Configuration Information

Once you have entered all the configuration information, select **Save** to save the configuration to the project file. Then select **Ok** or press the **Esc** key to close the configuration screen.

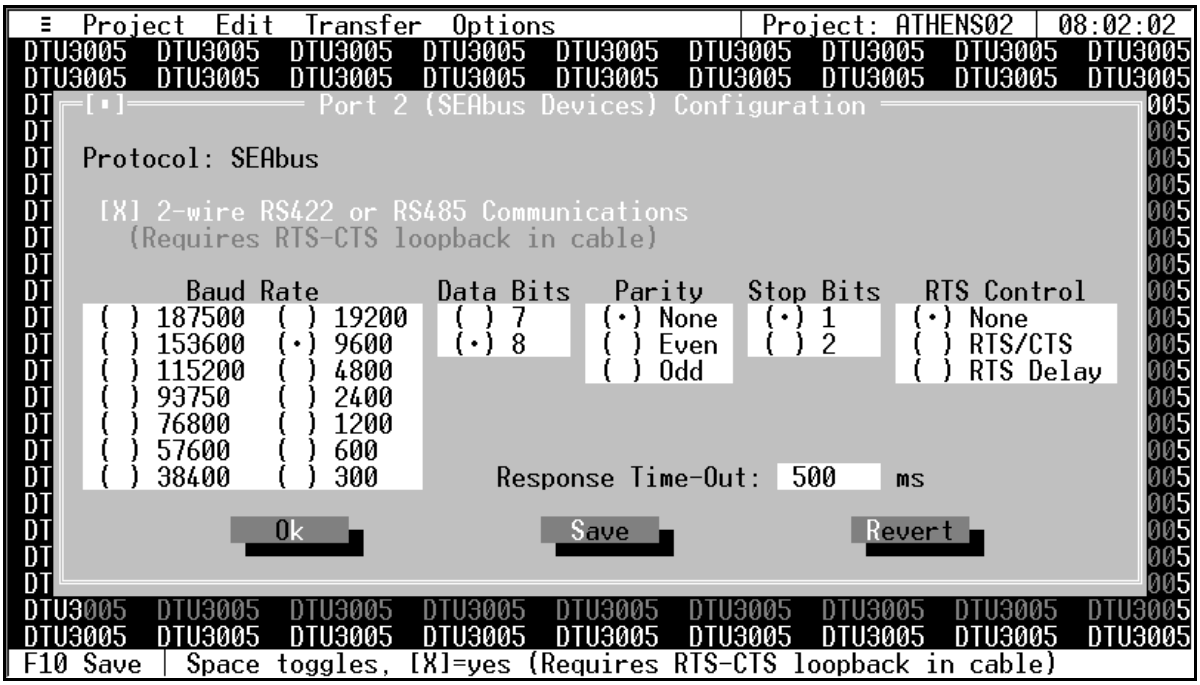
If you have changed the configuration and have not saved it to the project file, you will be prompted to either save or discard the changes.

Select **Revert** to return to the last previously saved configuration without saving any changes.

6.2 SEAbus Device Setup—Port 2

One or more Siemens devices may be connected to port 2. You must have a SEAbus Port Expander project file open to configure port 2 using the instructions in this section.

Select **Port 2 (SEAbus Devices)** from the **Edit** menu, and the Port 2 configuration screen appears.



Configuration Information

The configuration selections with the exception of Response Time-Out are the same as those for port 1. Refer to **Section 6.1** for instructions on configuring these fields.

Response Time-Out

The Response Time-Out tells the DTU how long to wait after transmitting a request to the PLC if no response has been received from the PLC. After this amount of time passes with no response being received, the DTU will assume that no response is coming and will retry the request. Enter the time in milliseconds.

Saving Port 2 Configuration Information

Once you have entered all the configuration information, select **Save** to save the configuration to the project file. Then select **Ok** or press the **Esc** key to close the configuration screen.

If you have changed the configuration and have not saved it to the project file, you will be prompted to either save or discard the changes.

Select **Revert** to return to the last previously saved configuration without saving any changes.

6.3 Passthrough Setup—Port 3

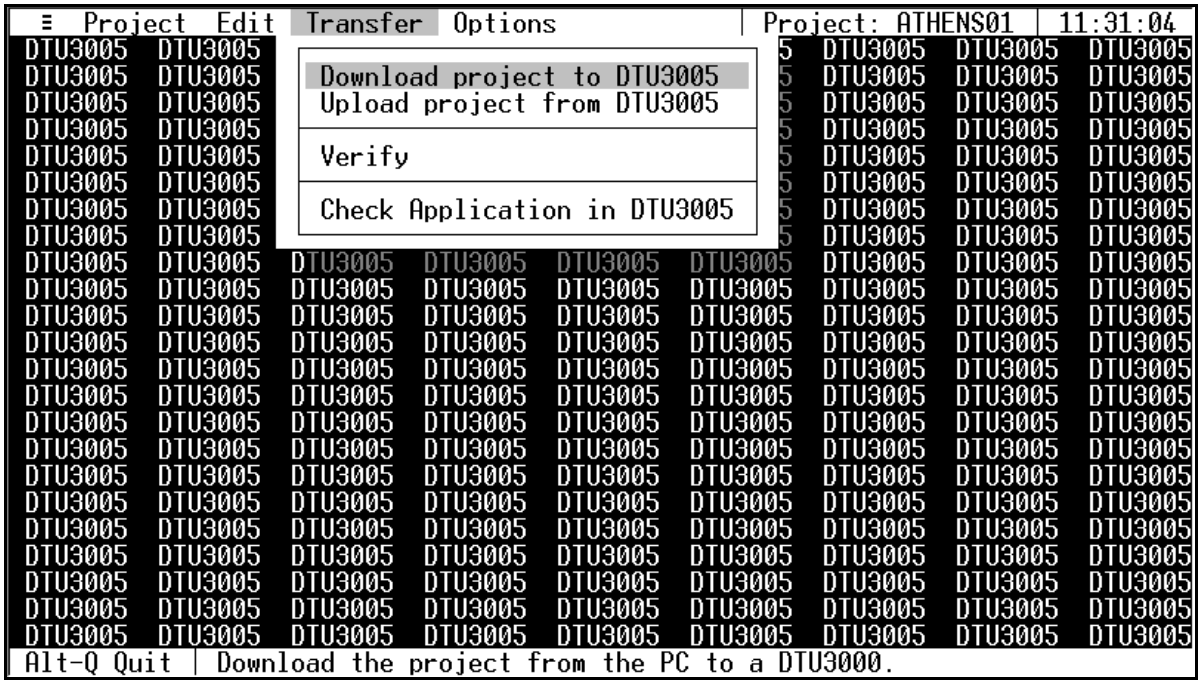
Select **Port 3 (Passthrough)** from the **Edit** menu, and the Port 3 Passthrough configuration screen appears. It is identical to the port 1 configuration screen, but configures the communications settings for the supervisory computer connected to port 3. The settings can be different than those for port 1, depending on the system. See **Section 6.1** for directions for setting up the passthrough port.

After configuring port 3, select **Save** to save the port 3 configuration to the project file, and then select **Ok** or press **Esc** to exit the Port 3 Passthrough configuration screen.

7 Transferring Project Files

Once you have configured and saved your project file for your particular application, you need to download it to the DTU3005 unit. First verify which COM port on your computer is used to upload and download projects to the DTU3005 unit (see **Chapter 8**). Then, select **Transfer** from the main menu and the following selections are available:

- **Download project to DTU3005**—allows you to transfer (download) any created project file from your PC to the DTU3005.
- **Upload project from DTU3005**—allows you to transfer (upload) the project file stored in the DTU3005 to the PC.
- **Verify**—allows you to verify a project file within your computer against the current project file stored in the DTU3005 unit.
- **Check Application in DTU3005**—allows you to check what type of project file is loaded (PLC to devices, Modbus Master to devices, or Passthrough) and which protocols have been loaded for each of the communication ports. It also reports the revision level of the DTU3005 unit's firmware.



Before using the **Transfer** commands, you must physically connect port 3 of the DTU3005B to your computer using a null modem cable. Also be sure that power is supplied to the DTU3005.

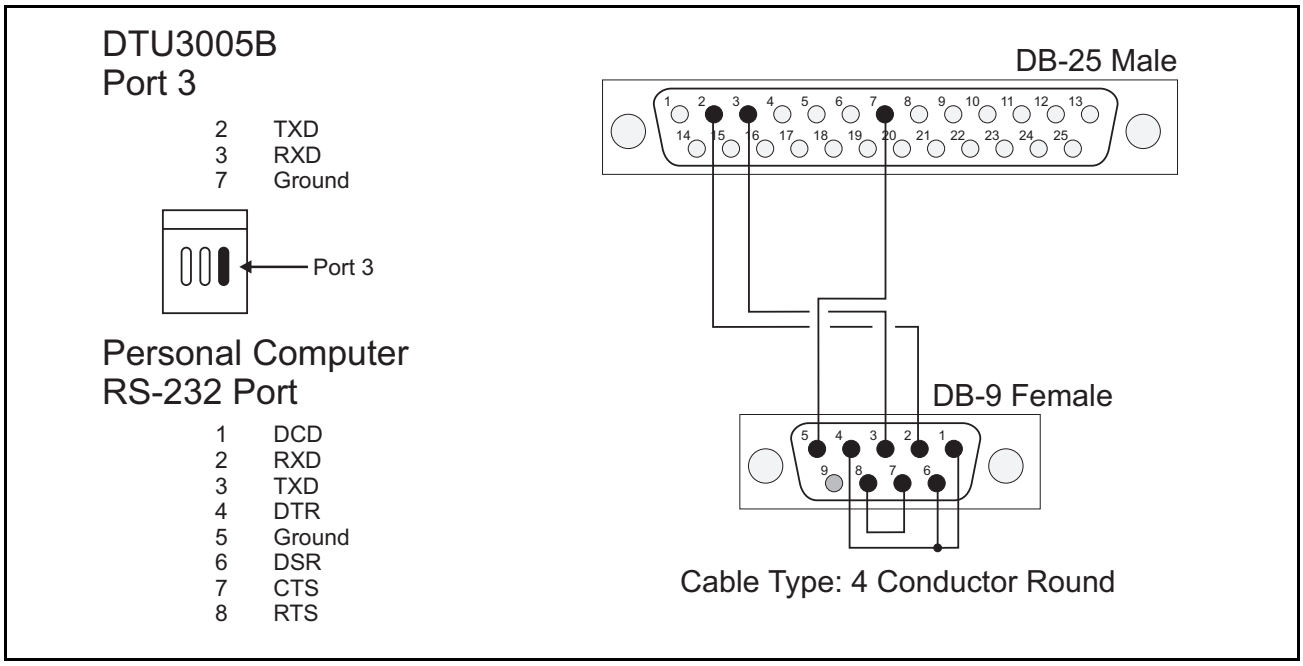


Figure 7.1 Null Modem Cable connection

The null modem cable will cross pins 2 and 3 (RXD and TXD). On the computer end of the cable, pins 7 and 8 (RTS and CTS) should be connected together. Also pins 1, 4, and 6 (DCD, DTR and DSR) should be connected together. The cable diagram is illustrated in **Figure 7.1**. In addition, the DIP switches on the front of the DTU3005B unit must be set to configuration mode as described below.

1. Power down the DTU3005B unit.
2. Set the DIP switches to configuration mode per the DIP switch settings listed below in **Table 7.1** and shown in **Figure 7.1**.
3. Restart the DTU3005B unit.
4. The status LED on the front of the DTU3005 unit flashes green to indicate that the unit is in configuration mode.

   Note: To return the device to normal operation, the DTU3005B unit must be powered off while the DIP switch settings are reset, then the unit will be in normal operation mode when it is powered up.

Table 7.1 Mode Switch Settings

Mode	Switch 1	Switch 2	Switch 3	Status LED
Normal Operation	Off	Off	Off	On steady
Configuration	Off	Off	On	Flashing Green

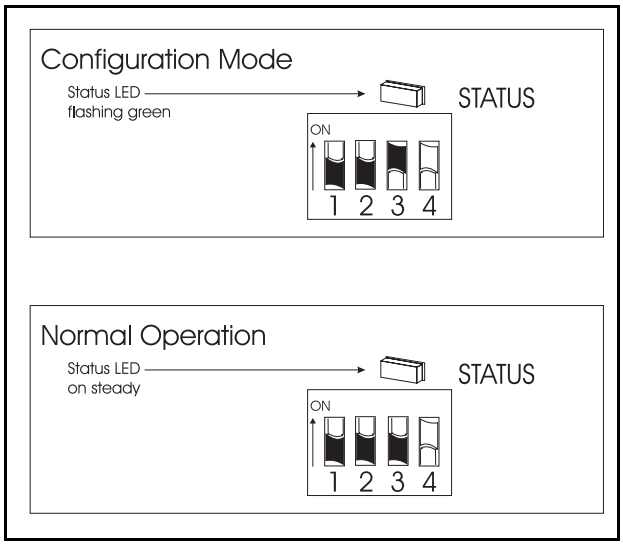


Figure 7.2 DIP Switch Settings for Normal Operation and Configuration Modes (Switch 4 is N/A)

71 Downloading Projects

Select **Download project to DTU3005** from the **Transfer** menu, and the following screen appears.

Select **Ok** and the DTU3005 Editor software transfers the currently displayed project to the DTU3005 unit.