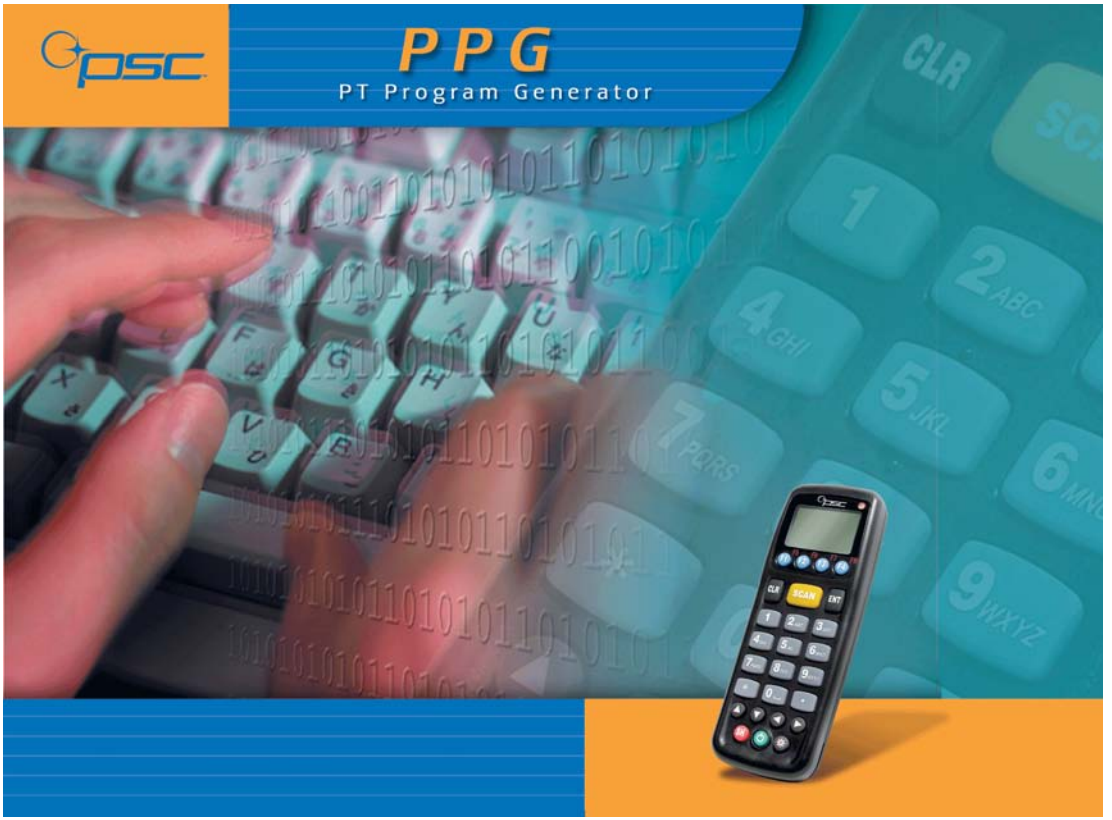
PT Program Generator



User's Manual

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CONTENTS

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PT Program Generator
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10.3 Waiver. A party's failure to enforce any of the terms and conditions of this Agreement shall not prevent the party's later enforcement of such terms and conditions.

10.4 Governing Law. This Agreement shall be governed by the laws of the State of Oregon, United States of America, excluding choice of law provisions.

10.5 Attorneys Fees. In the event an action is brought to enforce the terms and conditions of this Agreement, the prevailing party shall be entitled to reasonable attorneys' fees, both at trial and on appeal.

-END-

NOTES

Chapter 1
Introduction

This document assumes that you are familiar with Microsoft Windows®. If you do not know how to launch applications, select menu options, or use dialog boxes, please refer to your Microsoft Windows documentation before proceeding with PPG.

Document Overview

This document is divided into seven chapters and eight appendices:

- Introduction on page 1, provides an overview of PPG, describes the conventions used in this manual, and tells how to access PSC Technical Support.
- Getting Started on page 5, tells you how to install and run PPG. It also gives you an overview of PPG concepts and usage.
- PPG Application Design on page 15, provides information on programming concepts including how to design your program, define program modules and specify program flow.
- The PPG Menubar on page 23 describes the PPG menubar and how to access all PPG's features using the menubar, including creating, saving and editing applications.
- Creating & Using Nodes on page 49, gives you detailed information on Frames, Subroutines, Nodes, and Links.
- Managing Data on page 77, describes the use of Registers, Fields, Files, and Templates.
- PT40 Communication on page 89, show you how to download applications to the PDT and how to transfer data to and from the portable device.
- PPG Tutorial on page 99, is a step-by-step tutorial to use in learning PPG.

- Example Frames on page 135, contains sample code for commonly used functions.
- The PPG Library on page 159, describes the applications that come with PPG.
- PPG System Commands on page 163, identifies the system commands that can be used with PPG.
- ASCII/Hex Conversion Table on page 167, contains a table of ASCII characters for your reference.
- Useful Bar Codes on page 169, contains bar codes that can be used to program your portable data collection unit.
- Troubleshooting on page 171, provides troubleshooting information and table of possible error messages.
- Glossary on page 179, is a glossary of the specific PPG programming terms used in this manual.

Style Conventions

Formatting conventions are used throughout this document to provide a consistent method for representing various screen shots, buttons, controls, keyboard characters, notes, and cautions while you are working with PPG.

Manual Formatting Conventions

Keyboard Keys

Keyboard keys, such as **ENTER**, are in **Bold**. When keyboard keys are Linked with a plus sign (for example, **SHIFT+ENTER**, or **Ctrl+C**), hold down the first key while pressing the second key once.

Keystrokes

Input characters, filenames, file paths, field selections from a pull-down list, and data or keystrokes entered by the user are shown in **`courier bold`**.

Input characters are usually given in lowercase (no capital letters); you may enter them in lowercase, uppercase, or a combination. When input characters are given in uppercase or a combination of lowercase and uppercase, type the characters exactly as shown.

Windows Controls

Words in **Bold** are selections that appear in the PPG program, such as frame names, subroutine names, node names, file, field, template, and register names, menu options, buttons, dialog boxes, field names, and radio-buttons.

Words in **Bold** separated by an arrow (**>**) are menu actions you make in the order provided. For example, **File > Run** means select the **File** menu and then select **Run** from that menu.

Cautions indicate an action where there is a possibility of damage to data integrity or data failure. Cautions always have the Caution icon to the left.

Notes provide additional information on a topic, including technical details, exceptions to instructions and other pertinent information. Notes always have the notepad icon to the left.

Mouse Actions

Click or Select	Press and immediately release the left mouse button without moving the mouse. Clicking is used to select specific buttons on various forms and tables.
Double Click	Click the left mouse button twice in rapid succession. Used to initiate an application.
Right Click	Press and hold the right mouse button without moving the mouse.

Portable Keys

Keys on the portable data terminal (PDT) unit are bracketed with **< >**, to identify that they refer to the portable data collection unit, rather than the PC.

<F1> — <F8> Keys	The **Function** keys, **<F1> – <F8>**, are used specifically on the PT40 portable data collection units.
<ENTER> Key	To differentiate the **<ENTER>** key on the portable from the **Enter** key on the PC's keyboard, portable keys are formatted as "press **<ENTER>**".

NOTES

Chapter 2
Getting Started

Overview

Refer to this section as you prepare to install and use the PT Program Generator (PPG). The following general topics are covered:

Before You Start

What's New in PPG v5.0?

The following features are new to this version of PPG:

- PPG v5.0 works with PSC's Falcon PT40.
- Improved user interface provides buttons to access program nodes and controls.
- Double-byte language support for Chinese Simplified and Chinese Traditional characters.

PPG License Agreement

Review the license agreement; it gives you permission to copy the program files for backup purposes only. You may not make a copy for another person to use. When you open the envelope that contains the software, this means that you agree to the terms of the license agreement.

Registering Your Copy of PPG

PSC values your feedback. Please take a few moments and complete the Product Registration form located on PSC's website or on the PSC Manuals CD. Registering your products ensures that you will be informed of the latest product news, software updates and other future developments from PSC.

PPG Installation

PPG System Requirements

PPG runs with the minimum hardware and operating system requirements listed below. For maximum performance, install PPG onto a computer with a higher speed processor and more memory than the minimum requirements.

Required Hardware

The following equipment is required to run PPG:

- Processor - 450MHz
- Memory - 12MB
- Hard Disk - 10MB

- Video - VGA
- A CD-ROM drive
- A serial port (for loading your program into a portable)

Operating Systems

PPG works with the following Microsoft® Windows® operating systems:

- Windows® 98 (SP5)
- Windows® 2000 (full double-byte functionality)
- Windows® Me (SP5)
- Windows® NT (SP6)
- Windows® XP (full double-byte functionality)

Supported Portables

PPG v 5.0 only supports the PSC Falcon PT40. A compatible docking station or communications cable is required for the PDT to work with PPG. Contact a portable data collection supplier to purchase the required equipment and accessories.

Installing PPG

Complete the following steps in the installation utility to install PPG:

1. Insert the PPG Installation disk into your PC's CD drive. A **Welcome** screen opens.
2. Press **Next** on the **Welcome** screen to continue the installation.
3. Press **Yes, I Accept** at the License Agreement screen to continue the PPG installation process and accept the PPG license agreement.
4. At the **Destination Location** screen, select the PPG destination directory:
   - PPG installs to **`C:\Program Files\PSC\PPG50`** by default.
   - Press the **Browse** button to select or create another directory in which to install PPG.
5. Press **Next** to select the installation of the PT40 software and PPG.
6. Press **Next** to begin the installation of PPG. A series of **Installing....** screens appear.

7. Finally, a message that PPG has been successfully installed is displayed.
8. Press **Finish** to exit the installation.

Upgrading to PPG v5.0

If you want to upgrade to PPG v5.0, complete the instructions in Installing PPG on page 7. By default, PPG v5.0 is installed in a different default location on your PC's hard drive than PPG v4.5, so it is possible to have both versions installed at the same time.

Prior PPG version source files (`*.scr`) are converted when you open and save them in PPG v5.0. To maintain PPG v4.5 compatible applications, open them in PPG v5.0 and save them with a new name or new location.

There is no keyboard wedge support in PPG v5.0. Applications created in previous versions of PPG that use the keyboard wedge option can be saved in PPG v5.0, but they must be updated with a new input method after you save them.

Uninstalling PPG

To uninstall PPG, use the standard method of removing programs installed on Microsoft Windows:

1. From the Windows **Start** menu, select **Settings > Control Panel > Add/Remove Programs**.
2. At the **Add/Remove Programs** window, select **Change or Remove Programs** along the left side of the window.
3. Scroll down the screen until you locate **PT Program Generator** and select it by clicking on it with your mouse.
4. Press **Change/Remove** to initiate the program removal process.

Launching and Exiting PPG

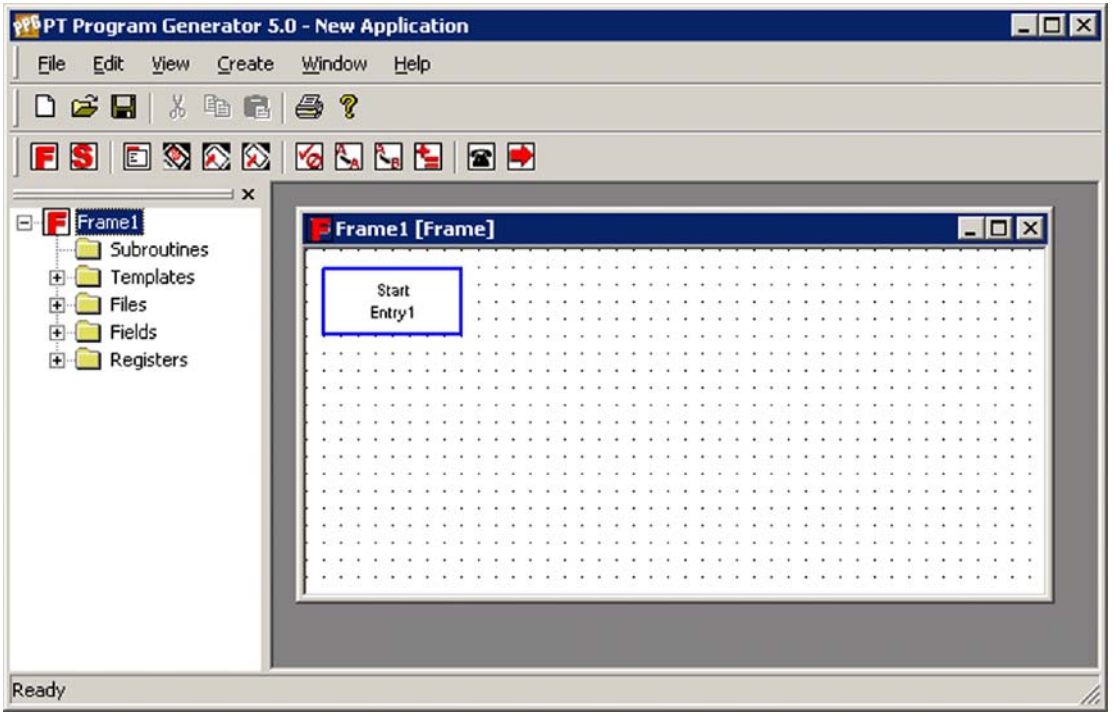
Launching PPG

To launch PPG, complete the following steps:

1. Select PPG from your Windows **Start Menu > PT Program Generator > PT Program Generator.**

2. The PPG window opens as illustrated in Figure 1 with a new, blank PPG application.

Figure 1. The PPG Window



Exiting PPG

To exit PPG, select **File > Exit** from the menubar or double-click on the **Control-menu** box. A dialog appears, asking if you want to save any changes to the current file. Select **Yes** to save changes or **No** to discard them.

Overview of PPG

Use PPG to construct and design an application for your PSC portable. You can create custom applications to collect, verify, and store data. Designing and creating the program is the first part of the process; there are several steps involved. Refer to PPG Application Design on page 15 for an overview of using PPG to construct an application for your PSC portable.

PPG Tutorial

To become familiar with PPG, complete the PPG Tutorial on page 99, or access the PPG Tutorial via the on-line help.

Program Files

Executable Programs

Following is a list of executable programs that are installed on your PC during the installation of PPG:

PPG PPG is the PT Program Generator application. This is the application you use to create programs for a PSC portable.

PPGXFER PPGXFER is used to transfer the program you created in PPG to the portable. This utility is called automatically by PPG when you download a program to the portable. Refer to Downloading the Application to the PDT on page 89 and Specialized Download Situations on page 92.

PPGComp PPGComp (PPG Compiler) is used to compile the program you created into the format which is downloaded to the PDT. This utility is called automatically by PPG when you download a program to the portable. Refer to Downloading the Application to the PDT on page 89.

XFER32 XFER32 is used to transfer data between a PC and the portable. After you input data or scan bar codes with the portable, you can use this utility to upload the data into a file on your PC. You can also use it to download information stored in a PC file into the portable. Refer to Using XFER32 on page 92.

Sample Program Files

PPG comes with four sample files. Some of these files are just portions of programs demonstrating use of a specific node. However, you can use any of these samples as a foundation for building a full-size program:

sample.scr `sample.scr` allows you to collect information with your portable, upload collected data to a PC, and erase collected data. You will be using this file as you work through PPG Application Design on page 15 and the PPG Tutorial on page 99.

sample2.scr `sample2.scr` is a simple but complete data-collection program that allows the user to enter data as either item-and-quantity values or just item values. The program also stores data, uploads data, and erases data.

sample3.scr	**`sample3.scr`** is an expanded version of **`sample2.scr`** that includes review and edit capabilities. (This is the program that was loaded with your portable when you first got it.)
sample4.scr	**`sample4.scr`** is an application which illustrates multiple frame levels. This example is useful as a model for designing complex applications.

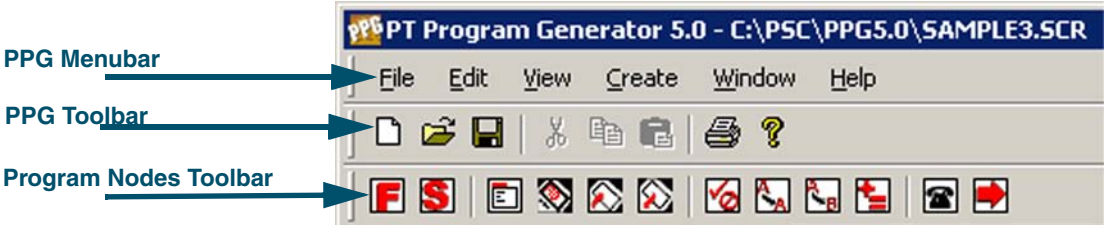
PPG also comes with some example frames and files, discussed in Example Frames on page 135. You can download additional PPG library files, discussed in The PPG Library on page 159, from PSC's website.

User Interface

Menus and Toolbars

The PPG menubar is discussed in detail in The PPG Menubar on page 23. In Figure 2, the top toolbar is the **PPG toolbar**. The second toolbar is the **Program Nodes** toolbar. Refer to View Menu on page 38 for information on toggling the **PPG toolbar** and the **Program Nodes** toolbar on and off.

Figure 2. PPG Menubar, PPG Toolbar, and Program Nodes Toolbar



Refer to the following tables for descriptions of **PPG toolbar** and **Program Nodes** toolbar buttons, their basic functions, and a Link to the section that discusses the function in detail.

PPG Toolbar Buttons

Click this Button	To
New	Create a new PPG flow chart file. Refer to Creating a New File (Ctrl+N) on page 24.
Open	Open an existing PPG flow chart file. Refer to Opening an Existing File (Ctrl+O) on page 25.
Save	Save an existing PPG flow chart file. Refer to Saving a File (Ctrl+S) on page 25.
Cut	Cut the selected node to the clipboard. Refer to Cut (Ctrl+X) on page 35.

Click this Button	To
Copy	Copy the selected node to the clipboard. Refer to Copy (Ctrl+C) on page 35.
Paste	Paste the cut or copied node to the flow chart. Refer to Paste (Ctrl + V) on page 35.
Print	Open the Print dialog box. Refer to Printing a File (Ctrl+P) on page 26.)
Help	Open the PPG online Help file. Refer to PPG Help (F1) on page 47.

Program Nodes Toolbar

To create new PPG **Program Nodes**, click on the node's **Create** button:

Click this Button	To
Frame	Create a new **Frame**. (Refer to Frames on page 50.)
Subroutine	Create a new **Subroutine**. (Refer to Subroutines on page 51.)
Menu	Create a new **Menu** node. (Refer to Menu Nodes on page 55.)
Display	Create a new **Display** node. (Refer to Display Nodes on page 56.)
Input	Create a new **Input** node. (Refer to Input Nodes on page 57.)
Output	Create a new **Output** node. (Refer to Output Nodes on page 60)
Verify	Create a new **Verify** node. (Refer to Verify Nodes on page 63.)
Copy	Create a new **Copy** node. (Refer to Copy Nodes on page 66.)
Modify	Create a new **Modify** node. (Refer to Modify Nodes on page 67.)
Math	Create a new **Math** node. (Refer to Math Nodes on page 69.)
Call	Create a new **Call** node. (Refer to Call Nodes on page 72.)
Link	Create a new **Link**. (Refer to Links on page 73.)

For a complete description of each node type, refer to Creating & Using Nodes on page 49.

Navigation

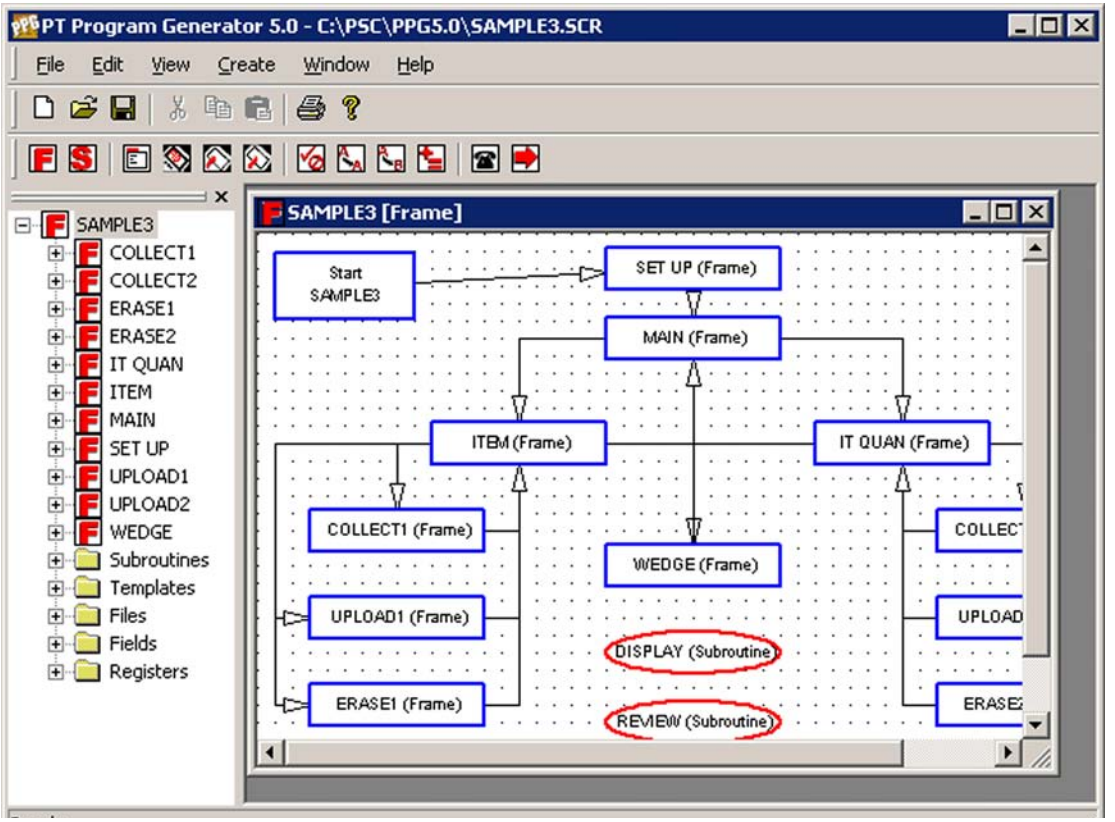
If your flow chart is larger than the PPG window, use the scroll bars and cursor keys to scroll different areas into view. (refer to Figure 3 on page 13). Or use your mouse to expand the window size by clicking and dragging on the beveled lower right corner of the PPG window.

Working with PPG Windows

To expand the PPG window to fill the screen, or the PPG Application to fill the PPG window, select the **Maximize** button in the upper right corner of the window.

To temporarily remove the PPG window from your screen without exiting the application, select the **Minimize** button. The window becomes an application icon in the Windows taskbar. Click on the taskbar icon to bring the window back exactly as you left it.

Figure 3. Scroll bars on a Flow Chart



For information on working in application windows, including using scroll bars and selecting menu commands, refer to your Microsoft Windows documentation.

Generating the Program

Refer to PPG Application Design on page 15 for an overview of using PPG to create a PDT application, starting with a flow chart of your data-collection process. Creating & Using Nodes on page 49 provides details on each program node type.

Downloading the Program

Once you have created a PDT application using PPG, connect your portable to a PC and use the **Download Program** command to load the program into the portable unit. **PPGComp** compiles the program automatically, translating it into code that is understood by the portable, and then sends the program via the cable to your portable. After the application has been downloaded to the portable, you are now ready to collect data with the portable.

Transferring Data

After you have input data or scanned a series of bar codes with the programmed portable data collection unit, you can use **XFER32** to transfer the collected data to a file on your PC. The data is uploaded via the serial cable to a specified file on your computer. You can also transfer data, such as a pick list for comparing input data, from the PC to the portable. For detailed instructions, refer to PT40 Communication on page 89.

Collected data is usually a series of numbers or alphanumeric strings stored in a file until you transfer it into a data processing program. For example, a scanned bar code that reads **`107-028-0274`**, once filtered through a program set up to interpret it, is translated into more readable information, such as **`DOCKERS T-LG, $25.60`**.

You can program the portable to translate scanned numbers into words, but this is usually done with your data processing program. For example, you can load the data into a spreadsheet program that performs calculations. Or use a database program that tracks your inventory. Use PPG to format collected data into human recognizable information.

Chapter 3
PPG Application Design

Overview

This chapter provides an overview of the process of designing and building an application using PPG. The following topics are covered:

Designing the Application

Application Output

Before you begin to design an application, you must decide how the resulting data will be handled. You probably have a good idea of how you would like the collected data to be output. The result of the application is usually a file of collected data, so you must determine the purpose of the file and how it is organized; this determines what data is collected and how. You may want to examine portions of collected data or work with data files downloaded into the PT40. After you have determined the data output format, you can begin to define the program steps and flow.

Application Structure

Next you must decide what you want the program to do. Draft a program flow chart with pencil and paper, while keeping in mind the following ideas and concepts.

Follow them as steps if you like:

1. List the major actions the user may take. These may include reading data from the scanner, uploading data from the PDT, and storing data in a file.
2. For each major action, define each step. In what order will the actions be taken? Walk through each step as if you were the end user.
3. Do multiple actions contain the same step? If so, save time and program size by putting these steps into a subroutine that can be called from different areas of the program.
4. Will each action be taken in a specific order or will the user be allowed to choose an action? To offer a choice of actions, such as collecting and uploading data, you can provide a menu that will allow the user to select an action.
5. Visualize the individual steps involved in each major action.
   - For example, will the user be collecting different types of data at different times?
   - For each action you would take as a portable user, imagine the options you would expect to have and the messages you would expect to appear on the screen.
6. In what order will the actions be taken?
   - Is there an obvious direction to the program? For example, a user would normally collect data and then upload it.
   - This order should be reflected in the main menu and in the program flow.
7. How will the user start? Do you want to identify the user first by asking for a password or ID number? What about a log-on message?
8. To make your design clearer, try breaking your design up into logical sections. As a guideline, if a function contains more than ten steps, you may want to break it down further. Keeping each frame small will make your program easier to implement and maintain.

- For example, an application with collect and store functions would be broken up into a collection function and a storage function.
- For example, a storage function may contain steps to verify the data meets certain criteria, store the data in a file and track the amount of data stored. This may, depending on the complexity of each step, be broken up into functions which perform each step.

Node Types and the Parent-Child Relationship

Build your application in a modular fashion, taking advantage of the Parent-Child relationship. There can be multiple levels in each program flow chart. Any type of Operation node can exist at any level. The top level is the parent and lower levels are children.

Table 1. Function and Operation Nodes

Function Nodes	Operation Nodes
Frames starting on page 5-50 Subroutines starting on page 5-51	Menu Nodes starting on page 5-55
	Display Nodes starting on page 5-56
	Input Nodes starting on page 5-57
	Output Nodes starting on page 5-60
	Verify Nodes starting on page 5-63
	Copy Nodes starting on page 5-66
	Modify Nodes starting on page 5-67
	Math Nodes starting on page 5-69
	Call Nodes starting on page 5-72

Applications constructed with PPG contain two general types of nodes, **Function Nodes**, which include **Frames** and **Subroutines**, and **Operation Nodes**. Each **Frame** in a program flow chart represents a major function or option. Connect **Frames** together in a logical way that indicates program flow.

While it is possible to create an entire application at the main frame level, this is not the best approach for any but the smallest applications.

Operation Nodes are described briefly in Creating Operation Nodes on page 18, and more completely in Creating & Using Nodes on page 49.

Creating Function Nodes

Once you've designed the basic program structure, the next step in generating a portable program is to define each **Function Node. Function Nodes** are frames or subroutines and are used to organize the steps and work of **Operation Nodes**. Most developers start by creating **Function Nodes**.

Frames

Frames contain a set of program steps that are collected and ordered in a logical structure. **Frames** can consist of other frames, subroutines, and nodes. Nodes are Linked together within the frame using Links.

Subroutines

Subroutines contain nodes that execute program steps, much like **Frames**, but they can be called from anywhere in the application. They should be self-contained and perform functions that are used in multiple places in the application. Use **Call** nodes to link **Subroutines** to the location within the **Operation Node** or **Frame** where they will be called.

Using Your Flow Chart

Using the flow chart you created in Application Structure on page 16, list the **Frames** and **Subroutines** you will define. As a general guideline, if the function is used in multiple places, make it a **Subroutine**. Otherwise, it should be a **Frame**. Once all **Function Nodes** are created, define each step by creating the **Operation Nodes**.

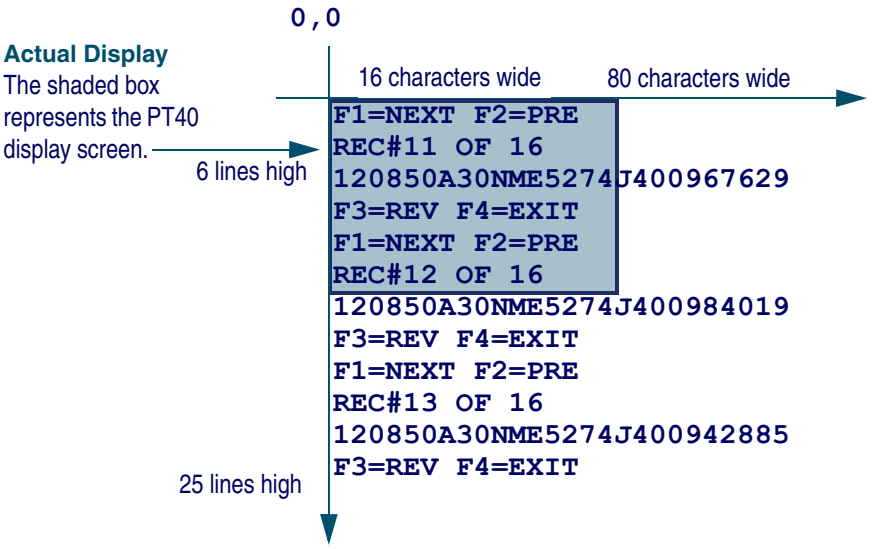
Creating Operation Nodes

Each **Operation Node** represents a program step or work performed by the application. After you have created the frames and subroutines, fill in the program steps for each function node. Using the flow chart, create an appropriate **Operation Node** for each step in the **Frame** or **Subroutine**. There are nine different types of **Operation Nodes** to chose from, as shown in Table 1 on page 17.

Actual vs. Virtual Display

The Falcon PT40's actual display screen is a window to a larger display area called the virtual display (refer to Figure 4). Most applications you will use will fit into the actual display. However, applications can sometimes contain data longer than the default 6 line by16 character view of the actual display.

Figure 4. Virtual vs. Actual Display Using Default System Font



Adding or changing character sizes changes the appearance of the actual display. The number of lines and characters will vary with the character sizes.

The actual display screen shows only a portion of the available data in the virtual display. Use the arrow keys to navigate the actual display screen to view the virtual display data. The text in the virtual display remains in place and the actual display screen changes its view within the virtual display.

If you scan longer bar codes or enter more data than can fit in a single line of the virtual display, the data automatically wraps to the next line. Because applications for the PT40 can contain and use different fonts, the amount of data that is available within the virtual display will vary.

The virtual display maintains the latest lines of data once all lines of the virtual display are full. The oldest lines of data are "pushed off the top" as new data is added at the bottom.

Defining Program Flow

After you create all the nodes, connect the program pieces together using **Link Nodes** to define the flow of the program.

Links are shown on the PPG display with arrows which point from one step to the next. Some nodes will have multiple entry and exit points. For example, a **Copy** node can have either one or two exit points. You may choose to have your application go to a **Display** node if an error occurs or, if the copy operation is successful, to continue on to a **Menu** node.

For information on the mechanics of creating, modifying and deleting Links, refer to Links on page 73.

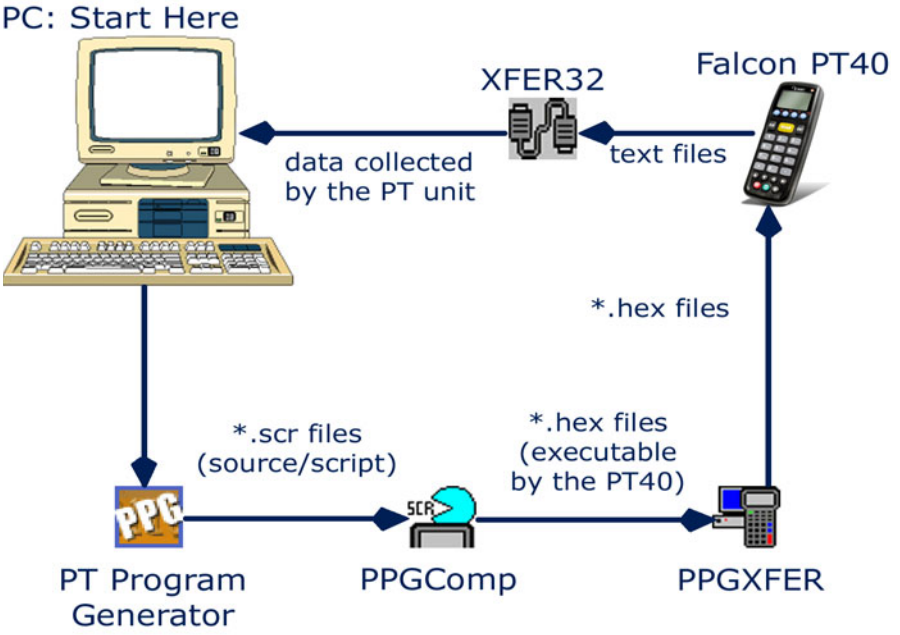
Refer to Data on page 43 for a brief overview of data types and Links to each type's description. For more detailed information on managing program data or to specify a **Data File**, **Field**, **Template**, or **Register**, refer to Managing Data on page 77.

Sending and Receiving Files

The final step in using PPG is to transfer the applications you have created to the Falcon PT40. Refer to PT40 Communication on page 89 for more information on sending and receiving files.

Figure 5 on page 21 is a flow chart showing the application generation, data flow, file transfer process used when you create custom files with PPG and download them to your PSC Falcon PT40 from a PC.

Figure 5. Application Generation, Data Flow & Transfer Process



Additional Resources

Before or after you complete the application design, to understand better how to work with PPG to design and to create custom applications for your PSC Falcon PT40, complete the PPG Tutorial on page 99.

Refer to Sample Program Files on page 10 for information on the four (4) sample files included with the PPG software. You can open these files to see how they are constructed, and use them as building blocks in constructing your own application.

Refer to Example Frames on page 135 for information on the example frames included with PPG. Refer to The PPG Library on page 159 for information on sample PPG program source files which you can download from PSC's website that include examples of file manipulation, templates, and nodes.

You can download additional library files at no charge from the Technical Support area of PSC's website at www.pscnet.com. Refer to The PPG Library on page 159 for more information on these files.

NOTES

Chapter 4
The PPG Menubar

Overview

This section discusses the PPG menubar, located at the top left of the user interface. The following menu items are reviewed:

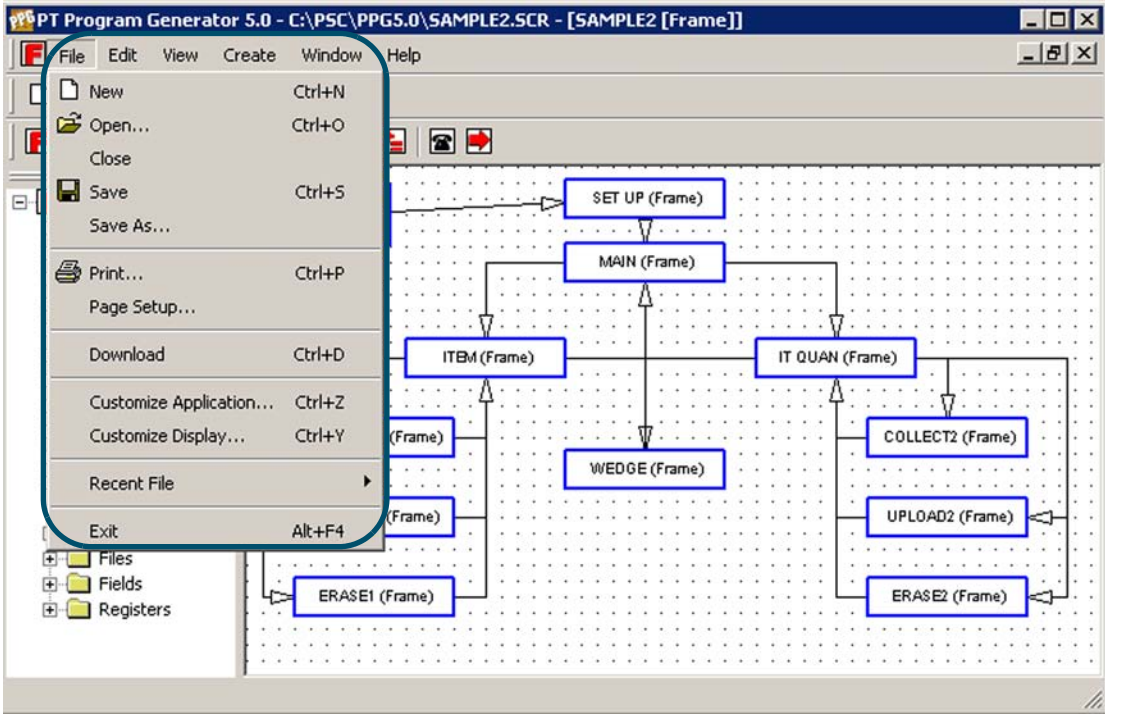
Refer to Menus and Toolbars on page 11 for a brief overview of the PPG menubar.

File Menu

The following sub-topics are covered in this section:

To access **File** menu items, click on **File >** and then the menu item you want to use from the menubar as shown in Figure 6. Or use the appropriate keyboard short cut, indicated on the same line as the menu item. Many standard Windows keyboard shortcuts can be used. For example, to print, press **Ctrl + P** simultaneously; to save, press **Ctrl + S** simultaneously.

Figure 6. File Menu



Like most software programs, PPG stores data in files. To save a program flow chart, you store it as a file. Once you have saved the file, you can open it and modify it. Use the **File** menu to create a new file, open an existing file, save a file, save a file with a new name, close a file, and print a file.

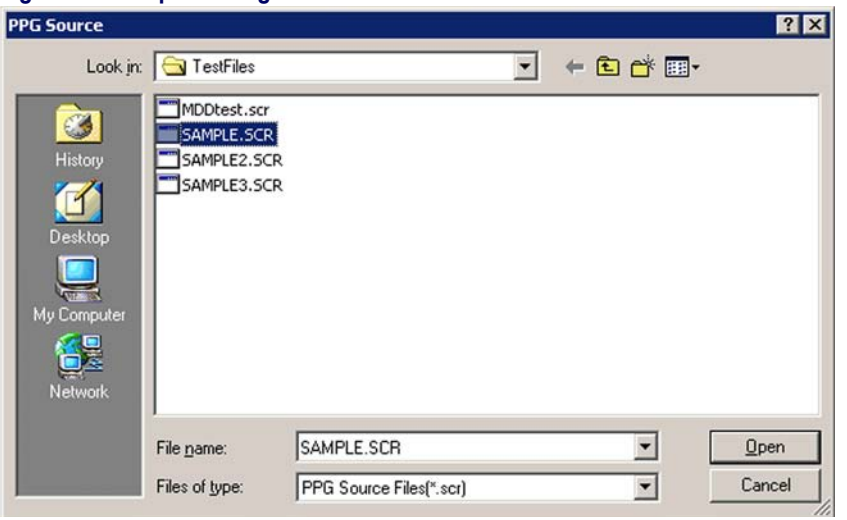
Creating a New File (Ctrl+N)

To create a new flow chart, select **File > New** from the menubar. If no application is currently open, an empty flow chart is loaded into the PPG window. If an application is already open, a second copy of PPG will start and open the empty application.

Opening an Existing File (Ctrl+O)

To open an existing program source file, select **Open** from the **File** menu, or use the keyboard shortcut: **Ctrl+O**.This action opens the **Open** dialog, as shown in Figure 7.

Figure 7. The Open Dialog



By default, the **File** list shows all program source (**`.scr`**) files in the **`PPG`** directory. If the file you want is located elsewhere, choose the drive and directory from those lists, or type them in the input box. Select the file you want to open from the **File** list or type its name in the input box, and select **OK**. If no application is currently open, the specified file is loaded into the PPG window. If an application is already open, a second copy of PPG will start and open the file you selected.

Closing a File

To close a file and leave PPG open, select **File > Close** from the menubar. If you have made changes to the file, PPG will ask you if you want to save your changes. Press **OK** to save the changes and close the file.

Saving a File (Ctrl+S)

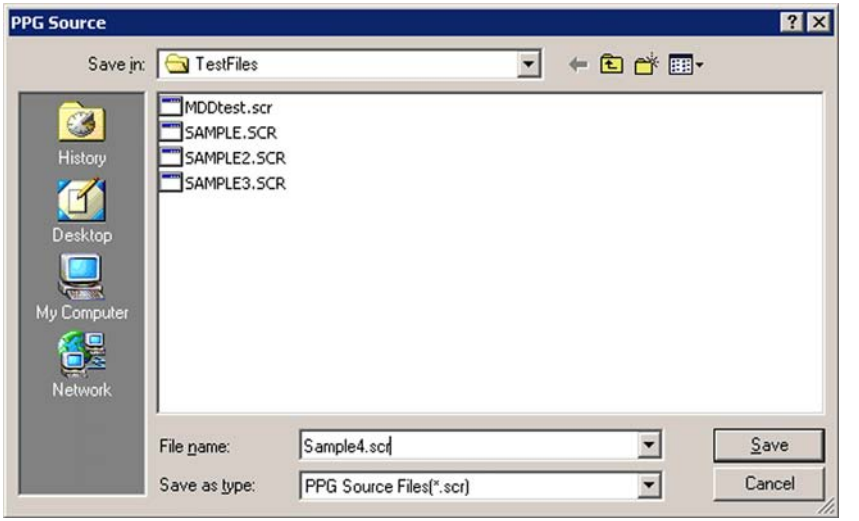
After you saved a flow chart in a file, use **File > Save** to save changes to it without being prompted for a file name. If a file has not already been saved, you are prompted to name the file. Select **OK** to save the program flow chart in the specified file.

If a file of that name already exists in the specified directory, a dialog box appears, asking if you want to replace the existing file. Select **Yes** to replace the file or **No** to return to the **Save As** dialog box, where you can give the file another name or place it in another location.

Save As

To save a newly created file for the first time (or to save an existing file with a different filename or location), select **File> Save As** from the menubar. This opens the **Save As** dialog box, shown in Figure 8.

Figure 8. The Save As Dialog



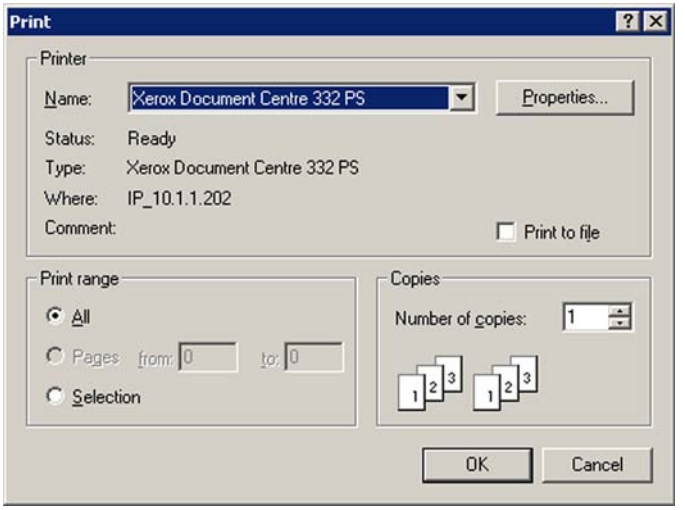
Type a name for the new file in the **File Name** field. The pull-down list displays the names of all existing source-program files in the **PPG** directory. Unless you want to overwrite the contents of an existing file, use a unique name. PPG automatically provides the program file with a **`*.scr`** extension.

By default, the file is saved in the directory in which you installed PPG, and this is where PPG will look to open a file. To store the file somewhere else, select or enter the drive and directory before the file name in the **File Name** field.

Printing a File (Ctrl+P)

To print the current view of a program flow chart, select **File > Print** from the menubar. Refer to the **Print** dialog, shown in Figure 9.)

Figure 9. The Print Dialog

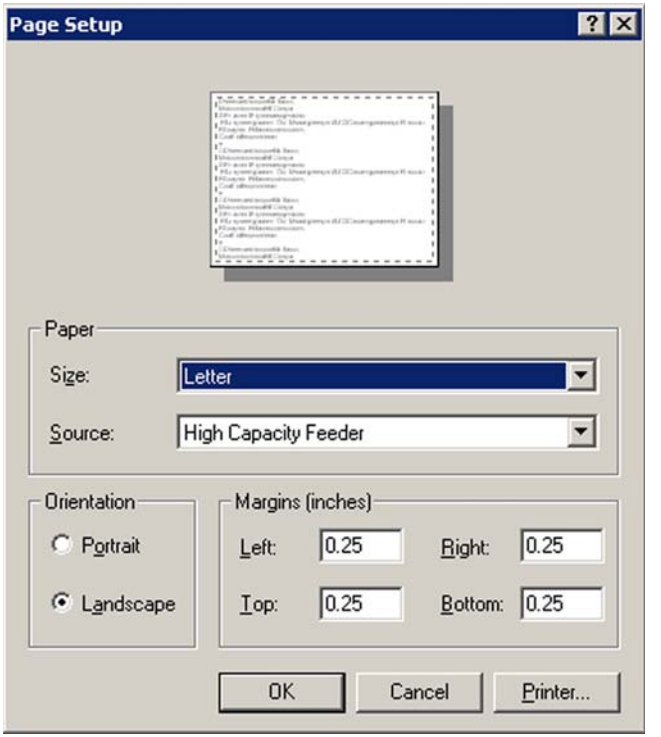


Press **OK** to send the displayed frame to the printer. Only one view of a flow chart can be printed at a time.

Page Setup

Select **File > Page Setup** to change the printing options. (Refer to Figure 10 on page 28.)

Figure 10. The Page Setup Dialog



Press **OK** when you are finished modifying the **Page Setup** options.

Download (Ctrl+D)

Use this feature after you have finished creating your flow chart. Select **File > Download** from the menubar to compile the program and download it onto the portable. The **PPG Compiler** window opens, downloads the file and then closes, automatically.

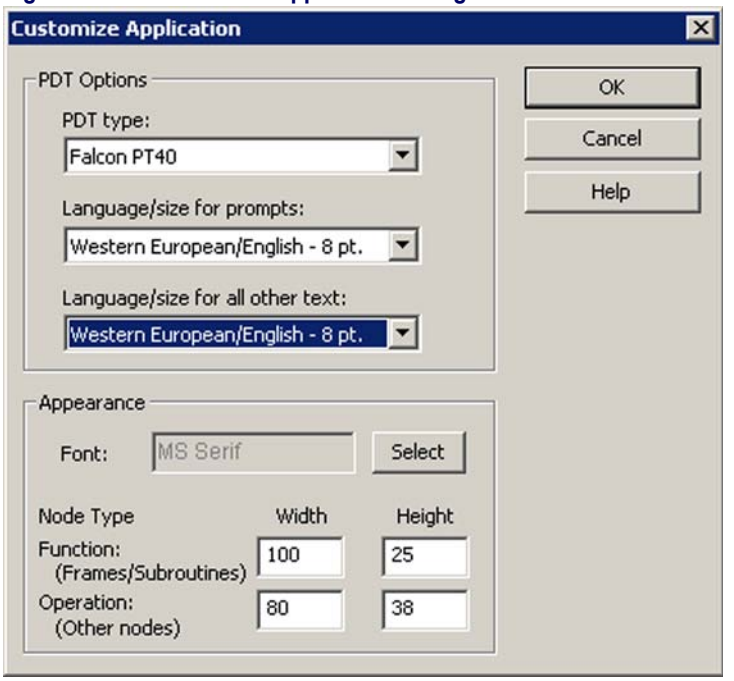
Refer to PT40 Communication on page 89 for complete instructions on downloading and transferring files to and from your PC and the PDT.

Customize Application (Ctrl+Z)

Each application is designed to run in a specific environment. To change the application settings and open the **Customize Application** dialog box:

1. Select **File > Customize Application** from the menubar.

Figure 11. The Customize Application Dialog



2. Change the desired settings as explained below:

PDT Options Click on the arrow to access the fields' pull-down lists.

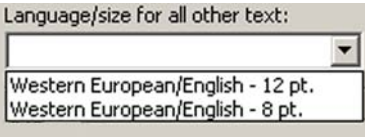
Default PDT type

Determines the PSC portable defaults. Select from one of two PSC portable types.

Default Language

Determines the language and font size in which prompts appear on the PDT.

Default Font Size



Determines the language and font size in which all other text appears on the PDT.

Appearance You can change the appearance of nodes with these fields.

Font Press the **Font Select** button to open the **Font** dialog box shown in Figure 12 to change the font and size displayed in the flow chart.

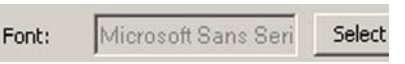
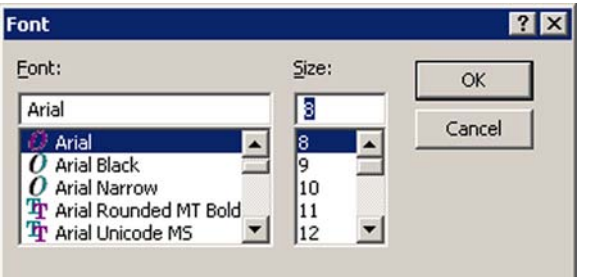
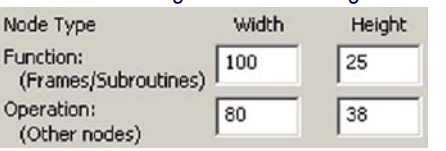


Figure 12. Font Dialog Box



Your font changes affect all text in the flow chart, not just the selected node or frame. All objects in the current flow chart are affected immediately. Corresponding settings for previously-created applications will not be changed.

Node Type Default width / height for nodes and grids are displayed in pixels



	Width	Height
Function	100	25
Operation	80	38

Width and **Height** indicate the number of pixels between points.

If some of the text in flow chart nodes is being cut off, you can either increase the node size or decrease the font size.

3. Select **OK** to save your settings. This opens the dialog shown in Figure 13 on page 31.

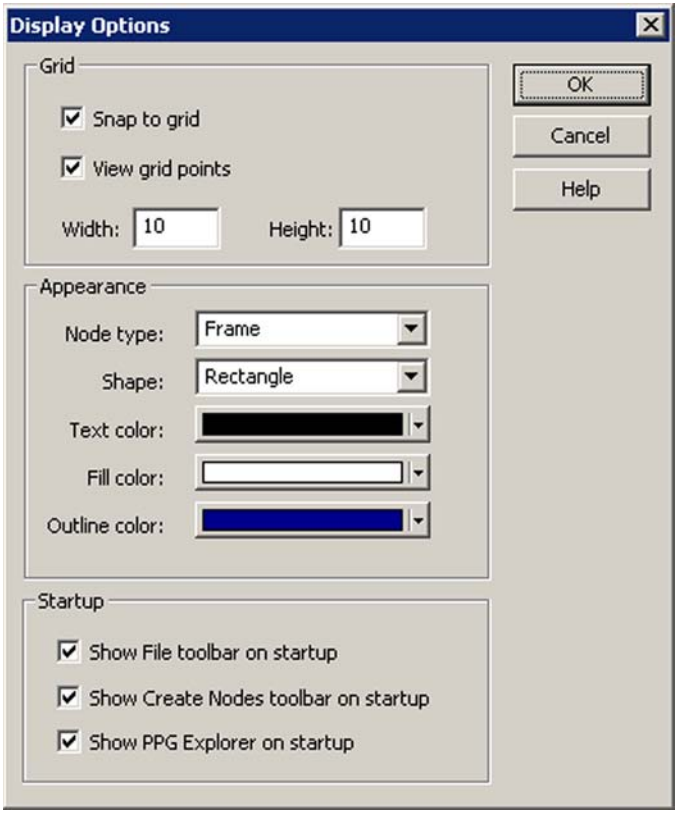
Figure 13. Customize Options dialog

4. Select **OK** to apply the setting changes to all new applications.
   - Press **No** to apply your changes only to the current application.
   - Press **Cancel** to cancel your changes.

Customize Display (Ctrl+Y)

File > Customize Display from the menubar to open the **Display Options** dialog box, as shown in Figure 14 on page 31.

Figure 14. The Display Options Window



Grid

Each flow chart has a grid background, which is useful in organizing the nodes. You can customize the grid to meet your needs.

Snap to grid

Enable **Snap to grid** to organize the flow chart so that nodes automatically snap to the nearest grid point when they are moved. If this feature is not enabled, nodes are free-floating.

View grid points

Enable this option to display grid points on the flow chart window.

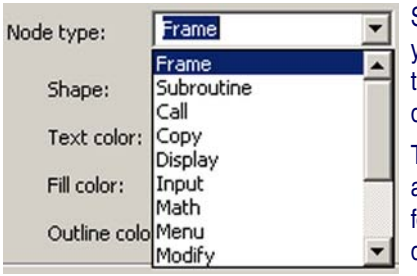
Dimensions

Default width/height = 10 pixels between points.

Appearance

You can change the shape and color for each type of node in the flow chart.

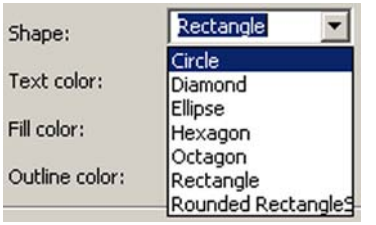
Node type



Select the node type you wish to modify from the **Node type** pull-down list.

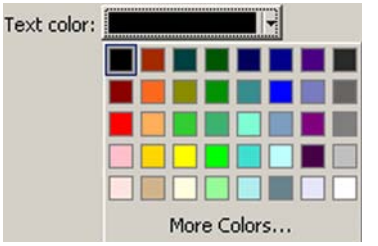
The shape, text style and colors currently set for that node type are displayed.

Shape



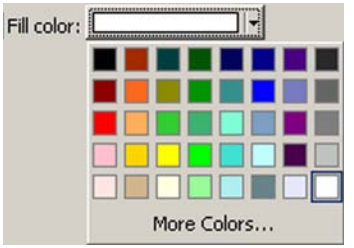
Select a shape for the node from the pull-down list.

Text color



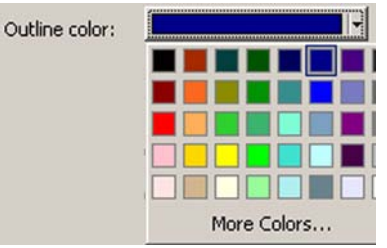
Select a text color for the node from the pull-down list. Default = **`Black`**.

Fill color



Select a fill color for the node from the pull-down list. Default = **White**.

Outline color

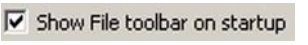


Select a outline color for the node from the pull-down list. Default = **Navy**.

More Colors... Click on **More Colors...** to open a standard Windows dialog box for creating custom colors.

Startup Select the checkbox to enable this feature when PPG opens.

Show PPG Toolbar Enable to display the **File toobar**.



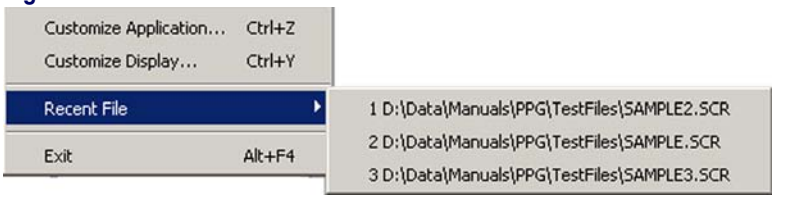
Show Program Nodes toolbar Enable to display **Program Nodes toobar** when PPG opens.

Show PPG Explorer Enable to display the **PPG Explorer** window when PPG opens.

Recent Files

Select **File > Recent Files** from the menubar to show a list of recently opened PPG files.

Figure 15. Recent Files Menu



You can select a file to open from this list.

Exit (Alt+F4)

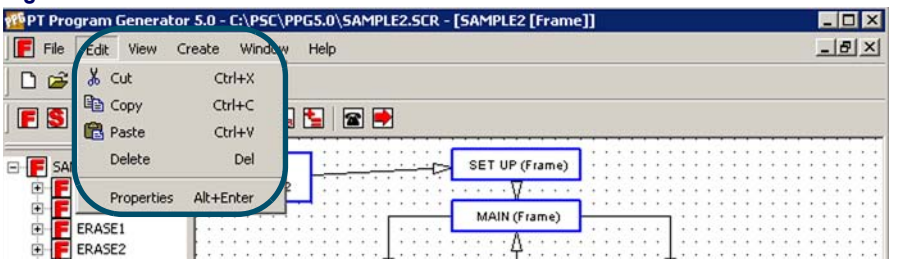
Select **File > Exit** from the menubar to exit PPG. If you have made changes since the last time you saved the file, PPG will prompt you to save the file.

Edit Menu

The following topics are covered in this section:

To access **Edit** menu items, select **Edit >** and then the specific menu item you want to use from the menubar, as shown in Figure 16 on page 34.

Figure 16.The Edit Menu



Selecting Objects

Select multiple objects using standard Windows selection methods:

- Select one object. Hold down the shift button, point and select another object with your right mouse button. Add as many objects as you wish, holding down the shift button while selecting the object with the mouse.
- You can also select a group of objects by pointing to a spot on the frame window which is above and to the left of the items to be selected. Hold down the left mouse button and drag the pointer to a point below and to the right of the objects to be selected. When the

box is the desired size and shape, release the mouse button. All objects within the box are selected.

You may then cut or copy all the selected objects and place them somewhere else, or drag all the selected objects with the mouse to a new location.

Moving Objects

To move an object from one frame or program to another, select it and choose **Edit > Cut**. To copy an object, select **Edit > Copy**. Then go to where you want the cut or copied object inserted and choose **Edit > Paste**. The object is pasted in the top left corner of the window; drag it with the mouse to reposition it.

You can use the **Cut**, **Copy**, and **Paste** commands to move and copy parts of a flow chart from one frame to another or from one program to another. These commands operate on frames and nodes just like they do on text or graphics in other Windows applications.

Moving Links

To move a node while retaining the position of anchored, jointed links, press and hold the **Shift** and **Ctrl** keys while grasping the node with the mouse and moving it to the new location.

Fields and templates cannot be moved or copied between programs.

Copied nodes lose their template and field references if the application in which they are placed does not have the same data elements.

Cut (Ctrl+X)

Select **Edit > Cut** from the menubar to cut the selected item. Or you can use the standard Windows keyboard shortcut and press **Ctrl+X**.

Copy (Ctrl+C)

Select **Edit > Copy** from the menubar to copy the selected item. You can also use the standard Windows keyboard shortcut and press **Ctrl+C**.

Paste (Ctrl + V)

Select **Edit > Paste** from the menubar to paste the copied item.Or you can use the standard Windows keyboard shortcut and press **Ctrl+V**.

Delete (Del)

To delete a node or frame, select it and choose **Edit > Delete** from the menubar or press the **Delete** key. The object is removed along with any associated Links.

CAUTION

PPG has no Undo command to reverse actions you make accidentally.

For that reason, it's a good idea to use the Cut command instead of the Delete command to remove nodes and frames. That way, if you delete something by mistake, you can use the Paste command to retain the information.

Properties

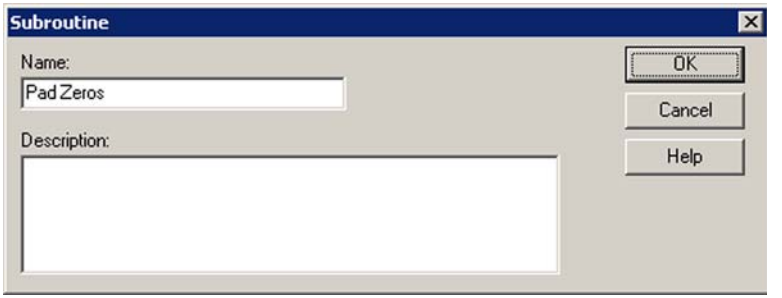
Select **Edit > Properties** from the menubar to view the **Properties** dialog for both **Function** and **Operation Node**s.

Function Nodes

For **Function Nodes** (**Frames** and **Subroutines**) you can also point to the node and click the right mouse button to activate a popup menu; select **Properties**.

The **Function Node's Properties** dialog opens, showing the assigned name and description.

Figure 17. Subroutine Properties Dialog Box



Name	PPG automatically names the item with its type. You can rename or change the name of the item.
Description	This field is optional, but you may wish to complete it to provide yourself additional information when using similarly named items.

- To keep modifications, press **OK;** a new name shows on the node.
- Press **Cancel** to close the dialog without keeping your modifications.

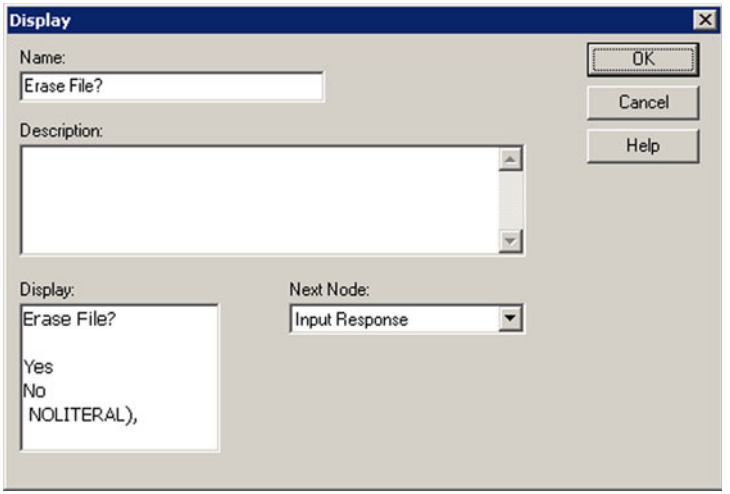
Operation Nodes

For **Operation Node**s you can also access the **Properties** dialog using the following methods:

- Point to the node and double click with the left mouse button.
- Point to the node and click the right mouse button to activate a popup menu; select **Properties**.

The **Operation Node's Properties** dialog box opens, showing the assigned name and other node information. Figure 18 illustrates one type of properties dialog box. Refer to Creating & Using Nodes starting on page 49 to view the properties dialog for each node type.

Figure 18. Display Node Properties Dialog Box



Name	PPG automatically names the item with its type. You can rename or change the name of the item.
Description	This field is optional, but you may wish to complete it to provide yourself additional information when using similarly named items.
Display	This displays what will appear in the portable's display window.
Next Node	Select the next node in the application's sequence of events.

- To approve the changes, press **OK** to view the new name on the node.
- Press **Cancel** to close the dialog without keeping your modifications.

View Menu

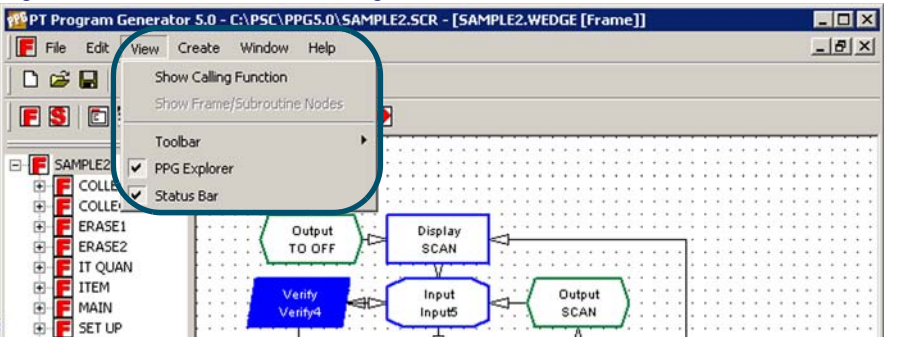
To access **View** menu items, select **View >** and then the specific menu item below you want to use from the menubar:

- Show Calling Function on page 38.
- Show Frame/Subroutine Nodes on page 38.
- Toolbar on page 39.
- PPG Explorer on page 40.
- Status Bar on page 40.

Show Calling Function

Select **View > Show Calling Function** to show the parent frame of an open child frame. Refer to Node Types and the Parent-Child Relationship on page 17 for more information on the Parent-Child relationship.

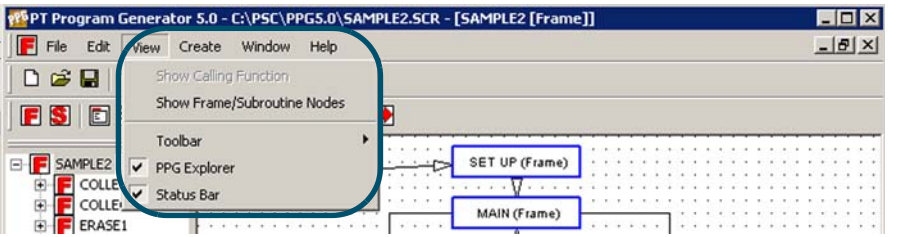
Figure 19. View Menu > Show Calling Function



Show Frame/Subroutine Nodes

Select **View > Show Frame/Subroutine Nodes** from the menubar. You can select this menu item only after clicking on a **Frame** or **Subroutine** node.

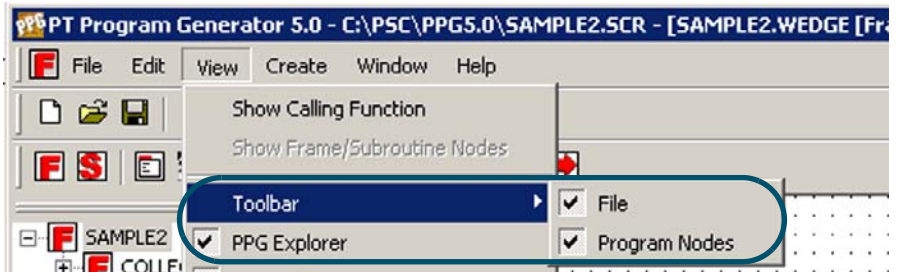
Figure 20. View Menu > Show Frames/Subroutine Nodes



Toolbar

The PPG Toolbars can be turned on and off by toggling the appropriate menu items. Use these features to customize the way your copy of PPG looks and behaves. Select **View > Toolbar** from the menubar.

Figure 21. View Toolbars menu



PPG

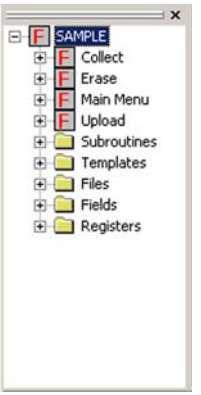
Select **View > Toolbar > PPG**. Selecting this menu item toggles the **PPG Toolbar** on and off.

Program Nodes

Select **View > Toolbar > Program Nodes**. Selecting this menu item toggles the **PPG Program Nodes Toolbar** on and off. Refer to Program Nodes Toolbar on page 12 for a table showing what each node button does and where to get more information on each node type.

PPG Explorer

Select **View > PPG Explorer to** toggle the PPG **Explorer** on or off. You can also click on the small **X** at the top right of the **Explorer** window to close it.



The **Explorer** window is dockable, which means you can reposition it to other locations. To move it, click on the double bar at the top of the **Explorer**. Hold the left mouse button down and drag the window to the desired location.

Status Bar

Select **View > Status bar** to toggle the bottom status bar on or off.

When you print to a menu or toolbar command, the status bar displays a text description of the command. Toggling the status bar off makes the application display window slightly larger.

Create Menu

From the menubar, select **Create >** and then the type of node or data you wish to create:

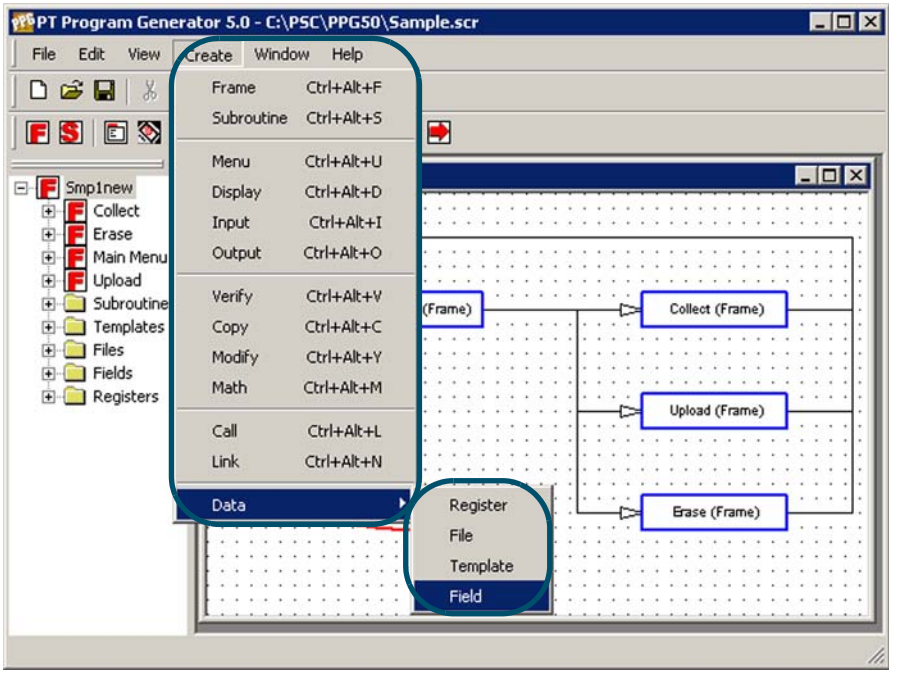
- Function Nodes on page 42.
  - Frame (Ctrl+Alt+F) on page 42.
  - Subroutine (Ctrl+Alt+S) on page 42.
- Operation Nodes on page 42.
  - Menu (Ctrl+Alt+U) on page 42.
  - Display (Ctrl+Alt+D) on page 42.

- Input (Ctrl+Alt+I) on page 42.
- Output (Ctrl+Alt+O) on page 42.
- Verify (Ctrl+Alt+F) on page 42.
- Copy (Ctrl+Alt+C) on page 42.
- Modify (Ctrl+Alt+Y) on page 43.
- Math (Ctrl+Alt+M) on page 43.
- Call (Ctrl+Alt+L) on page 43.
- Link (Ctrl+Alt+N) on page 43.

- Data on page 43.
  - Register on page 43.
  - File on page 43.
  - Template on page 43.
  - Field on page 43.

Refer to Creating & Using Nodes on page 49 for a a complete review of creating and using nodes.

Figure 22. Create Menu



Function Nodes

Frame (Ctrl+Alt+F)

For a thorough discussion of **Frames**, refer to Frames on page 50.

Subroutine (Ctrl+Alt+S)

For complete information on **Subroutines**, refer to Subroutines on page 51.

Operation Nodes

Menu (Ctrl+Alt+U)

Menu nodes present a group of options on the portable's screen. They allow the user to select an option by pressing a function key. For complete information on **Menus**, refer to Menu Nodes on page 55.

Display (Ctrl+Alt+D)

Display nodes display text on the portable's screen. Refer to Display Nodes on page 56

Input (Ctrl+Alt+I)

Input nodes specify how the portable will receive data. You can indicate how the input is accepted and where it is stored. Refer to Input Nodes on page 57.

Output (Ctrl+Alt+O)

Output nodes send data to either the display, serial port or the portable's system software. Output to the system software allows you to send special commands to reposition the cursor, sound a beep or reconfigure the portable. Refer to Output Nodes on page 60

Verify (Ctrl+Alt+F)

Verify nodes test data in a register or file to see if it matches the expected type or value. Refer to Verify Nodes on page 63

Copy (Ctrl+Alt+C)

Copy nodes move data between registers and files. Refer to Copy Nodes on page 66.

Modify (Ctrl+Alt+Y)

Modify nodes change the contents of a given register or file. Refer to Modify Nodes on page 67.

Math (Ctrl+Alt+M)

Math nodes perform basic mathematical functions on the contents of a register or file. Refer to Math Nodes on page 69.

Call (Ctrl+Alt+L)

Call nodes branch to a subroutine. Upon completion, the subroutine returns to the calling node. Refer to Call Nodes on page 72.

Link (Ctrl+Alt+N)

Links connect other nodes (except Subroutines.) For complete information on **Links**, refer to Links on page 73.

Data

The portable has its own data storage methods. Refer to Managing Data on page 77 for information on **Data Files**, **Fields**, **Templates**, and **Registers**.

Register

Registers store data temporarily. For complete information on **Registers**, refer to Registers on page 78.

File

Files hold data in the portable until it can be uploaded to a PC. For complete information on **Files**, refer to Files on page 81.

Template

Use templates to combine data stored in different registers or break down data in a single register into **fields**. For complete information on **Templates**, refer to Templates on page 84.,

Field

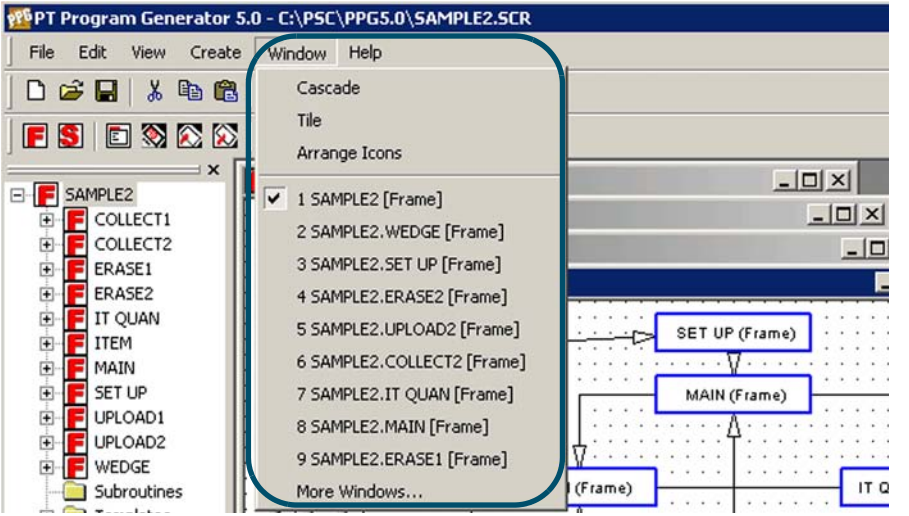
Fields allow you to store multiple pieces of data in a single register. For complete information on **Fields**, refer to Fields on page 87.

Window Menu

To access **Window** menu items, select **Window >** and the desired menu item:

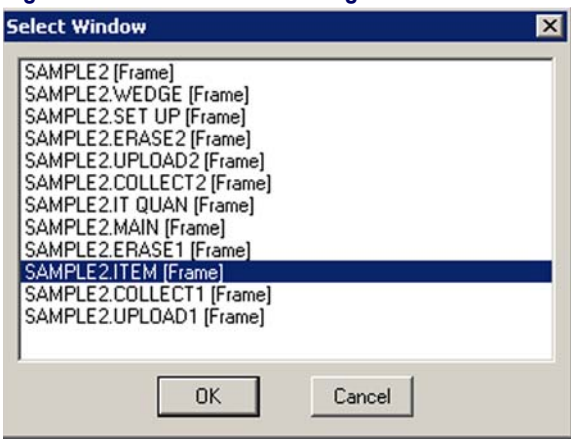
- Cascade Windows on page 45.
- Tile Windows on page 45.
- Filename [Frame] on page 46.

Figure 23. Window Menu



Select **More Windows...** at the bottom of the **Window** menu to view a list of open frames if you have more than nine (9) frames open.

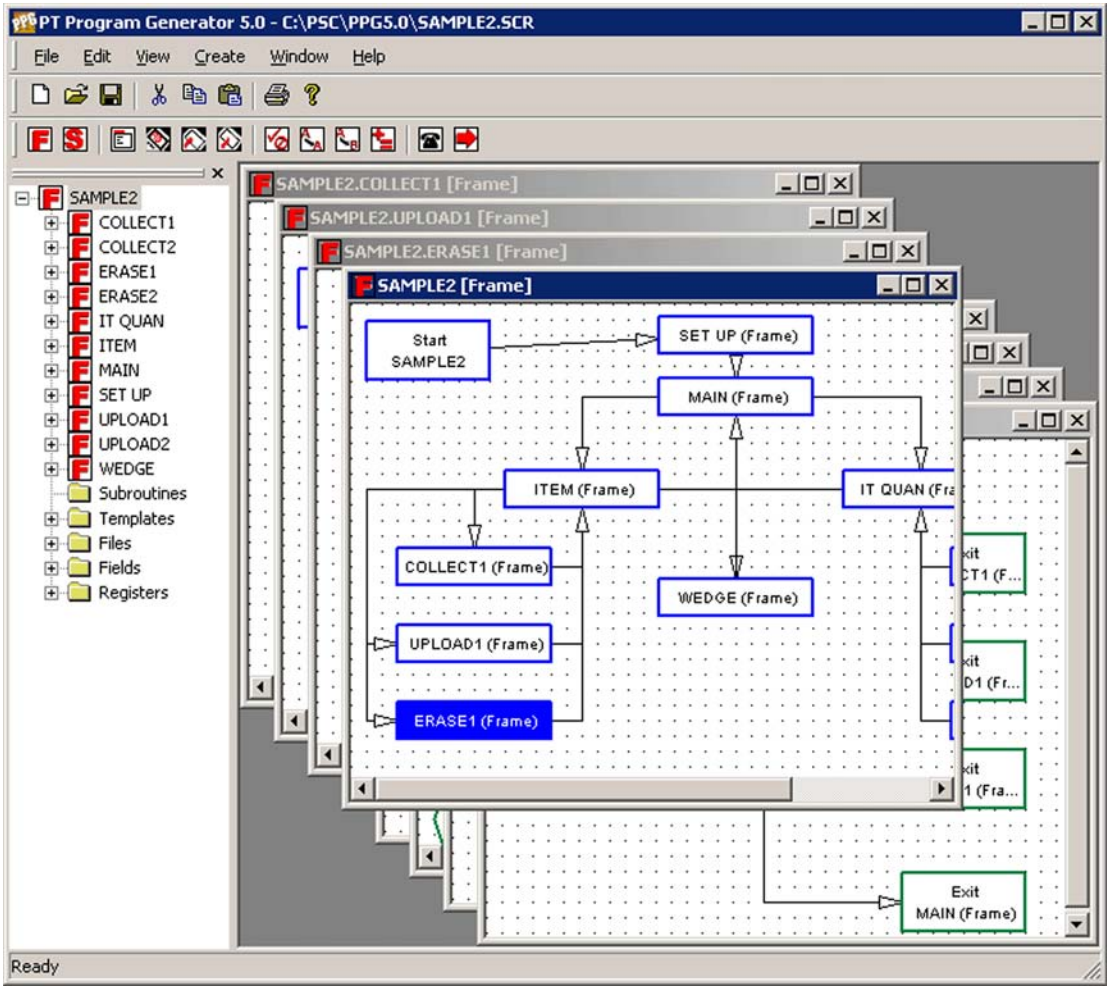
Figure 24. More Windows... Dialog



Cascade Windows

Select **Windows > Cascade** from the menubar to arrange open windows as overlapping tiles. Refer to Figure 25 on page 45, to view cascading windows.

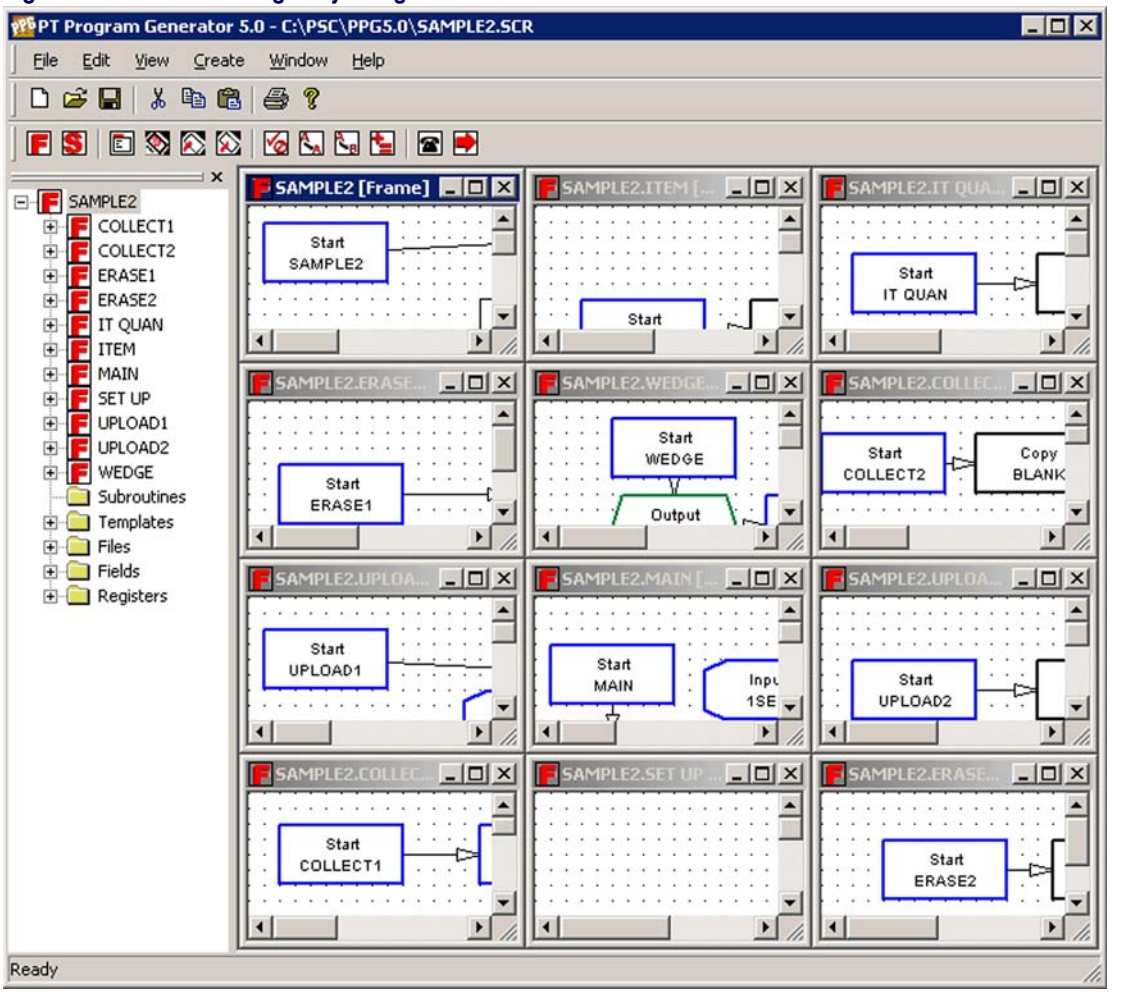
Figure 25. Windows Arranged by Cascading



Tile Windows

Select **Windows > Tile** from the menubar to arrange open windows as non-overlapping tiles. Refer to Figure 26 on page 46, to view tiled windows.

Figure 26. Windows Arranged by Tiling



Filename [Frame]

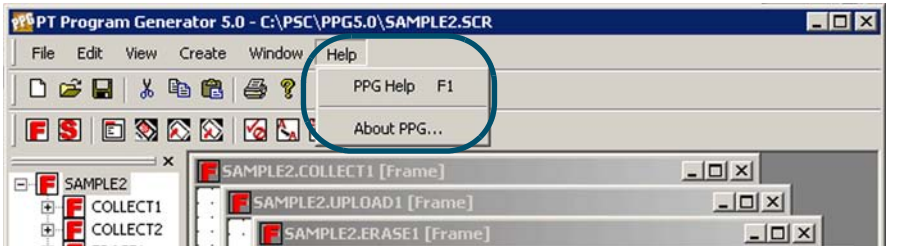
Select **Windows > Filename [Frame]** from the menubar to bring a window hidden behind other windows to the top or to expand a minimized **Frame**.

Help Menu

To access **Help** menu items, select **Help >** and then the specific menu item you want to use from the menubar:

- PPG Help (F1).
- About PPG....

Figure 27. Help Menu



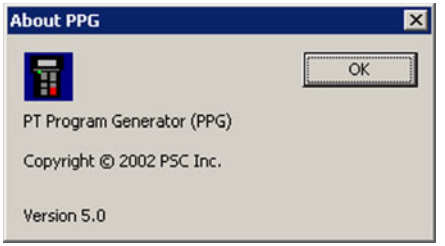
PPG Help (F1)

Select **Help > PPG Help** to access the main **Help** menu. You can also press **<F1>** or the **Help** button on many Dialogs for context sensitive **PPG Help** anywhere within the PPG application.

About PPG...

The **About** dialog shows information about the PPG application including copyright and version information.

Figure 28. About PPG...



NOTES

Chapter 5
Creating & Using Nodes

Overview

This section contains the following topics:

Flow Chart Levels

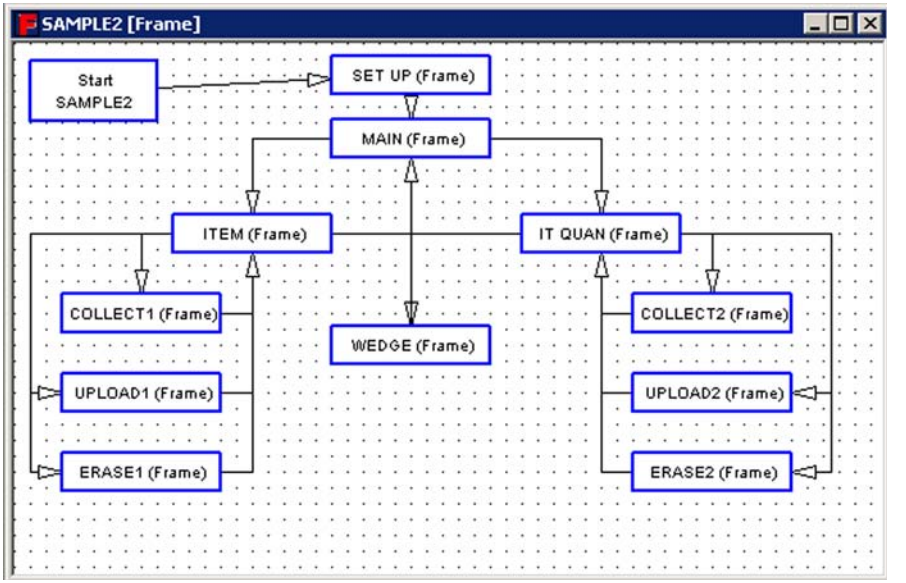
After creating an empty application with the **File New** command, start in the main frame level. Nodes at this level should include frames and subroutines defining major steps in the application. Take advantage of the parent-child relationship to organize the application in a logical and maintainable fashion.

To access the steps within a frame or subroutine, double-click on the frame with the left mouse button or select **View > Show Frame/Subroutine Nodes** from the menubar. To return to the higher level, double-click on one of the **Exit** or **Entry** nodes or choose **View > Show Calling Function** from the menubar.

Frames

Each frame in a program flow chart represents a major function or option. Typically, a program's frames include a **Main Menu** frame and a frame for each option on the menu. Links connect the frames in a way that indicates program flow. Figure 29 shows the start frame of the **`sample2.scr`** application installed with PPG.

Figure 29. The Frames Level of a Program



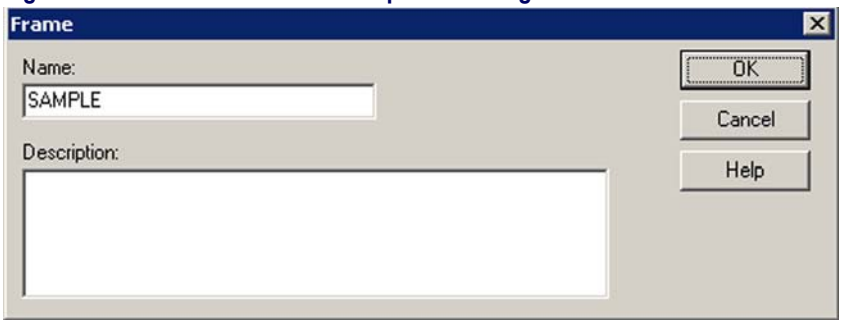
To create the frames of a program flow chart, complete the following steps:

1. Select **Create > Frame** from the menubar. A new frame appears in the lower right corner of the frame window. The new frame is assigned a default name.
2. To position the frame, point to it, hold down the left mouse button, and drag the frame with the mouse. When the frame is positioned where you want it, release the mouse button.

If you're creating several frames, you can create a single frame node as described above. Then select the frame by clicking on it with the left mouse button. Copy the frame by selecting Edit > Copy from the menu. Then select Edit > Paste as many times as necessary to create the number of copies you need.

3. To give the frame a more useful name, select **Edit > Properties** from the menu or select **Properties** from the pop-up menu (point and click the right mouse button). This opens the **Frame Properties** dialog box.

Figure 30. The Frame/Subroutine Properties Dialog Box



Name	PPG automatically names the item with its type. You can rename or change the name of the item.
Description	This field is optional, but you may wish to complete it to provide yourself additional information when using similarly named items.

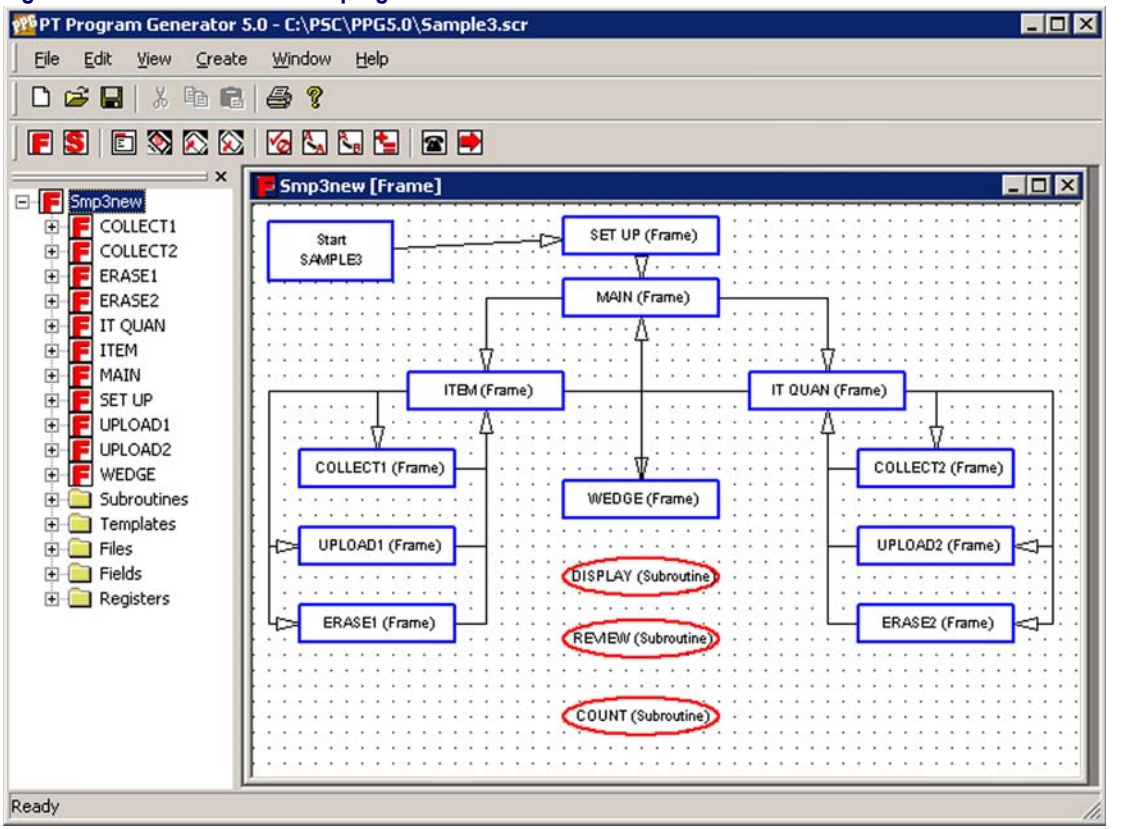
Subroutines

Subroutines, like frames, are nodes that contain program steps. Subroutines are useful when your program uses the same sequence of nodes in several frames. Rather than repeating the nodes for each frame, you can put them in a subroutine and then use a **Call** node to reference the subroutine (refer to Call Nodes on page 72).

Figure 31 on page 52 shows the Frames level of a program that contains three subroutines: one for counting the data collected in a file, one for verifying that data, and one for displaying the data. **Call** nodes within the program frames jump to the subroutines as needed.

Subroutine nodes can be placed anywhere in the application. However, to make subroutine management easier, most applications will locate subroutines either at the top-most frame level or in a separate frame that contains all application subroutines.

Figure 31. Subroutines in a PPG program



Creating subroutines is the same as creating frames. Complete the following steps:

1. Select **Create > Subroutine** from the menubar. A new subroutine opens in the lower right corner of the frame. The new subroutine is assigned a default name.

2. To position the subroutine, move the pointer to it, hold down the left mouse button, and drag the subroutine with the mouse. When the subroutine is positioned where you want it, release the mouse button. Since subroutines aren't Linked to other objects, their locations are optional. Normally, they are placed to one side of the frame.
3. To give the subroutine a more useful name, select **Edit > Properties** from the menubar or select **Properties** from the pop-up menu (point and click the right mouse button). This opens the **Subroutine Properties** dialog box (Figure 30 on page 51). Enter the new name in the name field, and select **OK**.

If you're creating several subroutines, you can create a single subroutines as described above. Then select the subroutine by clicking on it with the left mouse button. Copy the subroutine by selecting Edit > Copy from the menu. Then select Edit > Paste as many times as necessary to create the number of copies you need.

To reference a subroutine from within a frame, use a **Call** node (refer to Call Nodes on page 72). When the subroutine has been executed, control continues with the next node after the **Call** node.

Creating New Nodes

Each **Frame** and **Subroutine** of a program flow chart contains its own set of nodes, in a child (sub-level) flow chart. Every **Frame** is assigned at least one node automatically: a **Start** node, which shows the name of the Frame. If the **Frame** contains Links to other frames, an **Exit** node for each Link is also created automatically. A subroutine has a **Start** node and a **Return** node, which are created automatically by PPG. You add and Link your own nodes to define details for the Frame.

To get to the **Operation** level of a frame, double-click on it. You can also move to it with the mouse and then select **View > ShowFrame/Subroutine Nodes** from the menubar.

To create a node, complete the following steps:

1. Select the type of node you want to create from the **Create** menu. A new node will appear in the lower right corner of the frame window. The new node is assigned a default name.

2. To position the node, move the pointer to it, hold down the left mouse button, and drag the node with the mouse. When the node is positioned where you want it, release the mouse button.
3. To give the node a more useful name, double-click on it with the left mouse button, select **Edit > Properties** from the menubar.
   - Or select **Properties** from the menu which appears when you point to the node and click the right mouse button.
   - This opens the **Node Properties** (refer to Figure 33 on page 57).
   - Enter the new name in the name field, and press **OK**.
4. To set options and specify functions for the node, display the node's **Properties** dialog as described in Step 3, above. Set options and enter information as necessary, and then select **OK** to save your changes.

If you're creating several nodes of the same type, create a single node as described above. Then select the node by clicking on it with the left mouse button. Copy the node by selecting Edit > Copy from the menu. Then select Edit > Paste as many times as necessary to create sufficient copies.

Each node you create requires at least one Link to another node; some require two or more. Use the **Create Link** command to draw Links from one node to another (refer to Creating Links on page 73).

Each node is defined by a series of properties. To view or modify the properties of any node, double-click on the node with the left mouse button, select **Edit > Properties** from the menu or select **Properties** from the menu which appears when you point to the node and click the right mouse button. This opens the **Node Properties** dialog box (refer to Figure 32 on page 55).

All nodes contain the following fields:

Name	Edit as desired to call the Node by a meaningful name.
Description	Edit as desired to differentiate between similar nodes and node types.

Many **Node Properties** dialogs also contain the following:

Next Node	For each selected node, specify a frame or node to branch to.
Display	Enter text as you wish it to appear on the display of the PDT.

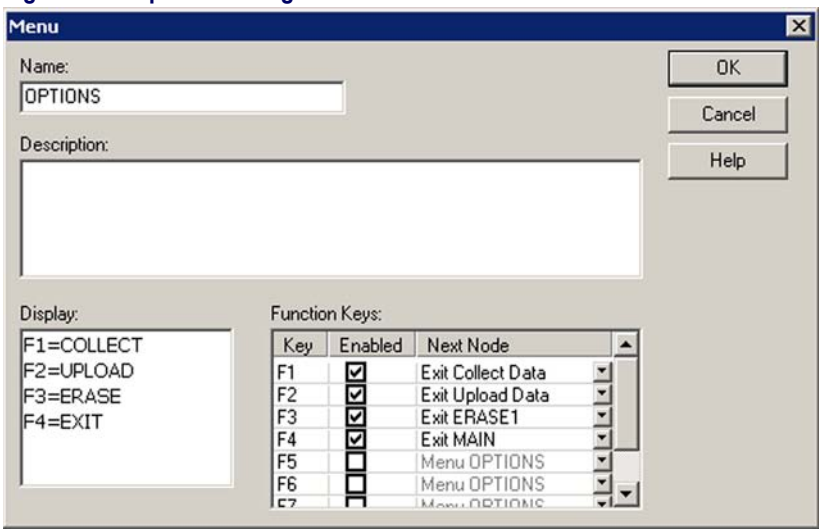
Each node type also contains properties unique to its type. For more details on each node type, all operation nodes are described in this section in the order that they appear on the PPG toolbar and the PPG menubar.

Menu Nodes

A **Menu** node presents a group of options on the portable's screen and allows the user to choose one of those options by pressing a function key. The portable's function keys can be used with or without the **shift** key, allowing for a total of eight selectable menu options.

Figure 32 on page 55 shows the **Properties** dialog for a **Menu** node.

Figure 32. Properties Dialog for a Menu node



Menu Text

The **Menu Display** window represents the portable's screen. The Falcon PT40 display can vary, depending upon the options you selected in Customize Application (Ctrl+Z) on page 28. Refer to Actual vs. Virtual Display on page 19 for more information.

- System font size 8: the display is 6 rows by 16 characters wide.
- System font size 12: the display is 4 rows by12 characters wide.
- Chinese characters: the display is 3 rows x 8 characters wide.

- Or you can get a combination of Chinese characters and one of the system fonts.

Enter menu text here, including titles or prompts you want to display. In general, each line of the screen is associated with one portable function key, although it is possible to have more than one function per line. Activate only the keys you want to use.

Function Key

The **<F1>** through **<F8>** checkboxes activate or deactivate the function keys associated with each line of the screen. If you want the function key to execute an option on the menu, select it here. Next to each checked box, there is a pull-down list of nodes from which you can select the name of the node that comes next when that function key is selected.

Any function keys not activated in the **Menu** node dialog box will have no effect when pressed.

To display information on the portable's screen use a Display node instead of a Menu node (refer to Display Nodes).
To execute only one action regardless of which function key is displayed, use a Display node in conjunction with an Input node (refer to Input Nodes on page 57).

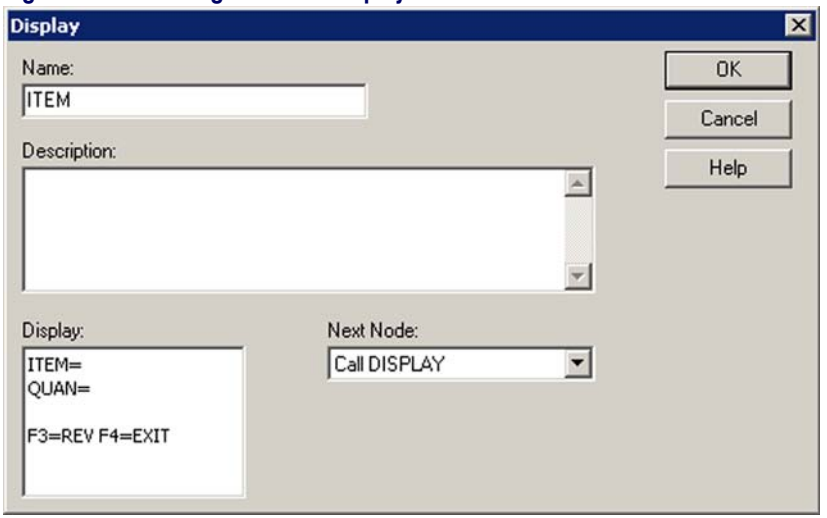
Display Nodes

Display nodes display text on the portable's screen. The dialog box for **Display** nodes (refer to Figure 33 on page 57) contains a text-entry area the exact size of the portable's screen. Use it to enter the display text.

Refer to Actual vs. Virtual Display on page 19 for more information

Display nodes are designed to display data. To present options that can be selected with the portable's function keys, use a Menu node (refer to Menu Nodes on page 55).

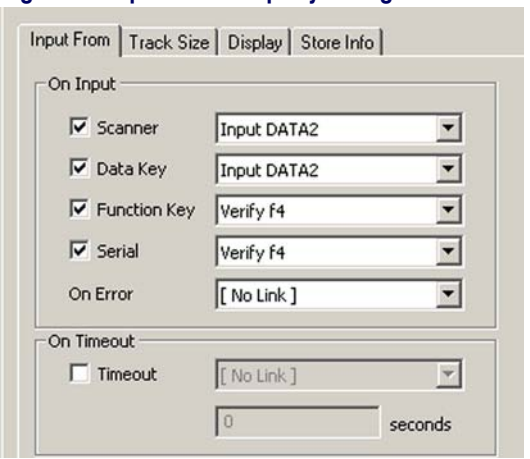
Figure 33. The Dialog Box for a Display node



Input Nodes

Input nodes specify how the portable will receive data. You can use the dialog box for an **Input** node to indicate which sources of input (scanner, data keys, etc.) you want to accept.

Figure 34. Input Node Property Dialog



Input From Tab (Next Nodes)

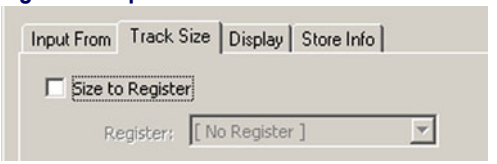
Scanner	Allows data input from the bar code scanner. The program proceeds without waiting for the user to press the **ENTER** key.
Data Key	Allows data input from the portable's data keys (all the keys except the four function keys, **<F1>** through **<F4>**). The program waits for the user to press the **ENTER** key.
<Fn> Key	Allows data input from any of the function keys. There are four function keys, **<F1>** through **<F4>** or you can press the **<Shift>** key once to put the unit into shifted mode. This results in function keys **<F5>** through **<F8>**. For example, press **shift** and then **<F3>** to enter **<F7>**. The program proceeds without waiting for the user to press the **ENTER** key.
Serial	Allows data, such as downloaded inventory, to be input using the serial interface or serial device.
On Error	For each selected node, specify a frame or node to branch to upon receiving an error.
TimeOut	Specifies the number of seconds the portable will wait for data to be input. If no response is encountered within that time, the program moves on to the node specified by the **Link To** setting.

For each selected input source, specify the frame or node to branch to. The pull-down list for this option lists each node in the frame or subroutine. Select the next node to be completed for each input type. You can specify a different Link for each type of source. For example, you could Link any scanned (scanner) input to a **Verify** node that makes sure it's a valid number and at the same time set up any function key input to return to the Main Menu. You can also specify a file or register to store the input data in, create a Link for a timeout condition (no input received within a given number of seconds), and arrange for input data to be displayed in a specific position on the screen.

Track Size Tab

The **Track Size** tab option specifies whether to save the number of characters received. Selecting this option allows you to select a register (refer to Registers on page 78). Be sure to use a different register from the one used to store the data. For serial input with a file as the destination, the number of records in the file is saved as the size in the register.

Figure 35. Input Node: Track Size Tab

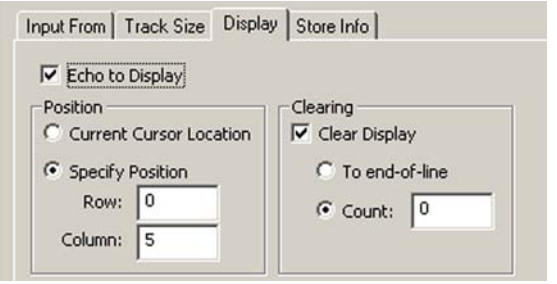


An Input Size register is predefined for your convenience.

Display Tab

The **Echo to Display** option determines whether the received data is displayed on the portable's screen.

Figure 36. Input Node: Display Tab



When this option is selected, you are prompted to specify how and where data is displayed. You can select either the current cursor location or a specific position. Selecting the current cursor position may cause the data display to vary. Selecting a screen position allows you to specify an exact starting position.

The default settings (0 for both row and column) start the display in the top-left corner of the screen. The rows and columns are numbered starting with 0; the first row is 0, the second is 1, and so on. Specify rows 0 through 5 and columns 0 through 15 on a PT40.

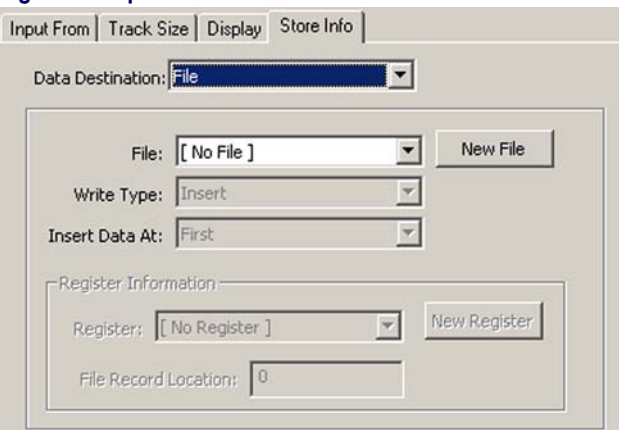
The **clearing** option allows you to further control the display. To remove existing data from the line on which the input data is displayed, select either **To end-of-line** or **Count**. Select the appropriate option for the data you expect to receive.

The echoed input is left on the screen until you display something else.

Store Info Tab

Data Destination specifies where to store the input data.

Figure 37. Input Node: Store Info Tab



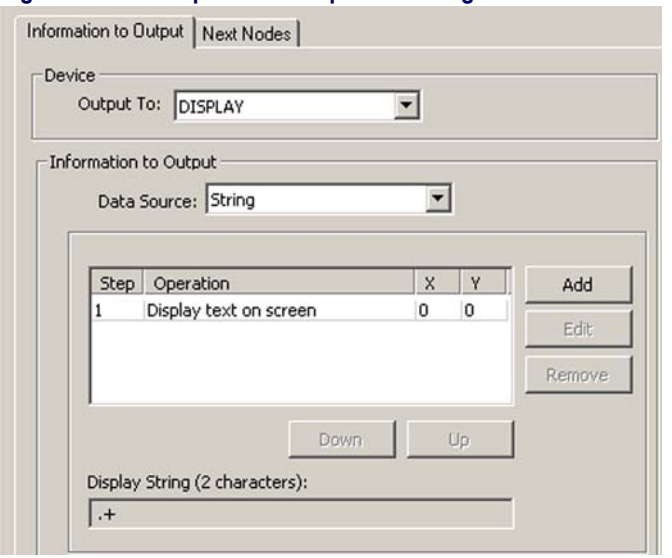
To specify placement of the data in a register (refer to Using a Register as a Destination on page 79), select **`Register`** in the **Data Destination** pull-down list. To store the data in one field of the register, select **`Field`** from the **Write Type** pull-down list. Specify or define a template, and select the field (refer to Creating a Template on page 85).

To store the data in a file, select **`File`** from the **Data Destination** pull-down list, and select a file from the **File** pull-down list. You can choose to insert the data before a given record in the file, replace a given record, or insert the data in alphabetic or numeric order (refer to Files on page 81).

Output Nodes

Output nodes send data to the portable's display, serial port, or system software.

Figure 38. The Output Node Properties Dialog



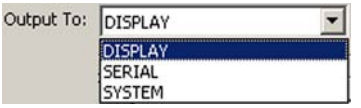
You can send a constant value or the contents of a register or file. When sending data to the system, you can use special commands that sound a beep, set the system date or time, or reconfigure the portable. You can also send commands to the display to reposition the cursor or erase the display.

Figure 38 on page 61 shows an **Output** node properties dialog.

Information to Output Tab

Output To specifies the channel over which data is sent.

Output To — Select an option to **Output To**.



- **Display** — Writes the data to the portable's screen, starting at the current cursor position. You can also send special commands to position the cursor on the display.
- **Serial** — Sends the data over the portable's serial port to a connected PC (to upload a file, for example).
- **System** — Sends the data to the portable's operating system. This option is used with special commands that sound a beep, set bar code parameters, set serial parameters, or set the system date or time, etc.

Information to Output

The **Information to Output** options specify the data or command to be transmitted (string), or the register or file containing the data.

Refer to Registers on page 78 and Files on page 81.

Special Commands

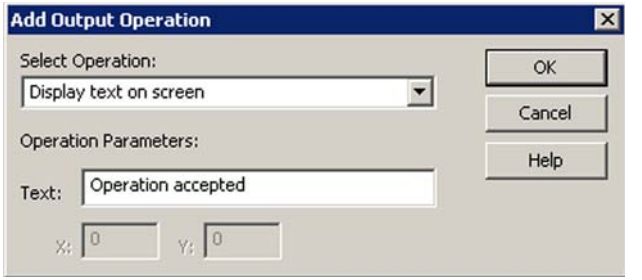
You can use an **Output** node to send special commands to the portable's display or operating system.

Creating Special Display Commands

To create a command to send to the display, complete the following steps:

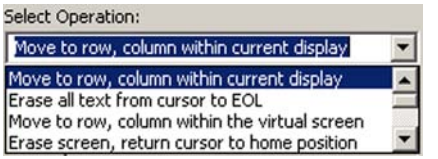
1. Select **`Display`** as the **Output to Device**.
2. Select **`String`** as the **Data Source**.
3. To add a command, press the **Add** button. An **Add Output Operation** dialog appears (shown in Figure 39).

Figure 39. The Output Operation dialog



Select Operation

Select the location for the beginning of the command to appear on the portable's display from the **Select Operation** pull-down list.



Move to row, column within current display

Erase all text from cursor to EOL

Move to row, column within the virtual screen. Refer to Actual vs. Virtual Display on page 19 for more information.

Erase screen, return cursor to home position

Move up one or more rows

Move down one or more rows

Move right one or more columns

Move left one or more columns

Display text on screen

[NO OPERATION]

Depending upon which operation you select, one or more parameters may be required.

4. Fill in the appropriate values and select **OK**.

You may combine multiple **Output** commands in a single command string.

Creating Special System Commands

Refer to the *Falcon PT40 Product Reference Guide* for a table of system commands.

Next Node

Next node specifies the next operation to perform depending upon the success or failure of the output.

Verify Nodes

Verify nodes test data in a register or file to see if it is a certain type (ASCII, numeric, or alphabetic). They can also check that the data matches a given constant, matches the contents of a register, or falls within a given numeric or alphabetic range.

Usually a **Verify** node Links to one node if the data passes the test and to another node if it doesn't. For example, a **Verify** node might check to see if the value scanned is numeric. If it is, the **Verify** node might branch to an **Output** node that sends the value to a file; otherwise, it might display an error message.

Wildcards

PPG supports the use of wildcards in searches and verifications. The following wildcards are supported:

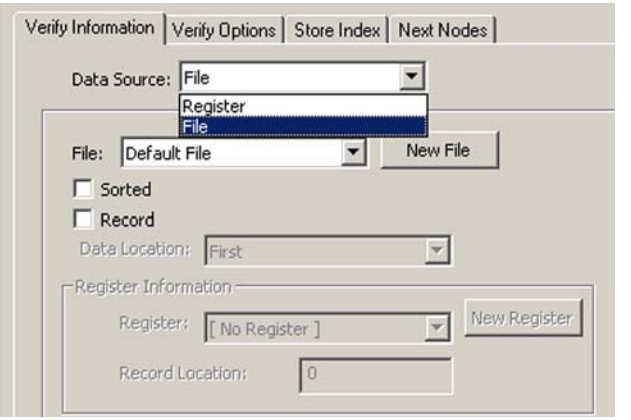
* Any sequence of characters.

?	Any single character.
@	Any alphabetic character.
#	Any numeric character.
~,	Any field (any sequence of characters up to the specified delimiter, which can be any character, in this case, a comma).

Figure 40 on page 64 shows the **Verify Information** tab of the **Verify** node properties dialog.

Verify Information Tab

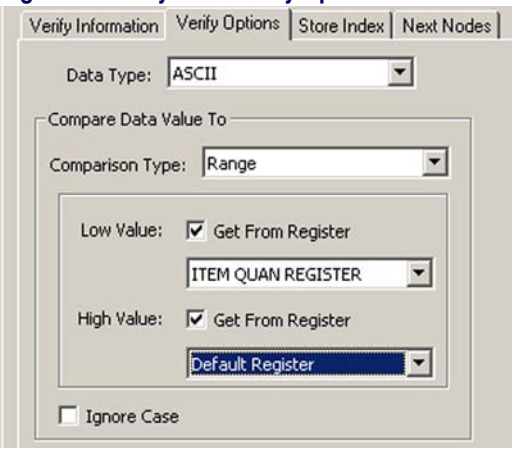
Figure 40. The Verify Node Properties Dialog



Data Verify Source specifies the location of the data to be verified—either a register or a file. The **Sorted** setting uses a binary search algorithm to speed up the file searches. This option works only with presorted files. Use the displayed sub-dialog box to specify the exact register or file (Using a Register as a Source on page 78 and Using a File as a Source on page 82).

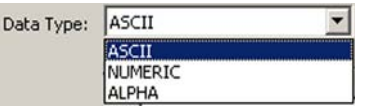
Verify Options Tab

Figure 41. Verify Node Verify Options Tab



Data Type

Data type allows you to select the type the data should match



ASCII values

ASCII values (hex values **20** to **7F**) include alpha-numeric characters and symbols (such as brackets, commas, dollar sign, and slash).

Refer to ASCII/Hex Conversion Table on page 167 for a table of ASCII values.

NOTE: Use the ASCII setting only if you don't care if the data is numbers or letters.

Numeric values

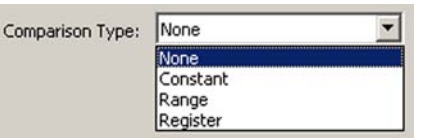
Numeric values (hex values **30** to **39**) include the characters **+** (plus), **–** (minus), and **.** (period).

Alphabetic values

Alphabetic values include hex values **41** to **5A** and **61** to **7A**.

Comparison Type

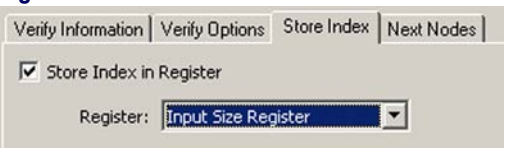
Comparison Type specifies the data to be tested against.



None	Requires no match; it tests only on the basis of type.
Constant	Compares the value in the data source to a constant value
Range	Verifies that the value in the data source falls between an upper and a lower value
Register name	Verifies that the value in the data source matches the value in a specified register (refer to Registers on page 78, for details on specifying a register location.)
Ignore Case	**Ignore Case** verifies the data match regardless of capitalization. If you want the data to be case specific, make sure this option is not selected.

Store Index Tab

Figure 42. Store Index Tab



The **Store Index In Register** option stores in a register the number of the first record in the file that passes the verification. If there is no match, it stores the position of the last record. Select a register name from the list. This option is only available when the **Verify Source** option is set to **File**.

Next Nodes

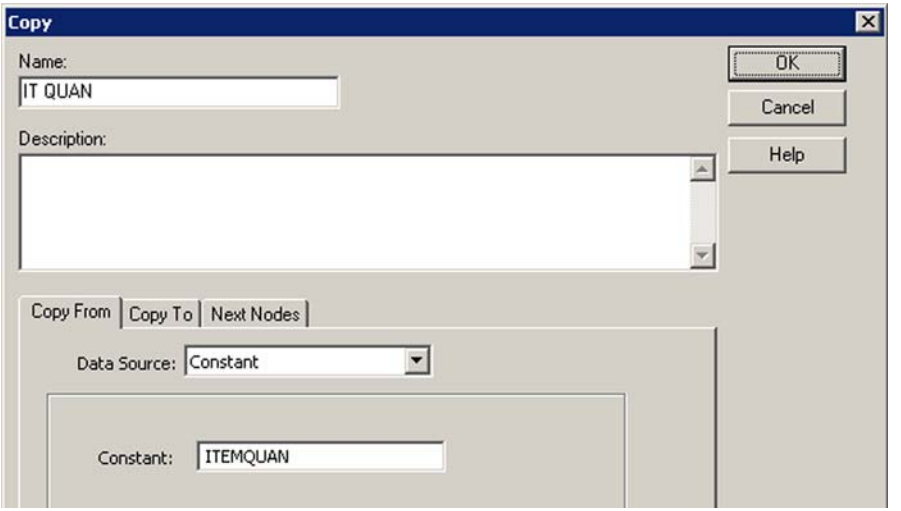
Next node specifies the next operation to go to when the verify function succeeds or fails.

Copy Nodes

Copy nodes are used to move data between registers and files. Collected data is often stored temporarily in a register until it is validated. Then a **Copy** node transfers the data into a file. A **Copy** node can also copy data from a portable file to a register, where it can be referenced or displayed. You can also use a **Copy** node to copy a constant value to a register or file or to copy data between files and between registers.

Figure 43 on page 67 shows the dialog box associated with a **Copy** node.

Figure 43. The Copy Node Properties Dialog



Copy From Tab

Data Source indicates the data to be copied—either a constant or the contents of a register or file. If you choose **Constant**, you are prompted for a number or text string. If you choose **Register** or **File**, you are prompted to specify a location. For more information, refer to Registers on page 78 and Files on page 81.

Copy To Tab

Data Destination indicates where the data is copied. Data can be copied to either a register or a file. Select the destination from the available options. For more information, refer to Using a Register as a Destination on page 79 and Using a File as a Destination on page 83.

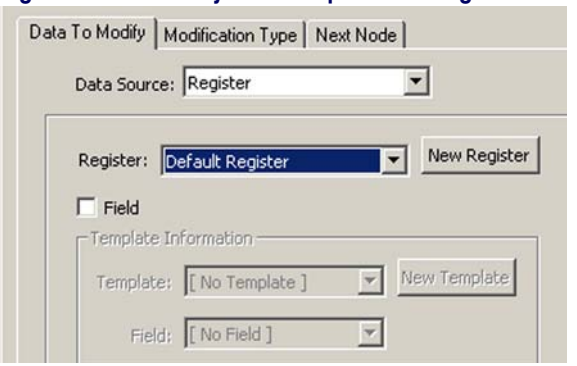
Next Nodes

Next node specifies the next operation to go to when the verify function succeeds or fails.

Modify Nodes

Modify nodes let you change the contents of a register or file. You can switch text to all uppercase or all lowercase, reverse the order of data, or delete data. You can also perform a search-and-replace operation on data and clear the eighth bit of data. Figure 44 on page 68 shows the dialog box for a **Modify** node.

Figure 44. The Modify Node Properties Dialog



Data to Modify

Data source specifies the location of the data to modify. If you choose **Register**, select a register from the displayed Register list box. To modify only one field of the register, select the **Field** type and select the **Template** and **Field** name from the displayed list boxes (refer to Registers on page 78).

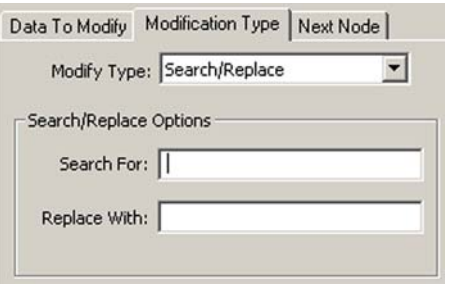
If you choose **File**, select the file name from the pull-down list. If you select **Record**, refer to Using a File as a Source on page 82.

Modification Type

This option allows you to select how the data is modified. Select from the following:

To Upper case	Changes all lowercase characters in the source string to uppercase.
To Lower case	Changes all uppercase characters in the source string to lowercase.
Search \ Replace	Replaces all instances of a given string with a second given string.

You must use the entire string; it is not possible to do a partial match using a the **Search/ Replace** feature on the **Modify** node. To use a partial match, refer to Searching for a Partial Match on page 148 using the **Verify** node.



Reverse	Reverses the order of data in the specified register. For example, if the register value were **123456**, this option would reverse the order of characters in the string to **654321**.
Delete	Erases the data from the specified register, field or file.
Clear 8th Bit	Ensures that specified data is in seven-bit ASCII format. If the data is stored in eight bits, this options clears the eighth bit. For example, when you are working with a database file that originated on the PC, this strips the 8th bit prior to uploading collected data to the PC.

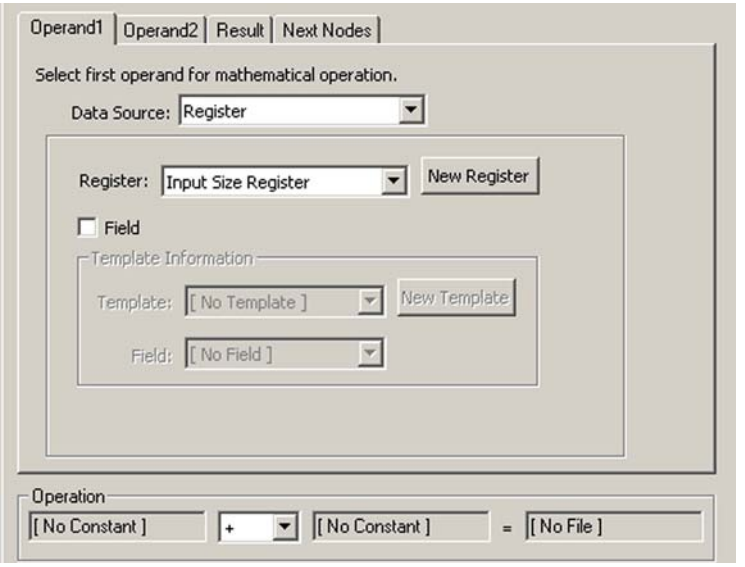
Next Nodes

Next node specifies the next operation to go to when the modify function succeeds or fails.

Math Nodes

Math nodes perform basic mathematical operations on the contents of a file or register.

Figure 45. Math Node Properties Dialog



For example, you could multiply the contents of the default register by 3 and store the results in a register called **Triple**. Rather than supplying a constant (such as 3), you could specify another register that contains the number you want to multiply, add, subtract, or divide by. Figure 45 on page 69 shows the dialog box for a **Math** node.

The format of the math function is as follows:

```
Constant | Register | File  + | - | / | *|
%  Constant | Register = Register | File
```

The results of the math operation must be within the range of **-999,999,999** through **999,999,999** and are always rounded to the nearest integer.

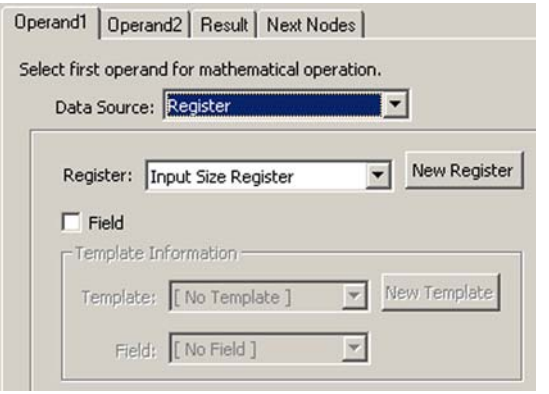
Floating Point Math

PPG supports floating point math. Decimal values and exponential notation of values with up to 13 digits can be entered in an application.

Operand 1 Tab

The **Operand 1** tab lets you specify a constant value or a file or register containing the first operand for the mathematical operation. The location of **Operand 1** is displayed near the bottom of the dialog.

Figure 46. Math Node: Operand 1Tab

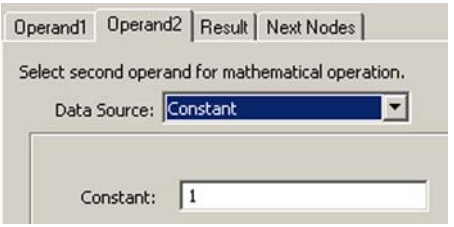


For more information on files and registers, refer to Registers on page 78 and Files on page 81.

Operand 2 Tab

The **Operand 2** tab lets you specify a constant value or a file or register containing the second operand for the mathematical operation. The location of **Operand 2** is displayed near the bottom of the dialog.

Figure 47. Math Node: Operand 2 Tab

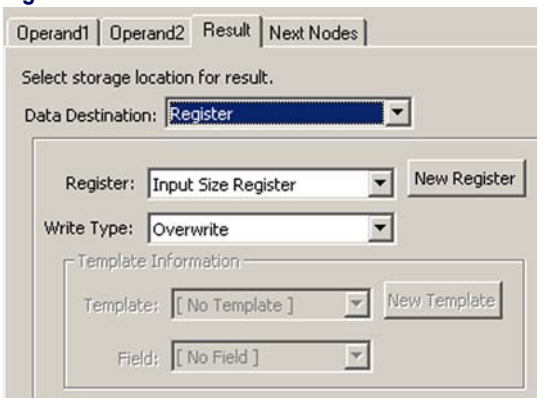


For more information on files and registers, refer to Registers on page 78 and Files on page 81.

Result Tab

Register/File specifies where the result of the math operation is stored—in either a field, register, or file. The location where the result of the mathematical operation is stored is displayed near the bottom of the dialog.

Figure 48. Math Node: Result Tab

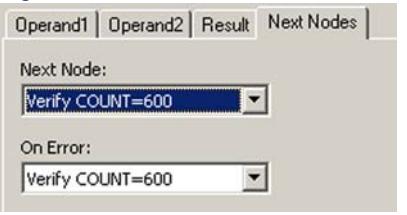


For more information, refer to Using a Register as a Destination on page 79, and Using a File as a Destination on page 83.

Next Nodes Tab

Next specifies the node to branch to if the math operation passes and where to branch to if it fails. A math operation will fail only if you attempt to divide a value by zero or operate on a nonnumeric value.

Figure 49. Math Node: Next Nodes Tab



Operation (Mathematical Function)

At the bottom of the **Math Node Properties** dialog (refer to Figure 45 on page 69), there is an Operation section, shown in Figure 50. Select from mathematical functions that follow it.

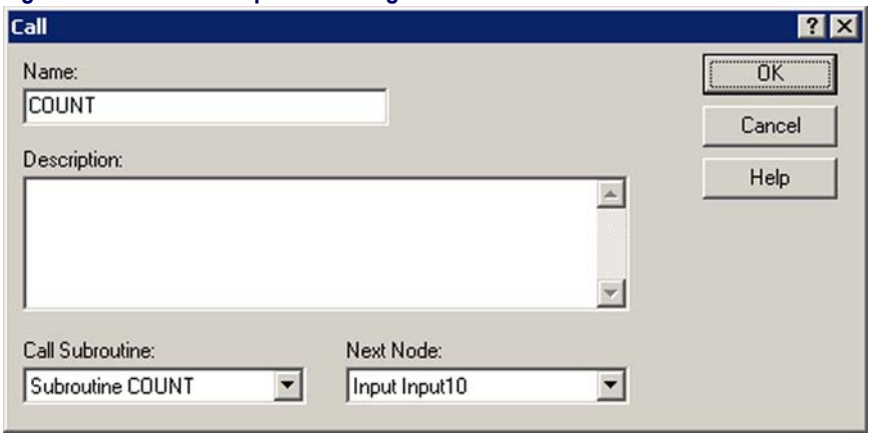
Figure 50. Math Node: Operation

+ (Addition)	Adds the two values.
- (Subtraction)	Subtracts operand 2 from operand 1.
*** (Multiplication)**	Multiplies operand 1 by operand 2.
/ (Division)	Divides operand 1 by operand 2. Returns the integer result.
% (Modulus)	Divides operand 1 by operand 2. Returns the remainder.

Call Nodes

Call nodes execute a branch to a subroutine. A subroutine contains nodes that perform a routine function, such as copying data to a file or verifying data. A subroutine can be called from multiple locations in the program (with **Call** nodes), eliminating the need for duplication. Creating subroutines and referencing them with **Call** nodes optimizes a PPG program, saving both time and program size. Figure 51 shows a **Call Node Properties** dialog.

Figure 51. Call Node Properties Dialog



Call Subroutine

Click on the down-arrow **button** to the right of the input box to display a list of all subroutines within the program. Select the subroutine you want to **Call**, and then select **OK**.

A **Call** to a subroutine executes the specified subroutine and then returns to the node following the **Call** node.

Links

Creating Links

Links are arrows that connect frames and nodes, directing the program to the next step. A Link pointing to a frame or node shows how it is accessed. A Link pointing away from a frame or node shows where the program goes next.

To create a Link, complete the following steps:

1. Select **Create > Link** from the menubar or press the **Link** button from the **Program Nodes** toolbar.
2. Position your cursor (the Link) on the initiating node, click and hold down the left mouse button, and drag your cursor (the Link) on to the **Next Node**. Release the Link. The Link is drawn using the middle of each object as an axis, regardless of the exact position of the pointer.

To draw a jointed Link (a Link with one or more bends), point to the source node, move the pointer to where you want the first joint to be, click the mouse again, and draw the next leg of the Link. Click inside a frame or node to complete the Link.

Adjusting Links

To adjust an existing Link, move the arrow pointer to the Link's arrowhead or joint, and hold down the left mouse button. Drag the joint or arrowhead to a new position, and then release the mouse button.

If two or more Links overlap, you can select them separately by moving the arrow pointer to a joint or arrowhead and holding down the left mouse button. The selected Link appears dashed. To select the next Link in the stack, press and hold down the left button again.

Moving Links

To move a node while retaining the position of its anchored, jointed links, press and hold the **Shift** and **Ctrl** keys while grasping the node with the mouse and moving it to the new location.

Deleting Links

To delete an existing Link, select the Link by moving the cursor to the Link's arrow-head and holding down the left mouse button. Press the **Delete** button or the **ESC** button.

Automatically Generated Nodes

Start Nodes

Start nodes point to the first node in each frame. The are created automatically by PPG when a frame or a subroutine is created.

Exit Nodes

Exit nodes indicate where the frame ends and returns to its parent frame. Exit nodes are created automatically by PPG when you create a Link from one frame to another. (Refer to Node Types and the Parent-Child Relationship on page 17 for more information on the parent-child relationship between nodes.)

Return Nodes

Return nodes indicate where a subroutine ends and returns to its calling node. Return nodes are created automatically by PPG when subroutines are created.

NOTES

Chapter 6
Managing Data

Overview

This section discusses methods for controlling data flow, data handling, and data organization. The following topics are covered:

Controlling Data Flow

There are four tools you can use to control the flow of data:

Table 2. Data Flow Tools

Tool	Description
Registers	Stores data temporarily. When you scan or enter a string of data, it is usually placed in a register before it is copied into a portable file. You can also use registers to store user response to a prompt, the index of a record in a file, and so on.
Files	Holds data in the portable until it can be uploaded to a PC. Usually after input data is verified, it is inserted in a portable file. The file expands as more data is added. Files can also be used to hold database information downloaded from a computer. This information can then be used to verify scanned data or for other purposes.
Templates	Combines data stored in different registers or breaks down data in a single register into fields. You can use them to set up records in a file so that the data can easily be transferred to a database or spreadsheet file. You can also use them to access portions of data in a register.
Fields	Fields are a breakdown of data in a single register. Data is arranged as fields in records in a template. Fields can be set to either a fixed length or a variable length with a separator.

The following sections describe how to select a register to store or access data, how to select a source or destination file, and how to create a template for breaking down or combining data. The last two sections give examples of using registers, templates, fields, and files to control data flow.

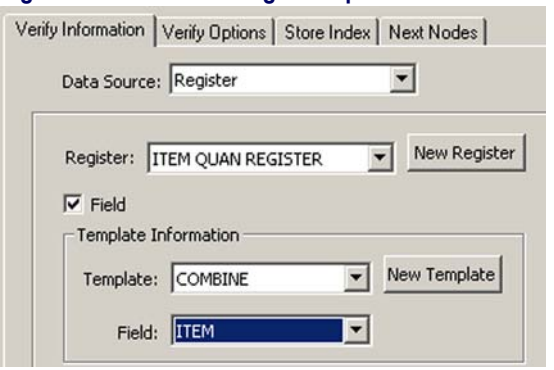
Registers

A register is a temporary holding place for data. Registers can be used both as a source of data and a place where you can place data temporarily.

Using a Register as a Source

When you choose **Register** as the source, you are given options as shown in Figure 52.

Figure 52. The Source Register Options



To view a list of existing registers, click on the arrow to the right of the register list. To select one of these registers, click on it. To create a new register, click on the **New Register** button.

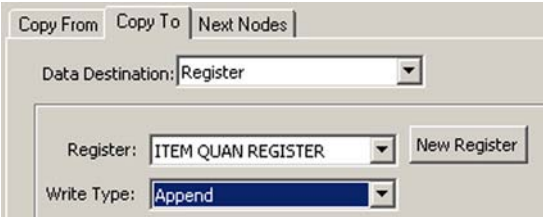
Register Fields

To select a specific field in the register, select the **Field** checkbox. This will display a list of templates and fields within the register. For more information on register fields, refer to Specifying a Register Field on page 80.

Using a Register as a Destination

When you choose **`Register`** as the **Destination**, you are given the options shown in Figure 53.

Figure 53. The Destination Register Options



To view a list of existing registers, click on the arrow to the right of the register list. To select one of these registers, click on it. To create a new register, click on the **Define Register** button.

Write Type

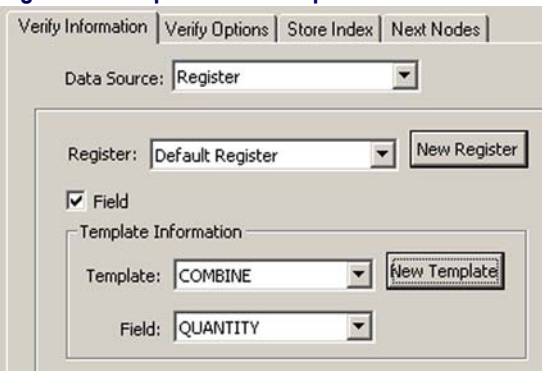
To select how the data is stored in the register, select the write type from one of these options:

Insert	Insert places the data at the beginning of the register, before any existing data.
Overwrite	Replace replaces any data previously stored in the register.
Append	Append adds the data to the end of the register, after any existing data.
Field	Field stores the data in a specified field of the register (refer to Specifying a Register Field on page 80).

Specifying a Register Field

If you enable the **Field** checkbox for the **Register Source** or select **`Field`** as the **Write Type** in a **Register Destination**, the template and field pull-down lists become available. (refer to Figure 54).

Figure 54. Template and Field pull-down lists



- Select the template you want to use from the **Template** pull-down list, and then select the field.
- To create a new template, select the **New Template** button (refer to Creating a Template on page 85).

Register Example: Parsing Data

You own a catalog business. When you ship packages out, you scan a label that includes the destination region. The first character of each label identifies this destination region as **North**, **West**, **South**, or **East**. Customize the application so it divides data into four separate files by region.

Create a template that separates the scanned data into two fields, the first one for the **region** character and the second one for the **rest**. The template examines the **region** field to determine the file into which the scanned data should be copied: **North**, **West**, **South**, or **East**.

To create this template, complete the following steps:

1. Create a template called **Region** containing the following fields:
   - **Region**, fixed length:1
   - **Rest**, variable length, comma delimited
2. Create a **Verify** node that uses the **Region** template to determine whether the character in the **Region** field is **N** and, if it is, proceeds to a **Copy** node that copies the contents of the input register to a file called **North**.
3. Create a second **Verify** node that checks whether the character is **W** and, if it is, copies the input code to a file called **West**.
4. Create a third **Verify** node that checks whether the character is **S** and, if it is, copies the input code to a file called **South**.
5. Create a fourth **Verify** node that checks whether the character is **E** and, if it is, copies the input code to a file called **East**.

Files

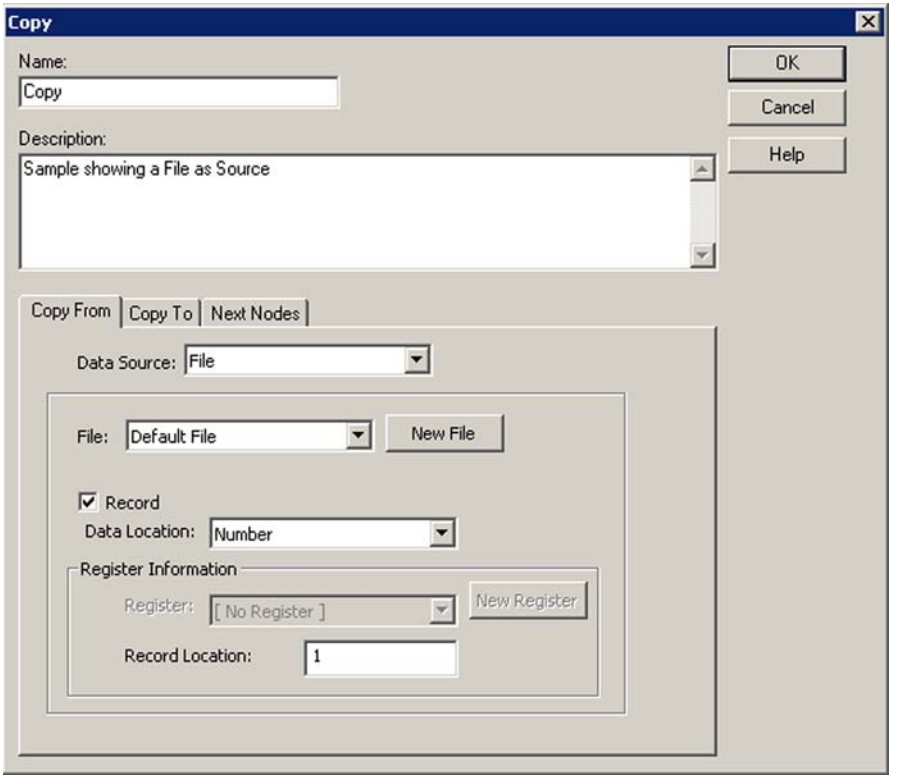
Portable files are used to store data that has been either input via the portable's scanner or data keys or downloaded from a PC file through the serial port. Each entry in a file is called a record, and the records in each file are numbered, with 1 as the first record.

There are two types of file settings in portable dialog boxes. Source file settings specify a file or record in a file to be read from. Destination file settings determine a file or record to be written to.

Using a File as a Source

From the **Data Destination** pull-down list, select **`File`** to make additional options available, as shown in Figure 55).

Figure 55. Source File Options



Select from the **File** pull-down list, or press the **New File** button to create a new file. Enable the **Record** checkbox to see additional options.

Data Location

The **Data Location** field lets you specify where the data you want to use is currently located; choose from the following options:

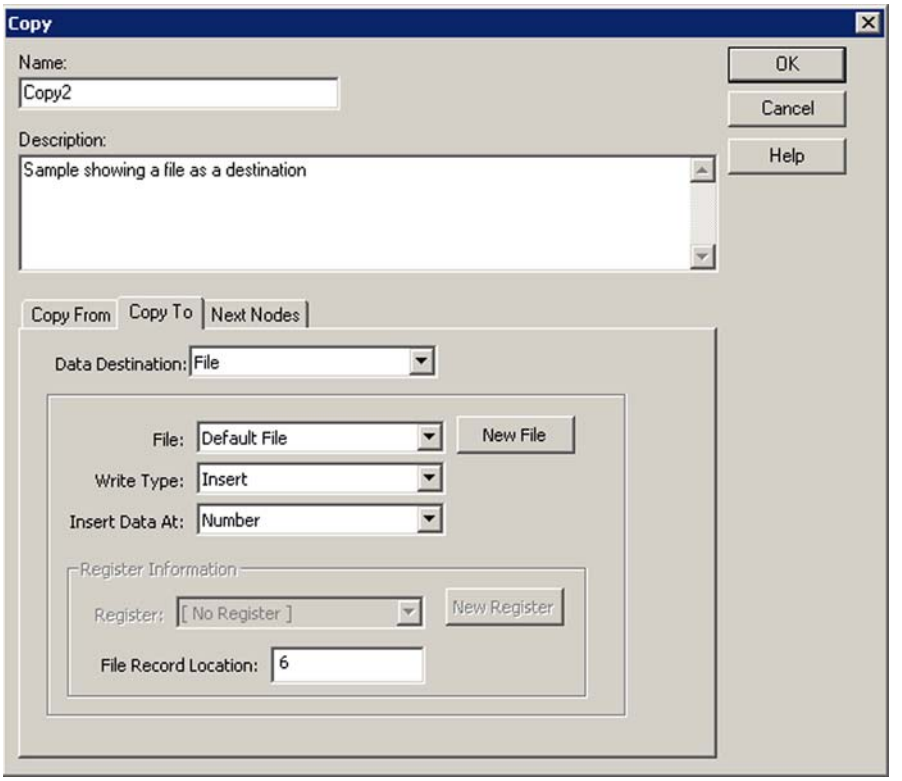
First	First indicates the first record in the file.
Last	Last indicates the last record in the file.
Number	Number selects a specific record. You are prompted for the record number.

Index Index lets you indicate a register where the number of the record you want to use is stored.
You are prompted for the name of the register containing the record value (refer to Using a Register as a Source on page 78.

Using a File as a Destination

When you choose **File** as the destination, you are given options as shown in Figure 56.

Figure 56. Destination File Options



Select from the **File** pull-down list, or press the **New File** button to create a new file.

Write Type

To indicate where the new information is stored in the selected file, select one of the following options:

Insert	Places the data before a given record. When this option is selected, additional options allow you to choose a specific record in the file. (These options are described in the preceding section, "Using a File as a Source.")
Overwrite	Replaces a given record. When this option is selected, additional options allow you to choose a specific record in the file. (These options are described in the preceding section, "Using a File as a Source.")
Append	Adds the data to the end of the existing file.
Sorted	Inserts the record into the file based on ascending ASCII value. Use this option to insert records into a specified file that has already been sorted to maintain the proper order of the records in the file.

Templates

A template is a structure that you can define and use to alter the way in which collected data is stored. Templates can be used only in registers, not in file records.

Template Uses

The most common use of templates is to parse data in a register. This allows you to collect and store more than one type of information. For example, your program could ask the user to first enter a location code for an item and then the item number. The template would combine each set of values in a register, and the value pair could then be copied to a file as fields in a single record. Data in the file would be arranged either in fields of a fixed size, as in the following:

```
2348493848
48  393948
8   293832
9   832928
185 392038
28  282930
```

or with delimiters separating variable-length fields in the record, as in the following:

```
2348,493848
48,393948
8,293832
9,832928
185,392038
28,282930
```

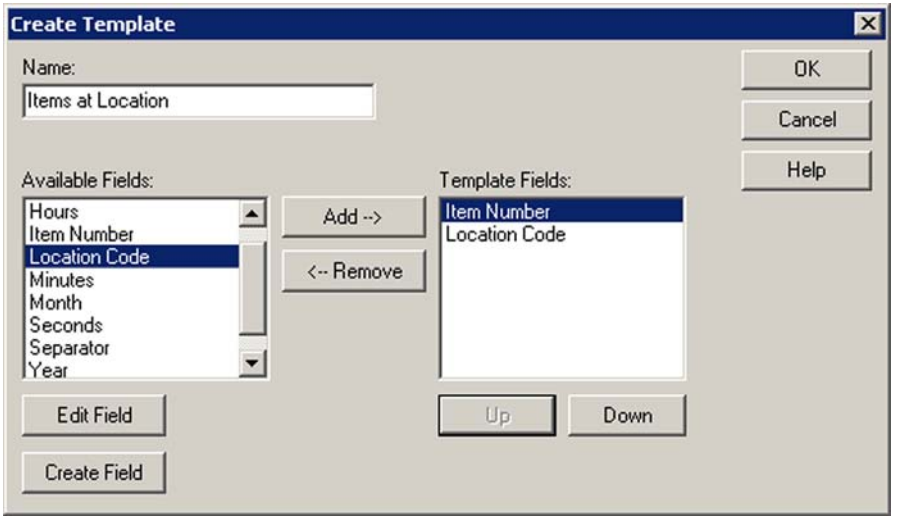
Once downloaded to the PC, this data file can be easily translated by a database or spreadsheet program. The first value in each record goes into a **Location** field, the second value goes into an **Item Number** field, and the program pairs the values appropriately.

Another use of templates is to break down data stored in one register into two or more register fields (for example, to strip out the first section of a code).

Creating a Template

To create a template, complete the following steps:

Figure 57. The Create Template Dialog



1. Select **Create > Data > Template** from the menubar. The **Create Template** window is displayed as shown in Figure 57

2. In the **Create Template Name** field, enter the name of the template you want to create.
3. On the left, you will see a list of all currently defined fields. The list of fields currently contained in the template appears in the **Available Fields** list on the left.
   - To add an existing field to the template, select the field name and press **Add**. The field name now appear in the **Template Fields** list on the right. To remove a field from the template, select the field name from the **Template Fields** list and press **Remove**.
   - Select the **Create Field** button at the bottom of the dialog to create a new field.

Refer to Fields on page 87 for more information on creating fields. Once you've created a template, it is added to the template pull-down list and you can use it with any register.

Modifying an existing template

To modify an existing template, complete the following steps:

1. Locate the template in the **PPG Explorer**, and right-click on it to open a pop-up menu. Select **Properties**.
2. The **Create Template** window is displayed as shown in Figure 57 on page 85.
3. Follow the instructions described above in Creating a Template.

Template Example: Modifying Inventory

You run a small TV-repair shop and keep track of parts inventory on a PC in the shop office. Instead of going to the office PC each time you use a part, you would prefer to use the portable to adjust your inventory during the day and update your PC inventory file each night.

Create a portable application to download the latest inventory file from your PC and modify it to keep inventory current. Each time you remove a part from the shelf, scan its part number label. The application subtracts **1** from the quantity of items for that part number in the inventory. At the end of the day, upload the adjusted data from the portable to the PC.

Use registers, files, and templates as shown in the following steps:

1. Create an **Input** node to download a inventory file from the PC to a portable file.
2. Use second **Input** node to store a scanned part number in a register named **`Part Number`**.
3. Copy the **`Part Number`** register to a **`Lookup`** register.
4. Append **`,*`** to the lookup key (wild card lookup).
5. Lookup **`Lookup`** register against the inventory file.

This assumes that the inventory file is comma delimited, and contains **`Part Number`** and **`Quantity`** fields.

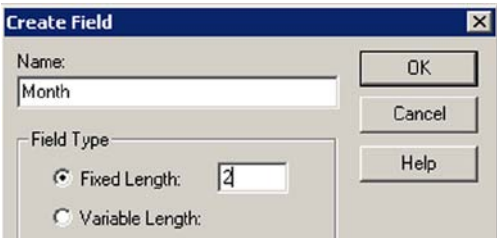
Fields

Fields are a breakdown of data in a single register. Most programs expect to see related values on the same line. Each line is referred to as a record, and each item on the line is called a field.

The fields are either set to a fixed length (so that they appear in columns in the data file), or they are allowed a variable length with a separator (such as a comma) separating them. You can also use a template to break apart data stored in a register into separate fields.

To create a new **Field**, select **Create > Data > Field** from the menubar to open the **Create Field** dialog, shown in Figure 58.

Figure 58. Create Field Dialog

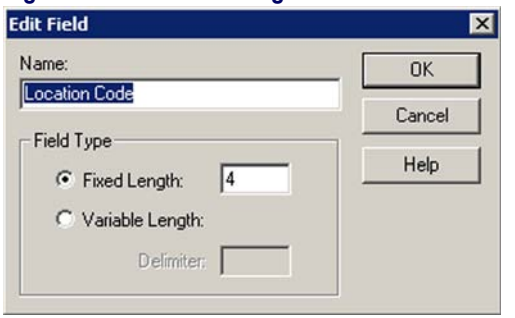


To edit an existing **Field**:

1. Locate the field in the PPG **Explorer**; right-click to open a pop-up menu.
2. Select **Properties**.

3. The **Edit Field** dialog is shown in Figure 59.

Figure 59. Edit Field Dialog



Using Fields in Templates

The most common use of templates is to parse data in a register. A template defines the structure used to access data. The fields are either set to a fixed length (formatted into columns in the data file), or they are allowed a variable length with a separator (such as a comma) separating them. You can also use a template to divide a register's data into separate fields.

Chapter 7
PT40 Communication

Overview

This chapter describes how to communicate with the PSC PT40 portable data terminal (PDT). The following topics are covered:

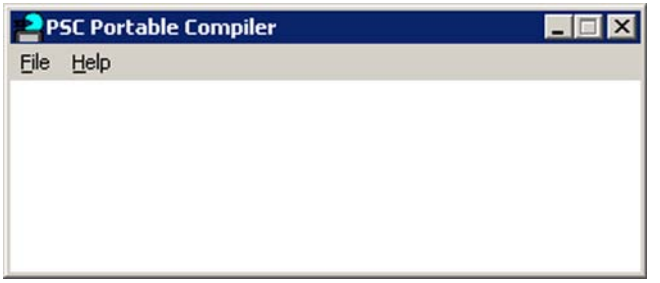
Downloading the Application to the PDT

To load a program into your PSC portable, complete the following steps:

1. Connect the dock or serial cable with a 9-pin connector to a serial port on your computer. (Use a 25-to-9-pin adapter if necessary.)
2. Connect the other end of the dock or cable to the portable.
3. Turn the portable on.
4. In the PPG window, if the application to be downloaded is not already open, use the **File > Open** command to open it.
5. Select **File > Download Program** from the menu. If a dialog box appears, asking if you want to save changes to the file, answer **Yes** or **No**.

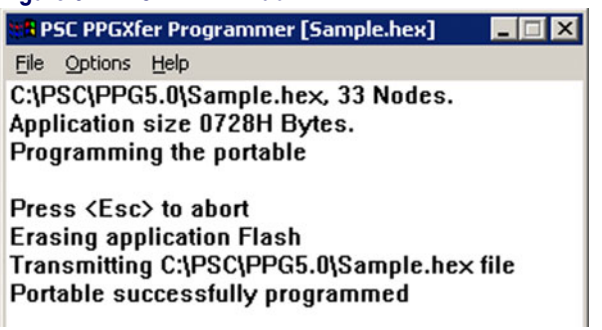
- The PSC Portable Compiler window appears momentarily as PPG compiles the program, translating it into a language understood by the portable.

Figure 60. PSC Portable Compiler Window



- The original **`*.scr`** file remains intact, and the compiled file is given the same name, but with a **`*.hex`** extension. It is this **`*.hex`** file that is downloaded into the portable.
- When compilation is complete, the **PPGXFER** window opens, displaying the message **Initiating Download**.
- If a connection between the PC and the PDT is successfully established, the window shows further messages as the compiled **`*.hex`** file is loaded into the portable. Refer to What Happens During a Download? on page 91 for more information.
- When downloading is complete, you'll see the message **Portable successfully programmed** in the **PPGXFER** window, and your application's initial window appears in the portable's display.

Figure 61. PPGXFER Window



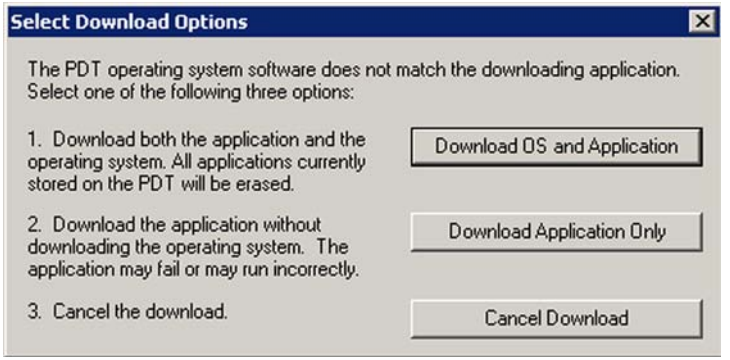
6. Double-click on the **PPGXFER** window's **Control Menu** box or select **File > Exit** to close the **PPGXFER** window.

What Happens During a Download?

During the application download process, a number of steps take place. First, the downloader checks the version number of the PT40's operating system.

1. The downloader allows you to choose from three different options.

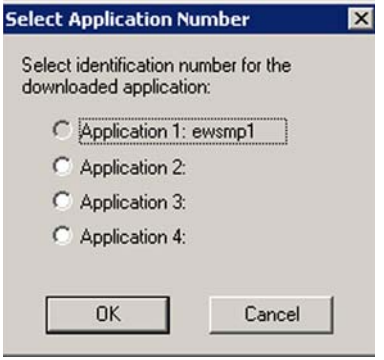
Figure 62. Updating the Operating System's Download software.



Download the new operating system	This option removes all applications currently stored on the Falcon PT40 and installs or updates the PT40 operating system.
Proceed without downloaded the new operating system	The application is sent to the PT40 without the latest operating system. If the PT40 has an outdated operating system, the newly downloaded application may not run correctly.
Cancel	The download process ends without downloading the application.

2. The downloader requests a list of currently loaded applications from the Falcon PT40.

Figure 63. Select an Application from the List of Options.



3. The Falcon PT40 can hold up to four applications. Choose the location where you want to load your new application.
    - Once you select a location, your application is downloaded.
    - If there was previously an application in the location you select, that application will be removed and replaced with a new application.

Specialized Download Situations

If you are downloading a program file to several portables, or if you switch between two or more programs in a portable, you can save time by downloading the program's compiled file, rather than recompiling the source file each time.

To do so, launch the **PPGXFER** directly from Windows via **Start > Programs > PT Program Generator > PPGXFER**. Once you're in the **PPGXFER** window, use the **File > Open** command to select your previously compiled **`*.hex`** file. Once you select the file, downloading begins immediately.

Using XFER32

XFER 32 is the application used to send and receive files to and from the PDT. When you start **XFER32**, the **XFER32** user interface, shown in Figure 64, opens.

Figure 64. XFER32 User Interface

XFER32 Setup

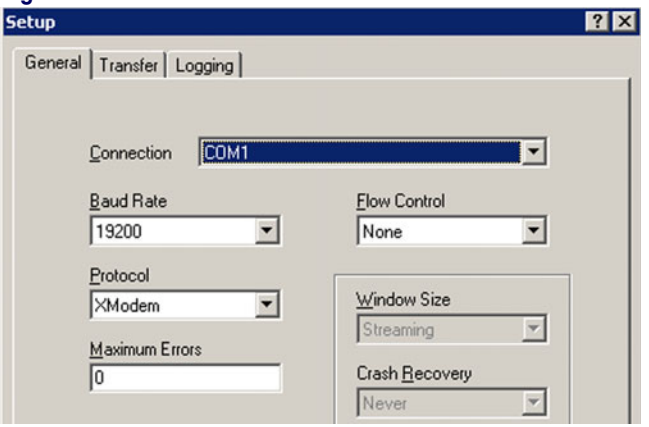
To prepare for data transfer between the PC and the PDT, click on the **Setup** button to open the **Setup** dialog box, which contains three tabbed sections:

The settings in these dialogs can be modified or customized to meet your communications requirements.

General Tab

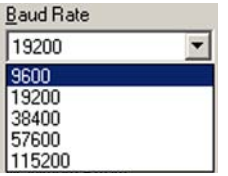
The **General** tab is the first tab displayed on the **XFER32 Setup** dialog box. Use this section to modify the PDT's **Connection**, **Baud Rate**, **Flow Control**, **Protocol** (**ACK/NAK** is the only protocol used by the PT40), and **Maximum Errors**. **Window Size** and **Crash Recovery** are not supported by the PT40.

Figure 65. General Tab



Connection Enter the **Connection** port for file transfers. Select from the list of detected serial ports or modems.

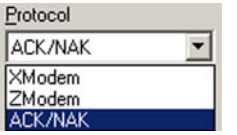
Baud Rate Select a **Baud Rate** for serial communications from the pull-down list. The default value for XFER32 is **19200**. The default value for the PT40 is **9600**.



Note: The PT40 supports only baud rates up to 38400.

Protocol

Select either **XModem** or **ACK/NAK** as the file transfer **Protocol** for sending and receiving files.

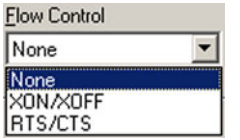


NOTE: The PT40 defaults to the **ACK/NAK** protocol unless you select **XModem**. XFER32 defaults to the **ZModem** Protocol. **ACK/NAK** and **XModem** protocol are the only two protocols supported by the PT40.
NOTE: **ZModem** Protocol is NOT supported by the PT40.

Maximum Errors Enter the maximum number of **Errors** permitted before a file transfer is aborted. Range: **1** to **50**. **0** specifies no limit to the number of file transfer errors.

Flow Control

Select the mechanism used to control the flow of data. Sender and receiver must agree on the flow control method.



Note: **RTS/CTS** is the default. Use either **None** or **RTS/CTS**. **XON/XOFF** is not supported by the Falcon PT40.

None No flow control used.

XON/XOFF NOTE: **ZModem** Protocol is NOT supported by the Falcon PT40. This feature is only available with **ZModem** protocol.

RTS/CTS Hardware flow control that uses **Request to Send** (**RTS**), and **Clear to Send** (**CTS**) serial port lines to communicate when to suspend and resume data transfer.

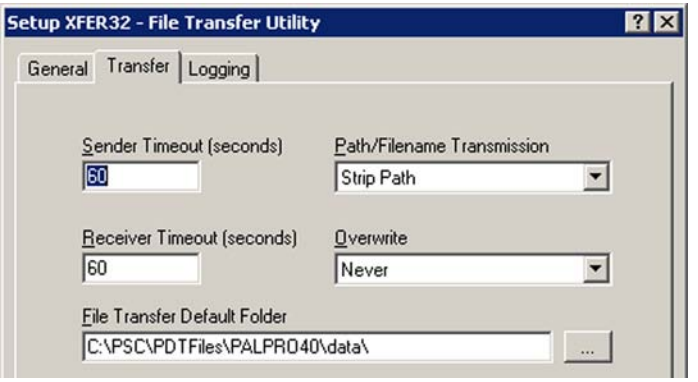
Window Size NOTE: **ZModem** Protocol is NOT supported by the Falcon PT40. This feature is only available with **ZModem** protocol.

Crash Recovery NOTE: **ZModem** Protocol is NOT supported by the Falcon PT40. This feature is only available with **ZModem** protocol.

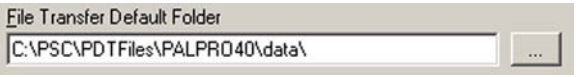
Transfer Tab

Select the **Transfer** tab to establish file transfer settings.

Figure 66. Transfer Tab of the File Transfer Utility



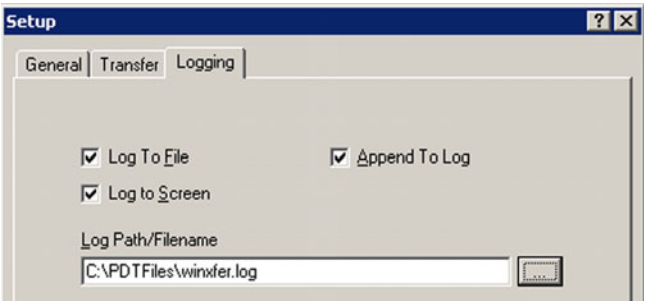
Sender Timeout (Seconds)	Enter the maximum number of seconds to wait for a connection when sending files. A value of **0** waits indefinitely.
Receiver Timeout	Enter the maximum number of seconds to wait for a connection when receiving files. A value of **0** waits indefinitely.
Path/Filename Transmission	NOTE: **ZModem** Protocol is NOT supported by the Falcon PT40. This feature is only available with **ZModem** protocol.
Overwrite	Select to determine the action the receiver takes when a received file already exists.
Source Longer or Newer	Overwrites the existing file if the received file is longer or newer.
CRCs Don't Match	Overwrites the existing file if the CRCs of both files don't match.
Append	Appends the received file to the existing one.
Always	Overwrites the existing file with the one received.
Source Newer	Overwrites the existing file if the received file is newer.
Date/Length Don't Match	Overwrites the existing file if the dates or lengths of both files don't match.
Never	Skips the transfer if the received file already exists.
File Transfer Default	Enter the **File Transfer Default** folder for storing received files. Use the **Browse** button to locate a new location.



Logging Tab

Select the **Logging** tab to establish settings for the communications log. The communications log can be helpful as a trouble-shooting aid.

Figure 67. Logging Tab of the File Transfer Utility



Log To File	Specifies that the log is to be written to a text file.
Log To Screen	Specifies that the log is displayed on screen.
Append to Log	This option becomes available when you select **Log to File**. When enabled, **Append to Log** adds log information to the end of the log file. If not enabled, new log information replaces the previous log file.
Log Path/ Filename	Specify the location for storing the communications log. If a path is not given, the file is stored in the **Default File Transfer** folder.
Browse	Use the **Browse** button to locate a new log file.

Select **OK** to save the settings and close the setup functions.

Sending and Receiving Data

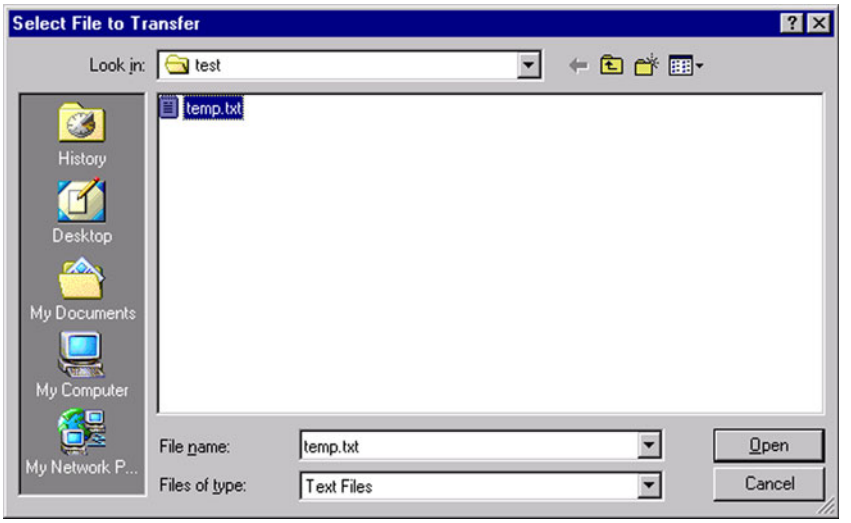
Verify that the portable is properly attached to the host PC. If the portable uses a dock, make sure that the dock is properly attached to the PC.

Refer to Transmit (Send) Files, below for specifics on sending files. Refer to Receive Files on page 98 for specifics on receiving files.

Transmit (Send) Files

1. Select the **Transmit Files** button.

Figure 68. Send File to Portable Window



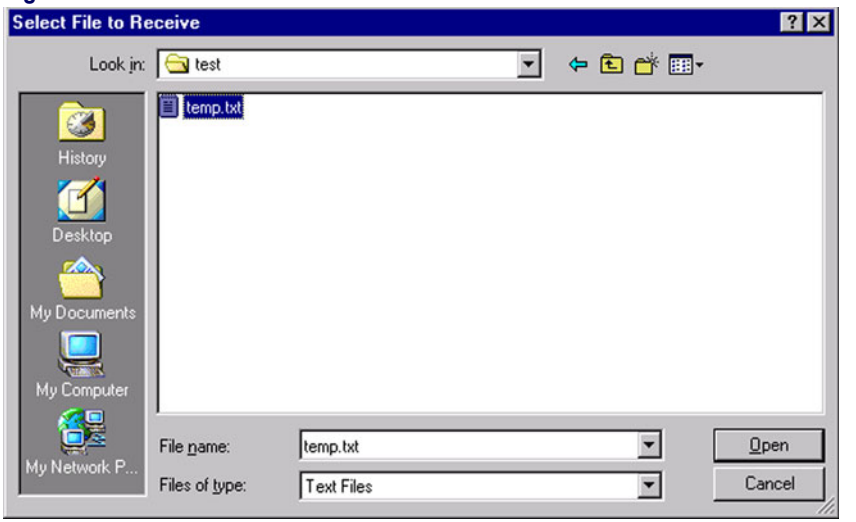
2. Select the file to send.
3. Click **Open** to send the file to the data collection terminal
   - Press **Cancel** to not send any files

Receive Files

When receiving files from a data collection terminal, a prompt appears. Enter the name of the incoming file.

1. Select the **Receive Files** button.

Figure 69. Receive File from Portable Window



2. Select (or enter) a filename for the file.
3. Click **Open** to begin receiving the file.

Press **Cancel** to not receive a file.

If you are using a DOS Host PC and wish to use DOS to transfer files, you can download PDTFER, an unsupported DOS file transfer application, from PSC's website at www.pscnet.com

Appendix A
PPG Tutorial

Overview

This tutorial reviews common PPG procedures. Instructions for the following tasks are available:

The entire tutorial takes approximately two hours to complete. You can stop at the identified break locations. If you do take a break, complete the instructions for saving and reloading your work. If you can't complete the tutorial in one sitting, the break points are the best stopping places.

When you are done with this tutorial, you should have an understanding of the steps involved in programming and uploading data from the portable with PPG. Refer to chapter PPG Application Design on page 15 for more information on creating a custom portable program.

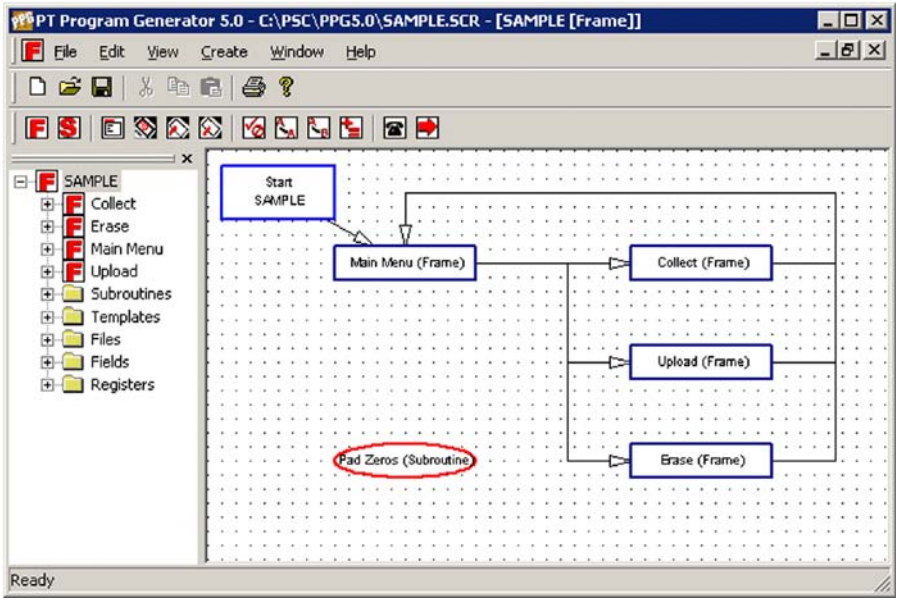
Studying a Sample Program

The easiest way to find out how a portable program works is to study an existing one. PPG comes with four sample program files. This tutorial looks at the simplest of the four. Later, you will load it into your portable and collect and upload data with it.

Complete the following steps to see how a sample program works:

1. If PPG is not already started on your PC, from the Windows **Start** menu, select **Programs > PT Program Generator > PT Program Generator** to load PPG.
2. Click on the **Maximize** button at the top right of the title bar to expand the PPG window to a full screen.
3. Choose **File > Open** and select **`sample.scr`** from the displayed list of files in the **`c:\Program Files\PSC\PPG50`** directory. Press **Open** to load the file into the PPG window (refer to Figure 70).

Figure 70. A Sample Program File



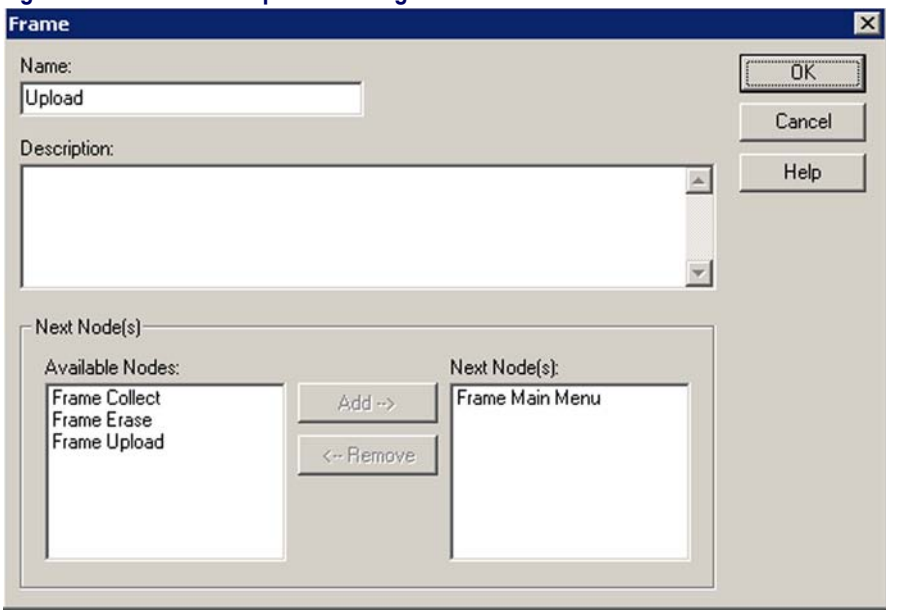
4. Click on the **Maximize** button on the top right of the **Smp1New** title bar to expand the frame window to its full size.

- The program is initially shown at what is called the Program level. This level contains a flow chart of the program's main functions. Each shape in the flowchart is either a function node or an operation node. Most of the nodes are Linked together with arrows, indicating the flow of the program.
- This sample program includes a **Main Menu** frame that branches off into three tasks: collecting data, uploading data, and erasing data. Each of the tasks also allows you to return to the **Main Menu**.
- The shape labeled **Pad Zeros** in the bottom-left corner is a **Subroutine**. It doesn't Link directly to the other frames, but it is jumped to from other parts of the program by **Call** nodes.

The current frame is always indicated by a shape filled with color. To select a frame, click on it with the left mouse button.

5. Move the mouse pointer to the **Upload** frame and click the right mouse button (or select the frame and choose **Edit > Properties** from the menu). The **Frame Properties** dialog box will appear (refer to Figure 71). This is where you define the text displayed in the frame.

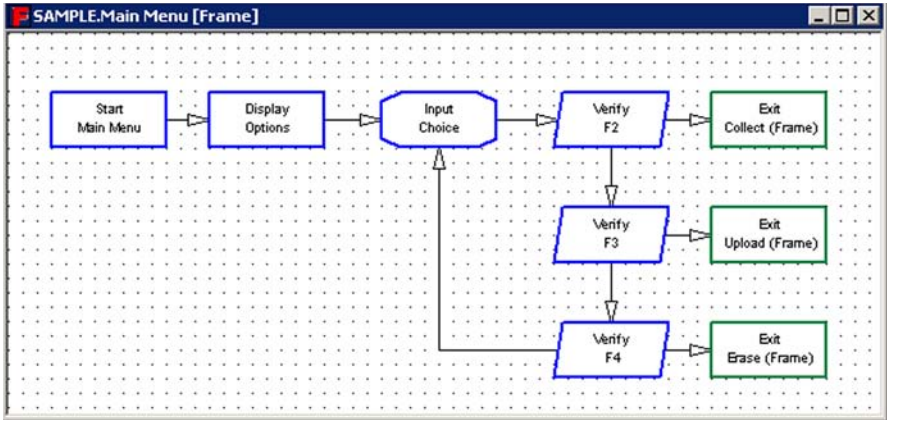
Figure 71. The Frame Properties Dialog Box



6. Select **Cancel** or press **ESC** to close the dialog box.

7. Each program frame has sublevel flow charts, which break a program down into component parts. Double-click the **Main Menu** frame to view its flow chart.

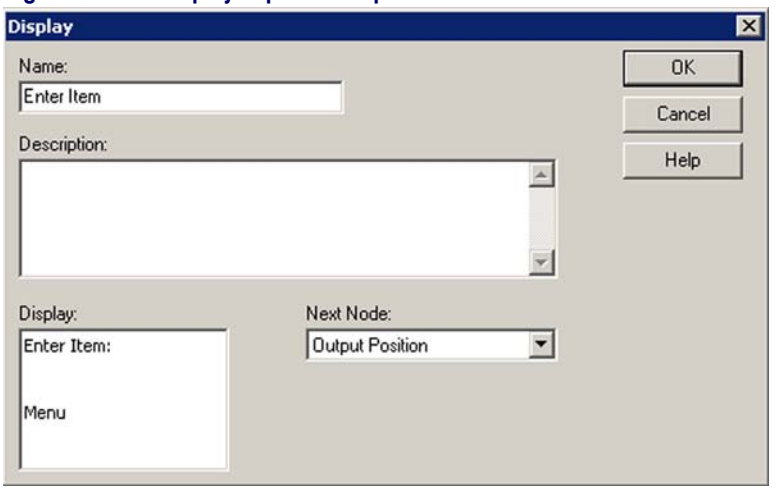
Figure 72. The Contents of the Main Menu frame



Within the Main Menu frame, each shape represents an Operation node. Operation nodes give the program detailed instructions, such as where to store scanned data. You specify these instructions by setting the properties for each Operation node.

8. Double-click the **Display: Options** node to view its **Properties** (refer to Figure 73).

Figure 73. The Display: Options Properties



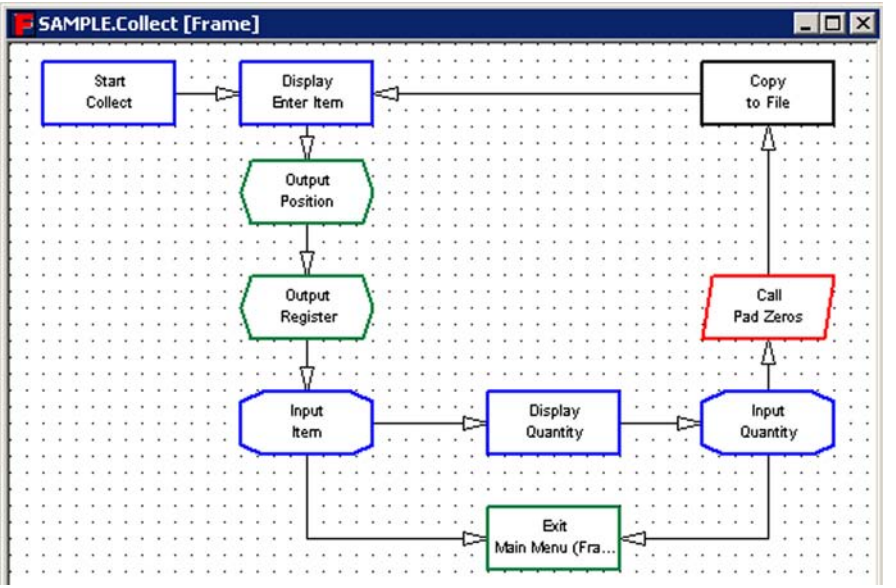
9. To close the **Display: Options** properties dialog, press **Cancel**.

10. Select the **X** (close button) on the top right of the **Main Menu** title bar to return to the higher level of the program.
    - Or choose the **View > Show Calling Function** to go back to the **Sample Frame** level.

You can also use View > Frames and View > Nodes in the menu to jump between levels.

11. Double-click the **Collect** frame to view its contents (refer to Figure 74).

Figure 74. The Contents of the Collect frame

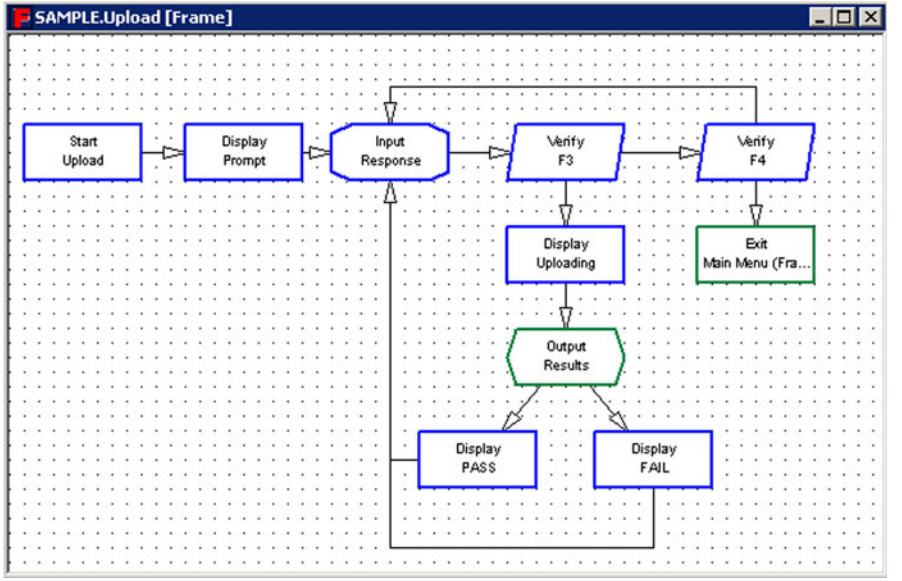


- Two **Display** nodes prompt the user to scan or enter first an item code (**Display: Enter Item**) and then a quantity value (**Display: Quantity**). Both entered values are displayed together on the screen (via the **Output** nodes) and are then copied to a file for storage (via the **Copy** node).
- The **Input** nodes send control back through the **Exit** node to the **Main Menu** frame if a function key is pressed. The **Call** node jumps to the **Pad Zeros** subroutine back in the **Sample** frame level, padding the input value with zeros, if necessary, to meet a required number of digits.

12. Close the **Collect** frame window to go back to the Program level.

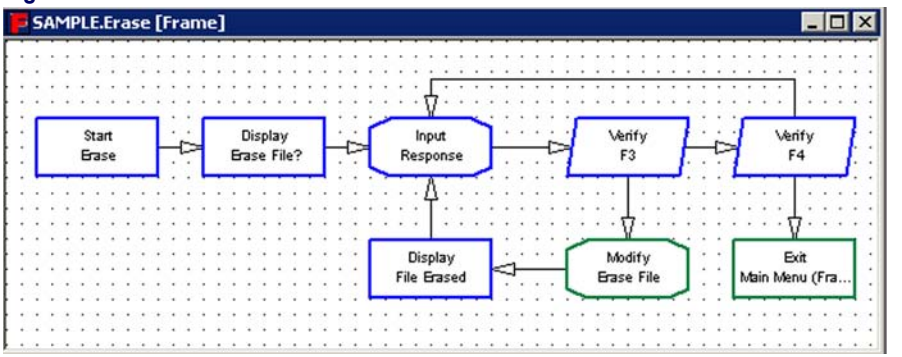
13. Double-click the **Upload** frame to view the upload nodes (refer to Figure 75).

Figure 75. The Contents of the Upload frame



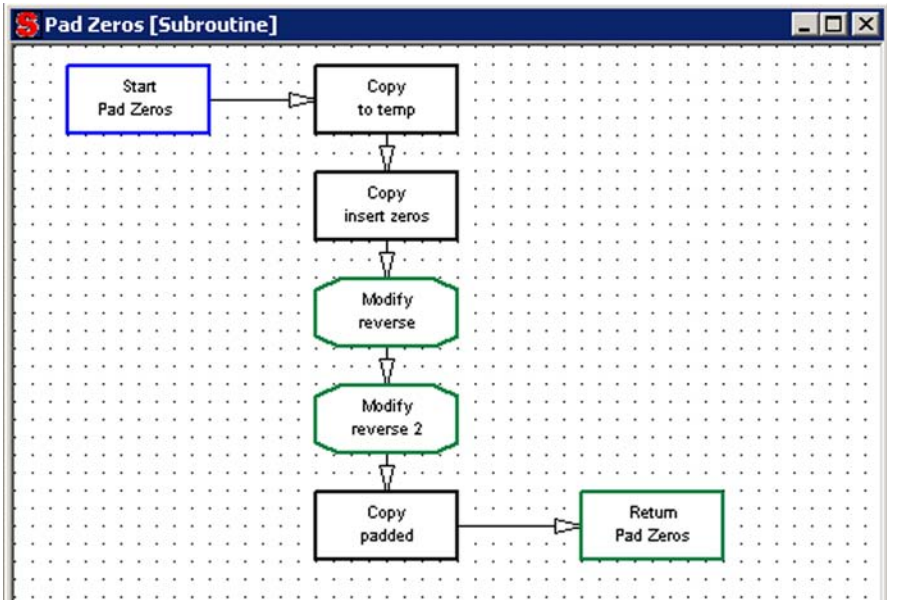
14. Close the **Upload** frame window to go back to the **Program** level.
15. Double-click the **Erase** frame to view its nodes (refer to Figure 76).

Figure 76. The Contents of the Erase frame



16. Close the **Erase** frame node to return to the Program level.
17. The **Pad Zeros** subroutine (**Program** level) is called from the **Collect** frame. It adds zeros in front of a value to force it to a specific number of digits. Double-click the **Subroutine** node to open it.

Figure 77. The Contents of the Pad Zeros subroutine



18. Close the **Pad Zeros** subroutine window and to return to the **Program** level.

By looking at all the pieces of this program file, you can get a general idea of how the program is put together. The Program flow chart defines the major tasks of the program: **Main Menu**, **Collect**, **Upload**, **Erase**, and **Pad Zeros**. Each frame and the subroutine is associated with a more detailed flow chart. Together, the function and operation nodes work to outline every detail of the data-collection process.

Want a Break?

If you are ready for a break, you can easily stop here. You have not made any changes that need saving, so you won't lose any work if you exit PPG or turn off your computer.

Building a Custom Portable Program

At this point, you should understand the general concepts behind creating and loading a portable program, although many of the details have yet to be explained. In this section, you'll create a simple portable program from scratch. It will allow you to collect data with the portable and upload it to your PC. A menu that appears when you turn on the portable gives you a choice of the two possible actions.

Creating Frames and Links

A program's frames define its general functions, such as collecting and uploading data. Links connecting frames indicate program flow—how you move from frame to frame. The details for the program are contained in the program's **Operation** nodes.

Creating Frames

For your program, you will create three frames: **Main Menu**, **Collect Data**, and **Upload Data**. The program will start with the **Main Menu** frame, which offers access to the other frames. You can return to the **Main Menu** from either the **Collect Data** or **Upload Data** frames.

Create the frames shown in Figure 78 on page 107 by completing the following steps:

1. If you took a break and exited PPG, select **Programs > PT Program Generator > PT Program Generator** from the Windows **Start** menu to load PPG.

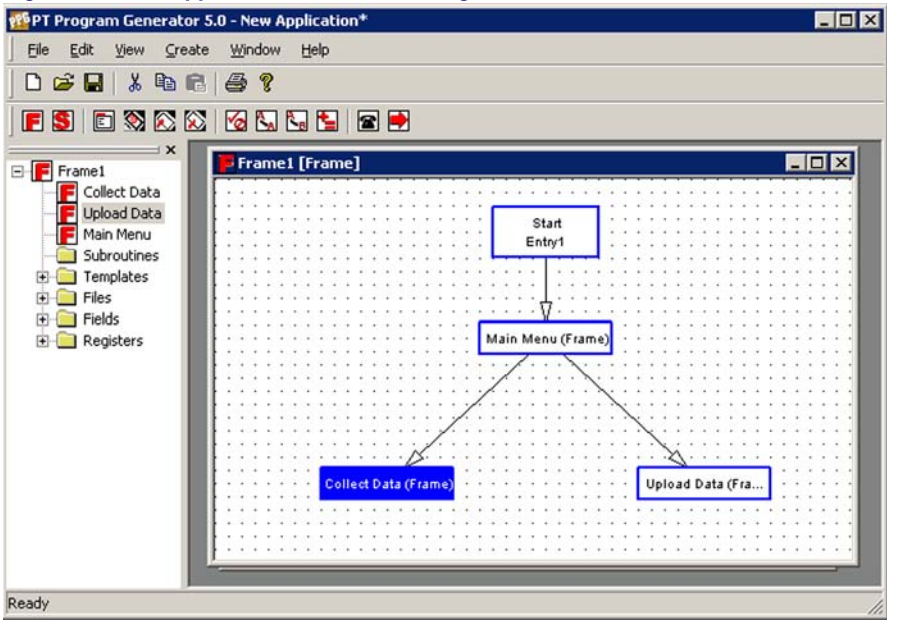
1. Click on the **Maximize** button, if necessary, to expand the windows to fill the screen.

2. If you are continuing from the last section, select **File > Close** to close the **Sample** application. The select **File > New** so that you can create a new flow chart. (If prompted to do so, do not save changes.)

3. Select **Create > Frame** to draw the first frame. A box labeled **FRAME** appears in the lower right corner of the window. Move it to the top-middle area of the workspace.

To adjust the position of a frame, just drag it with the mouse. To delete an unwanted frame or node, select it and then press DELETE

Figure 78. Main Application Level of the Program



4. Click the right mouse button and select **Properties** (or select the frame and choose **Edit > Properties** from the menu) to display the **Frame Properties** dialog. Type **`Main Menu`** in the **Name** field and select **OK**. The frame now appears with the name **Main Menu**.

5. Now create the **Collect Data** frame. Select **Create > Frame**, move the **FRAME** box to the bottom left area of the workspace. Click the right mouse button and select **Properties** to open the **Frame Properties** dialog. Enter **`Collect Data`** in the **Name** field., and select **OK**.

6. Select **Create > Frame**, move the **FRAME** box to the bottom right area of the workspace, click the right mouse button, and select **Properties** to open the **Frame Properties** dialog box. Enter **`Upload Data`** in the **Name** field, and select **OK**.

Creating Links

You now have the three frames of your program. The next step is to create the arrows, or Links, showing the flow of the program between the frames. Complete the following steps:

1. Select **Create > Link** from the menubar or press the **Link** button.

2. Move the **Link** cursor to the **Main Menu** frame and click the left mouse button.
3. Move the **Link** box to the **Collect Data** frame and click the mouse again. An arrow appears, pointing from the **Main Menu** frame to the **Collect Data** frame.
4. Select **Create > Link** from the menubar, click on the **Main Menu** frame, and then click on the **Upload Data** frame. A second arrow appears.

The Links you created give the user access to either the **Collect Data** or **Upload Data** frame from within the **Main Menu**.

To adjust a Link, use the mouse to drag the Link's arrowhead.

To delete a Link, select the ESC key.

Main Menu Access

From each of the action frames, you want to give the user access to the **Main Menu**. You must create additional Links back to the **Main Menu** frame. These will be jointed Links that bend at a 90° angle. Complete the following steps:

1. Select **Create > Link** and click on the **Collect Data** frame.
2. Instead of clicking directly on the other frame, move the cursor straight up until it is level with the **Main Menu** frame, and then click the left mouse button.
3. Now move the pointer to the **Main Menu** frame and click the left mouse button. A jointed line appears.

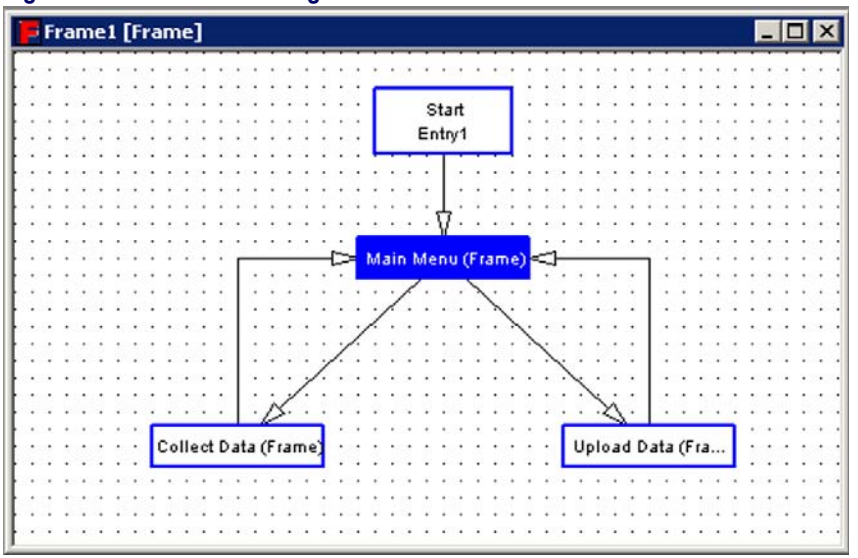
Jointed Links work just like straight Links, but they give you more flexibility in their placement. If a jointed Link appears jagged, drag its joint until its lines are perpendicular.

To redraw the screen and erase any extraneous lines, click in any blank area of the flow chart

4. Use the same method to create a jointed Link from the **Upload Data** frame to the **Main Menu** frame.

Your frame should now look like Figure 79 on page 109.

Figure 79. Flow Chart showing Jointed Links



Creating the Main Menu Nodes

After defining program's frames, you must specify the nodes for each frame.

To view the a frames' nodes, double-click on it. Or highlight the frame and select View > Show Frames/Subroutines from the menubar.

Operation nodes involve more detailed information than frames and are divided into nine node types, with a different dialog box associated with each node. For example, a **Display** node specifies text to display on the portable's screen; that text is entered into a dialog box attached to the node.

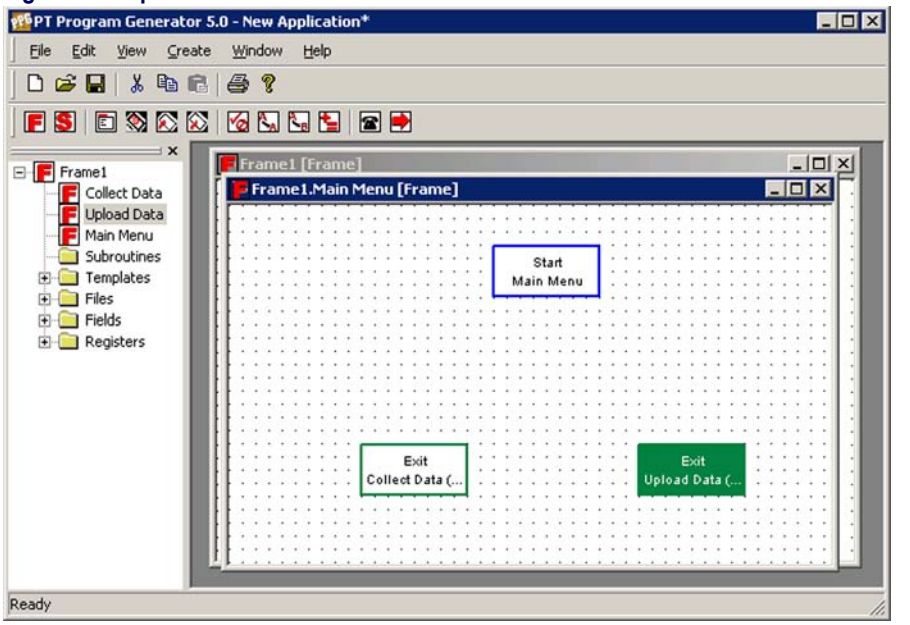
In this section, you will set up the nodes for the **Main Menu** frame. This is a simple frame, creating a path to either of the other two frames. You will create a **Menu** node that advances to the **Collect Data** frame if the user presses **<F3>** and to the **Upload Data** frame if the user presses **<F4>**.

Set up the nodes for the **Main Menu** frame by completing the following steps:

1. Double-click the **Main Menu** frame. A second window opens showing three boxes: **Start: Main Menu, Exit: Collect Data**, and **Exit: Upload Data**. These nodes are created automatically by the Links you set up and they offer entry to and exit from the **Main Menu** nodes.

2. Reposition the existing nodes as shown in Figure 80 on page 110.

Figure 80. Repositioned nodes



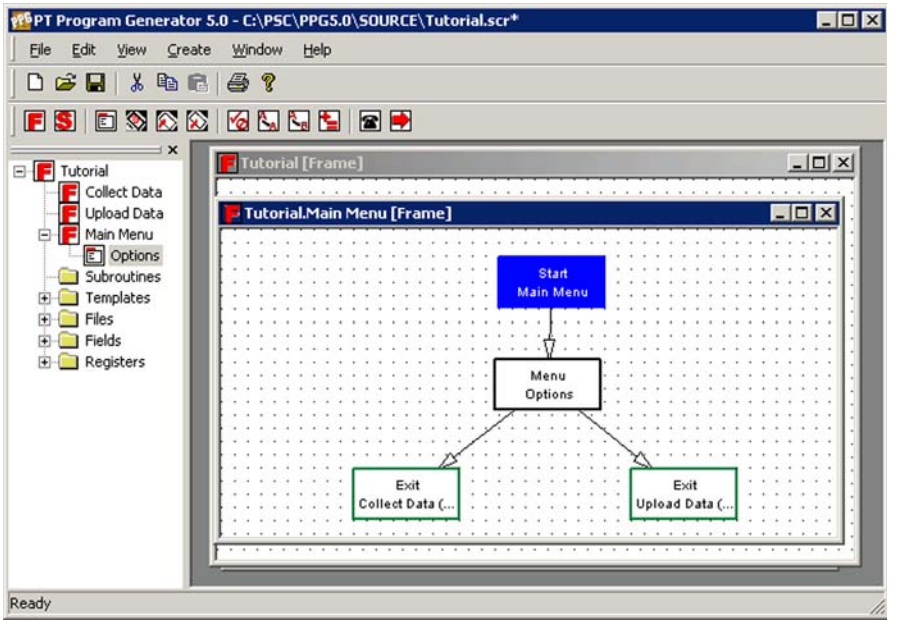
To reposition a node, move the mouse pointer to the node, hold down the left mouse button, and drag the node to its new position with your mouse.

3. Select **Create > Menu** from the menubar. A **Menu node** opens in the lower left of this second window.
4. Right-click the **Menu** node and select **Properties** from the pop-up menu. Or select **Menu > Properties**.
5. Change the node's name to **Options**.

Changing a node's name is identical to changing a frame's name (Refer to Figure 71 on page 101 for changing the name of a frame.) Only the second line of text on the node is changed. The first line always identifies the node's type.

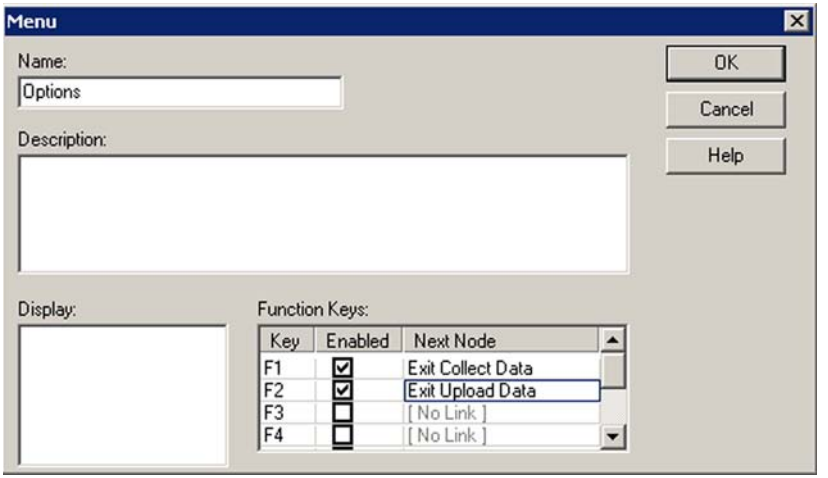
6. Now you need to Link the nodes together to indicate program flow. Select **Create > Link** from the menubar or press the **Link** button.
7. Use the mouse to draw the Links shown in Figure 81.

Figure 81. The completed Main Menu nodes



8. Right-click the **Menu: Options** node and select **Properties** to display the node's **Properties**. The dialog includes a text-entry area, called **Display**, that represents the portable's screen (refer to Figure 82).

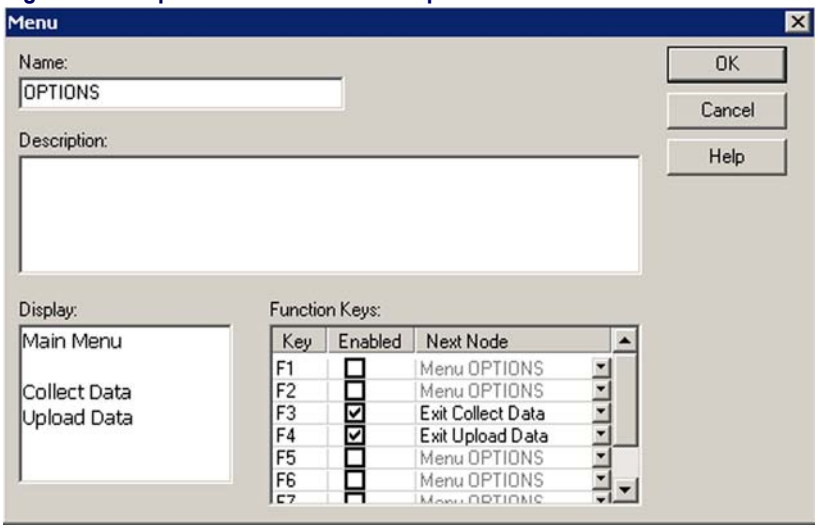
Figure 82. The Menu: Options Dialog Box



9. On the first line of the **Display** area, type **`Main Menu`**.

10. Use the keyboard navigation keys to skip the next line and go to the third line. Enter **`Collect Data`** in the Display area.
11. Go to the 4th line and enter **`Upload Data`**, as shown in Figure 83.
    - To the left of the text-entry area are checkboxes for function keys used to select options presented on the portable's screen.
    - The menu options you've created are designed for function keys **<F3>** and **<F4>** on the portable.
    - To initiate proper actions for these keys, specify which node to progress to for each function key.
12. Enable (check) the **<F3>** checkbox.
    - Click on the down-arrow button in the Next node pull-down list on the right side of the **<F3>** line.
    - A pull-down list appears, listing possible destination nodes.

Figure 83. The pull-down list for Menu: Options



13. Select **Exit Collect Data** so that when the user presses **<F3>**, the program will progress to the Collect Data frame.
14. Enable the **<F4>** checkbox. Click on the down-arrow button next to the next nodes pull-down list, and select **Exit Upload Data** from the displayed list. This moves the program to the Upload Data frame when the user presses **<F4>**.

15. Select **OK** to exit the dialog box. Then close this frame to return to the **Program** level of the application.

Saving Your Program

Even though the program's not complete, it's a good idea to save it periodically while you are creating it. Select **File > Save** to save the program in a file. Enter tutorial in the **File Name** pull-down list of the displayed dialog box, and select **OK**. PPG will add the extension **`*.scr`** automatically.

You have completed the **Main Menu** frame. These nodes display two options on the portable's screen and allow the user to press **<F3>** or **<F4>**. The program checks to see which function key was pressed and passes control to either the **Collect Data** or **Upload Data** frame.

Want a Break?

If you are ready for a break, you can stop here. You have not made changes that need to be saved, so you won't lose any work if you exit PPG or turn off your computer now.

Creating and Setting Up the Collect Data Nodes

The Collect Data frame allows the user to scan bar codes and enter data through the keys of the portable. That data is temporarily stored in a register and then copied into a file, which can be uploaded later to a PC.

You'll set up data-collection nodes to do the following:

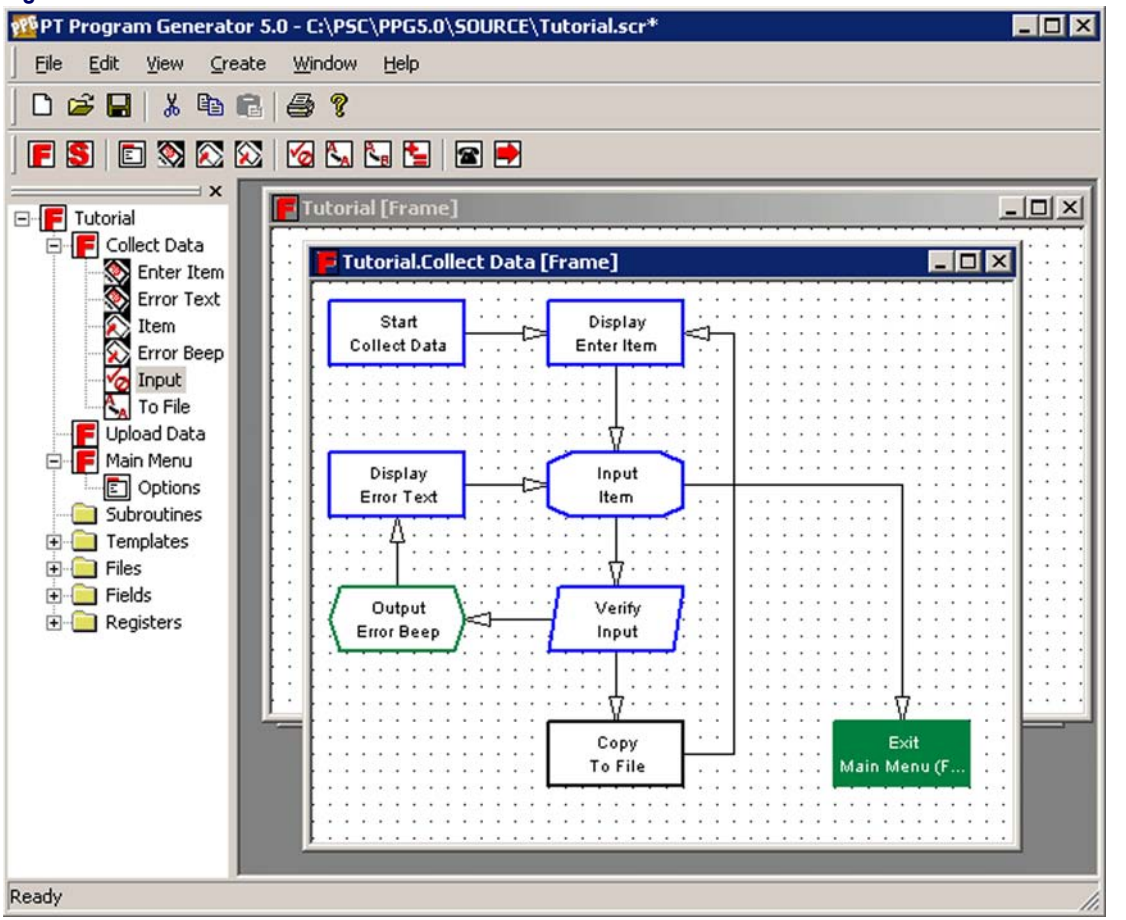
- Display a message on the portable's screen telling the user that the portable is ready to accept data.
- Allow data input from the scanner (scanner) or the portable's keys, specify how to handle each type of input, and name a register in which to store the data temporarily.
- Verify that the user input is valid and, if it is not, display an error message and sound a beep.
- Copy the data from the temporary register to a data file and redisplay the initial message asking for input.

In addition, you will create an option that will allow the user to return to the Main Menu by pressing a function key.

Create nodes for the **Collect Data** frame by completing the following steps:

1. If you're returning from a break after exiting PPG, double-click on the PPG icon in the PT Program Generator. Then choose **File > Open** and select tutorial.scr from the file list. Select **OK** to load the file into the PPG window.
2. At the Program level, double-click the **Collect Data** frame to access its contents. Because this frame has two Links (one to it and one from it), there are two nodes initially created: **Start: Collect Data** and **Exit: Main Menu**. Position these nodes so that the Entry node is in the upper left corner and the Exit node is at the bottom right.

Figure 84. The Collect Data nodes



3. Create all the nodes shown in Figure 84 on page 114, using commands on the **Create** menu or icons on the **Toolbar**. Each node's type is indicated by the first line of text in the node. Rename each node according to the second line of text. Link the nodes together as shown.

If you click twice on the Start or Exit node, this frame will move to the background window. Clicking on any visible part of the Collect Data frame will bring it to the foreground.

When Linking the Verify: Input node, create the Link to the Output: Error Beep node first. Then create the Link to the Copy: To File node. This will place the correct Link in the Next node options of the Verify: Input node.

The Display: Enter Item Node

You need to set up this node to display "Enter Item:" on the first line of the portable's screen and have the fourth line of the screen tell the user to press **<F4>** to return to the Main Menu. Complete the following steps to set up the node:

1. Double-click the **Display: Enter Item** node to open the node's dialog box (refer to Figure 85 on page 115).
2. Type **`Enter Item:`** on the first line of the text entry area.
3. Use the keyboard navigation keys to move to the fourth line and enter **`Menu`**.
4. Select **OK** to save your settings.

Figure 85. The Display: Enter Item

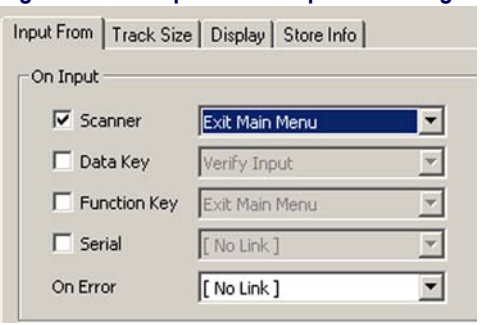
The Input: Item Node

Complete the following steps to set up this node:

1. Double-click the **Input: Item** node to display its dialog box (refer to Figure 86 on page 116).

2. On the **Input From** tab, the **Input From** checkboxes let you indicate which sources of input you want the portable to accept. Select the **Scanner**, **Data Key**, and **Function Key** checkboxes. This allows the user to input data by scanning or pressing keys.

Figure 86. The Input: Item Properties Dialog: Store Info Tab



- A pull-down list appears next to each selected checkbox. Specify a separate **Link To** setting for each type of input allowed.
- Select **scanner** and **data-key input** to Link to the **Verify: Input** node.
- Select **function key** input to return the user to the **Main Menu**.

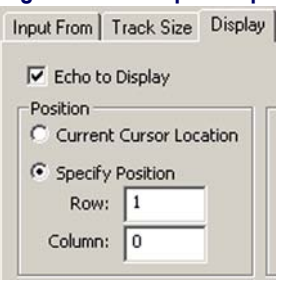
3. If you want the user to view the data while it is entered, enable the **Echo to Display** checkbox on the **Display** tab. This displays the characters entered with the data keys on the portable's screen. To specify the exact position on the screen, select **`Specify Position`**.

The Echo to Display option displays keyed-in characters only until the user presses the <Enter> key. Once the data is entered (or scanned), the program moves on through the next nodes and redisplays the menu text, overwriting the echoed characters.

To avoid this, you must add Output nodes to reposition the cursor and display the echoed characters on a different line. This is demonstrated later in the tutorial.

4. Select the **Specify Position** checkbox. **Position** boxes become available, allowing you to indicate the exact row and column you want the echoed data to begin on.
   - Position it on the second row and first column.
   - Columns and rows are numbered starting with **`0`** instead of **`1`**; so enter **`1`** in the **Row** field to indicate the second row and **`0`** in the **Col** field to indicate the first column.

Figure 87. The Input Properties: Display Tab



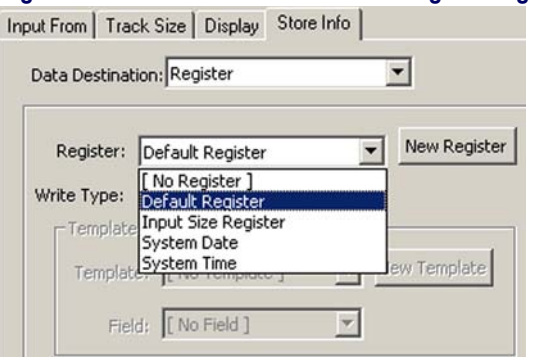
5. Create a special register for the input data to keep it separate from other data.

Figure 88. The Input: Item Properties Dialog: Store Info Tab

**A Register is a temporary holding place for data. Unless you specify otherwise, the program stores input data in a register named Default Register. **

6. Click on the **Store Info** tab. Select **`Register`** from the **Data Destination** pull-down list, as shown in Figure 89 on page 117.

Figure 89. Pull-down List of Available Program Registers



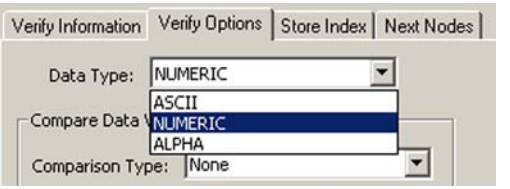
7. Press the **New Register** button to open a **Create Register** window. Enter **`Inventory`** in the **Create Register** field to create a new **Register** named **Inventory**. Press **OK**.
8. In the **Write type** pull-down list, select **`Overwrite`** to clear existing data from the register before storing newly input data.
9. Press **OK** to create the new **Register**.
10. Press **OK** to save your settings and exit the **Input Item** dialog box.

The Verify: Input Node

The **Verify** node ensures that the data entered is numeric. If the data isn't numeric, the node passes control to the **Output** and **Display** nodes, which sound a beep and display an error message. Complete the following steps to set up this node:

1. Double-click the **Verify: Input** node to display its **Properties**.

Figure 90. The Verify: Input Dialog Box



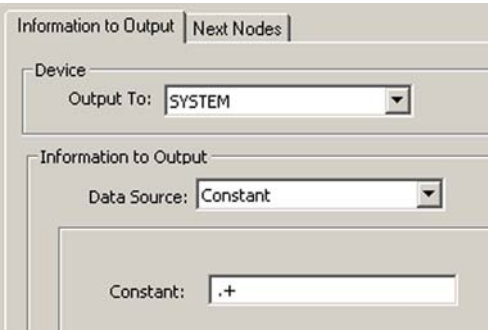
2. On the **Verify Options** tab, select **`Numeric`** from **Data Type** pull-down list. Leave the **Comparison** pull-down list set to **`None`** to NOT verify a specific number.
3. The selections for **Next nodes** are automatically set according to the Links you create. The top Link always defines the **Pass** setting. It should be set to go to the **Copy: To File** node if the data is numeric (**Pass**) and the **Output: Error Beep** node if it's not (**Fail**).
4. Specify what register to verify in the **Verify Information** tab. Select **`Inventory`** from the **Register** pull-down list. Scroll through the list to find it if necessary.
5. Press **OK** to save your settings and exit the dialog box.

The Output: Error Beep Node

Now you need to set the **Output** node to sound a beep. Complete the following steps:

1. Double-click the **Output: Error Beep** node to display its dialog box.

Figure 91. The Output: Error Beep Dialog Box



2. On the **Information to Output** tab, select **`System`** as the **Output To** setting and **`Constant`** as the **Data Source** setting.
   - In the constant field, enter the characters **`.+`** (period and plus). This is the command to sound a high beep.
   - Or enter **`.-`** to sound a low beep.)
3. Press **OK** to save your settings and exit the dialog box.

The Display: Error Text Node

You can have a special message appear when the error beep is sounded.

Double-click on the **Display: Error Text** node, enter the text shown in Figure 92, and press **OK**.

Figure 92. The Display: Error Text Dialog Box

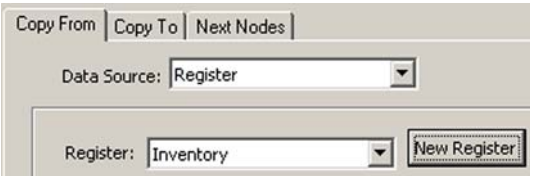
The Copy: To File Node

Finally, you need to set up the **Copy: To File** node to copy data from the Inventory register to a portable file for transmittal back to the PC. Each time new data is scanned or entered, existing data in the **Inventory** register is replaced. Therefore, the data must be copied and appended to a data file.

Complete the following steps:

1. Double-click the **Copy: To File** node to display the dialog box.

Figure 93. The Copy: To File Dialog Box



2. On the **Copy From** tab, leave the **Data Source** field set to **`Register`**.
3. Select **`Inventory`** from the **Register** pull-down list.
4. On the **Copy To** tab, select **`File`** from the **Data Destination** pull-down list.
5. Press the **New File** button to open the **Create File** window.
6. Enter **`Monthly Inventory`** in the **Name** field.
7. Press **OK** to save your new file.
8. In the **Write Type** pull-down list, select **`Append`**.

The file name can include spaces and more than eight characters.

9. Press **OK** to save your settings and exit the dialog box.
10. Press the **Close** button to return to the main Program level.
11. Select **File > Save** to save your changes to the application file.

The **Collect Data** nodes you created prompt the user to enter data, and they accept that data either through scanning or data keys. If the data is verified as numeric, it is appended to a data file named **`Monthly Inventory`**. If it's not numeric, the portable beeps and displays an error message. Pressing a function key brings back the **Main Menu**.

Creating and Setting Up the Upload Data Nodes

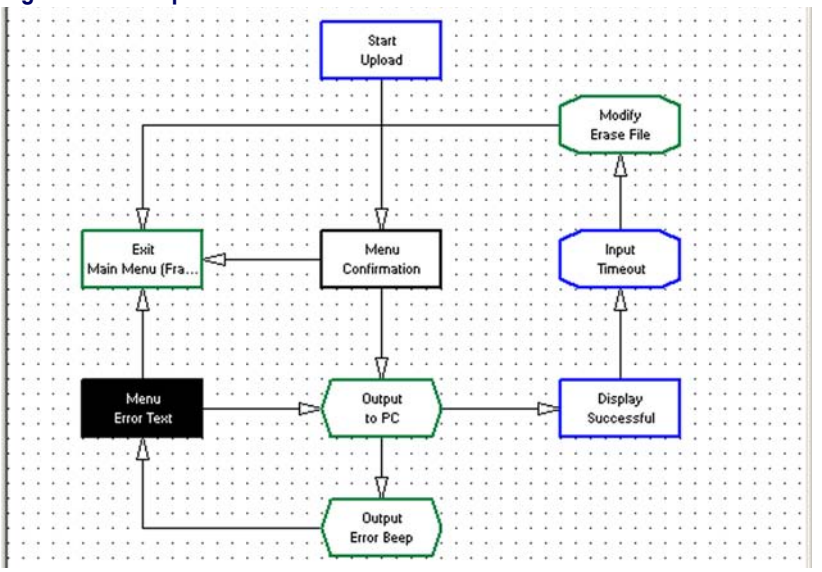
The last frame, **Upload Data**, allows the user to copy collected data from the portable's file to a file on the PC. You will set up nodes that do the following:

- Display a menu asking if the user wants to upload data.
- If the response is **Yes** (**<F3>**), send data over the serial connector to the PC. If the response is **No** (**<F4>**), exit to the **Main Menu**.
- If the output is successful, display a message indicating so for 45 seconds (or until the user presses a key), and then clear the portable's file and return to the **Main Menu**. If the output is unsuccessful, beep and display an error message, and then redisplay the prompt.

Create nodes for the **Upload Data** frame by completing the following steps:

1. Double-click on the **Upload Data** frame to view its contents.

Figure 94. The Upload Data nodes



2. Reposition the **Entry** and **Exit** nodes as shown in the completed flow chart in Figure 94 on page 121.
3. Create and name the new nodes shown in Figure 94 on page 121, and add the Links as shown.

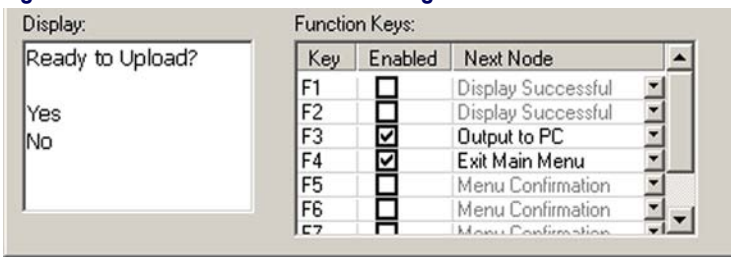
When creating the Links from the Output: to PC node, create the Link to the Output: Error Beep node first. This Link will be selected for the Next Node/On Error option.

The Menu: Confirmation Node

Complete the following steps to set up this node:

1. Double-click on the **Menu: Confirmation** node to open its dialog, and enter the text shown in Figure 95. Leave the second line blank.

Figure 95. The Menu: Confirmation Dialog



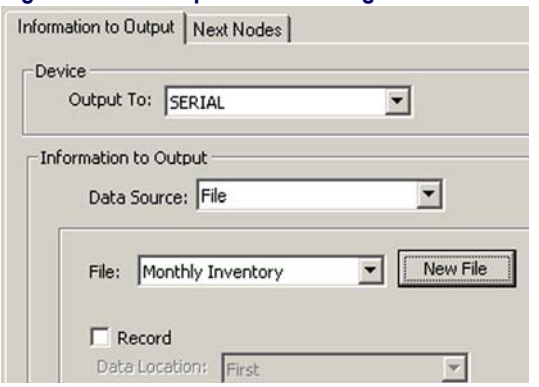
2. Enable the **<F3>** checkbox. Select **`Output to PC`** in the **Next Node** column to begin data output when the user presses **<F3>**.
3. Select the **<F4>** checkbox, and select **`Exit Main Menu`** from the pull-down list. This will redisplay the **Main Menu** when the user presses **<F4>**.
4. Press **OK** to save your settings and exit the dialog box.

The Output: to PC Node

Complete the following steps to set up this node:

1. Select the **Output: to PC** node to open its dialog (refer to Figure 96 on page 123).
2. On the **Information to Output** tab, select the **Serial** setting for **Output To Device**. This will send the output to the serial port of the portable, which should be connected to the serial port of the PC.

Figure 96. The Output To: PC Dialog Box



3. From the **Data Source** pull-down list, select **`File`**. From the **File** pull-down list select **`Monthly Inventory`**.
4. On the **Next Nodes** tab, select **`Display Successful`** from the **Next Node** field and **`Output Error Beep`** from the **On Error** field.
5. Press **OK** to save your settings and exit the dialog box.

The Output: Error Beep Node

Complete the following steps to set up this node:

1. Select the **Output: Error Beep** node to open its dialog box.
2. On the **Information to Output** tab, select **`System`** as the **Output To** setting and **`Constant`** as the **Source** setting.
3. Enter **`.+`** in the **Source** pull-down list. This is the code which tells the portable to sound a high beep.
4. On the **Next Nodes** tab, select **`Menu Error Text`** for both fields.
5. Press **OK** to save your settings and exit the dialog box.

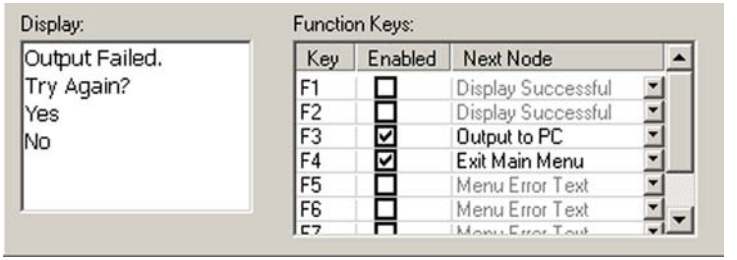
The Menu: Error Text Node

Complete the following steps to set up this node:

1. Select the **Menu: Error Text** node and enter the text shown in Figure 97.
2. Enable the **<F3>** checkbox and select **`Output to PC`** from the pull-down list to attempt a second output if the user presses **<F3>**.

Enable **<F4>** and choose **`Exit Main Menu`** to return to the **Main Menu** if the user presses **<F4>**.

Figure 97. New text for the Menu: Error Text node



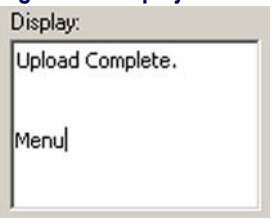
3. Press **OK** to save your settings and exit the dialog box.

The Display: Successful Node

Complete the following steps to set up this node:

1. Select the **Display: Successful** node to open its dialog.
2. Enter the text shown in Figure 98.

Figure 98. Display text for successful upload



A Menu node is not required here, because only one option is given, and it is executed if *any* function key is pressed, not only <F4>. The Input node that follows this operation will accomplish this task.

3. Press **OK** to save your settings and exit the dialog.

The Input: Timeout Display Node

Complete the following steps to set up this node:

1. Select the **Input: Timeout Display** node to open its dialog box.
2. Enable the **Function Key** checkbox. Select **`Modify Erase File`** in the box to the right of the **Function Key.**

3. Enable the **TimeOut** checkbox. Enter **45** in the **Seconds** pull-down list that appears next to **TimeOut**. This instructs the program to return to the **Main Menu** if the user presses a function key or if 45 seconds pass with no input.
4. Press **OK** to save your settings and exit the dialog.

The Modify: Erase File Node

After you have uploaded data from the portable file, you will want to erase its contents. Otherwise, further data you collect is appended to the data you just uploaded, and your data file will quickly grow out of control. Complete the following steps:

1. Select the **Modify: Erase File** node to open its dialog box.
2. On the **Data to Modify** tab, select **File** in the **Data Destination** pull-down list.
3. Select **Monthly Inventory** from the **File** pull-down list.
4. On the **Modification type** tab, select **Delete** from the pull-down list.

Figure 99. The Modify Type Tab: Erase File

5. On the **Next Node** tab, select **Exit Main Menu** from the pull-down list.
6. Press **OK** to save your settings and exit the dialog.

The nodes for uploading data are now complete. Close the **Upload Frame to** return to the main program level. Then select **File > Save** to save your changes to the file.

The nodes that you created for the **Upload Data** frame ask the user for confirmation of the upload task. If the user answers **Yes**, it outputs the data file over the serial port. If the upload is successful, a message is displayed, the portable's file is cleared, and the **Main Menu** returns. If the upload is unsuccessful, the program beeps, displays an error message, and gives the user the option of trying again.

Your portable program should now be complete.

Want a Break?

If you are ready for a break, you can easily stop here. You have not made any changes that need saving, so you won't lose any work if you exit PPG or turn off your computer.

Loading and Using the Program

Now that your program is tested and complete, it's time to load it into the portable and try it out.

Loading the Program onto the Portable

Complete the following steps to load the program onto the portable:

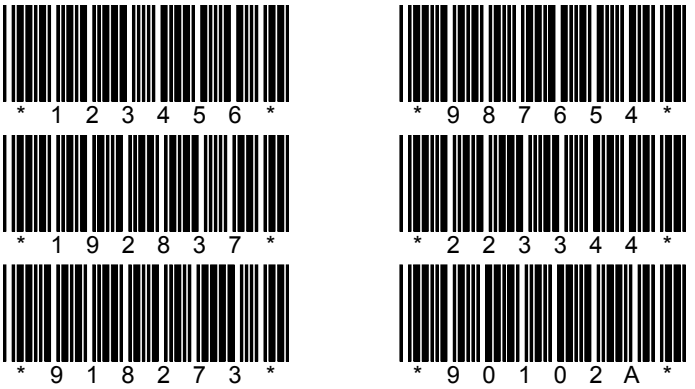
1. If the cable is not already connected to your portable and the PC, connect it now.
2. Turn the portable on.
3. In the PPG window, select **File > Download Program**. (If you are prompted to save your changes, answer **Yes**.)
   - The PSC **Portable Compiler** window appears while PPG compiles the program.
   - When compiling is complete, the PSC **Portable Programmer** window displays the message **Initiating Download**. If the connection is successful, the program is loaded into the portable.
   - When downloading is complete, the message **Portable successfully programmed** appears in the PSC **Portable Programmer** window, and the program's Main Menu is displayed on the portable's screen.

If you have problems, refer to Downloading the Program to the Portable on page 172

Using the Program on the Portable

Complete the following steps to run the application you just downloaded to the portable:

1. Double-click on the **PPGXFER** window's **Control-menu** box or select **File > Exit** to close the window. (If downloading was unsuccessful, choose **Abort** from the menubar first.)
2. Double-click on the **Control-menu** box in the **Compiler** window to close it.
3. Disconnect the portable from the cable, and press the **<F3>** key to begin collecting data.
4. Scan the following bar codes at least once. Each time a code is scanned correctly, you should hear a single beep.



   - You will not see the scanned codes on the portable's screen, because they are overwritten by the redisplayed menu once the data is input.
   - When you scan the last code, which contains an alphabetic character, you'll hear a double beep, indicating an error.

5. Enter the following four codes using the portable's data keys. The portable beeps each time you press a key. Press **ENTER** after each complete number.

```
12345          67890
98765          54321
```

6. Press the **<F4>** key to return to the program's **Main Menu**.

Creating and Using Templates

The programs you've worked with so far handle singular information: You scan or enter one code at a time, and the data is stored one entry per line. But suppose you wanted to collect sets of different types of data. If you were taking inventory, for example, rather than scanning each item in a group of identical products, you might want to scan only one of them and then use the data keys to record the number of items in the group.

You could add another **Input** node to the **Collect Data** frame of your program to store the types of data in different registers, but the data file you would end up with would have code numbers and quantity numbers on alternate lines, as in the following:

```
3849293
5
9385834
12
9848495
8
```

This arrangement of data would be difficult for an inventory or database program to interpret. Most programs expect to see related values on the same line, as in the following:

```
3849293, 5
9385834, 12
984849, 8
```

In this arrangement, each line is referred to as a record, and each item on the line is called a field. The database program can be set up to treat the first field as an inventory code and the second as a quantity value.

The way you tell a portable program to arrange data as fields in records is with a template. A template defines the structure used to access data. Most often, a template is used to combine values from two different registers as fields in a single register. The fields are either set to a fixed length (so that they appear in columns in the data file), or they are allowed a variable length with a separator (such as a comma) separating them. However, you can also use a template to break apart data stored in a register into separate fields.

You will incorporate a template into the **TUTORIAL** program to collect and store quantity values along with each item number. To do this, you'll add the following new nodes to the existing **TUTORIAL** program:

- A new **Display** node that will prompt the user to enter a quantity value after an item number is entered
- A new **Input** node that will use a template to store the quantity value in a register field
- Two **Output** nodes that will display the last-entered item and quantity values as a pair

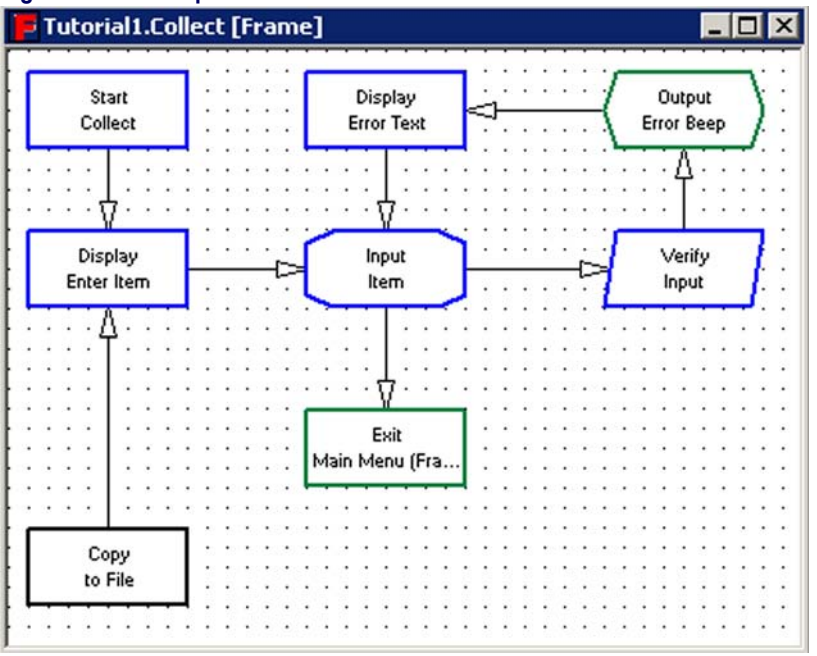
You will also alter the existing **Input** node to use a template.

Creating the New Nodes

Create the new nodes by completing the following steps:

1. If PPG is not already started on your PC, from the Windows **Start** menu, select **Programs > PT Program Generator > PT Program Generator** to load PPG.
2. Select **File > Open** from the menubar to load the **`tutorial.scr`** file. (Your screen will have Links not shown in Figure 100.)

Figure 100. The Repositioned Collect Data Nodes



3. At the **Program** level, select the **Collect Data** frame, and reposition the nodes as shown in Figure 100.

4. Delete the Link from the **Verify** node to the **Copy** node.

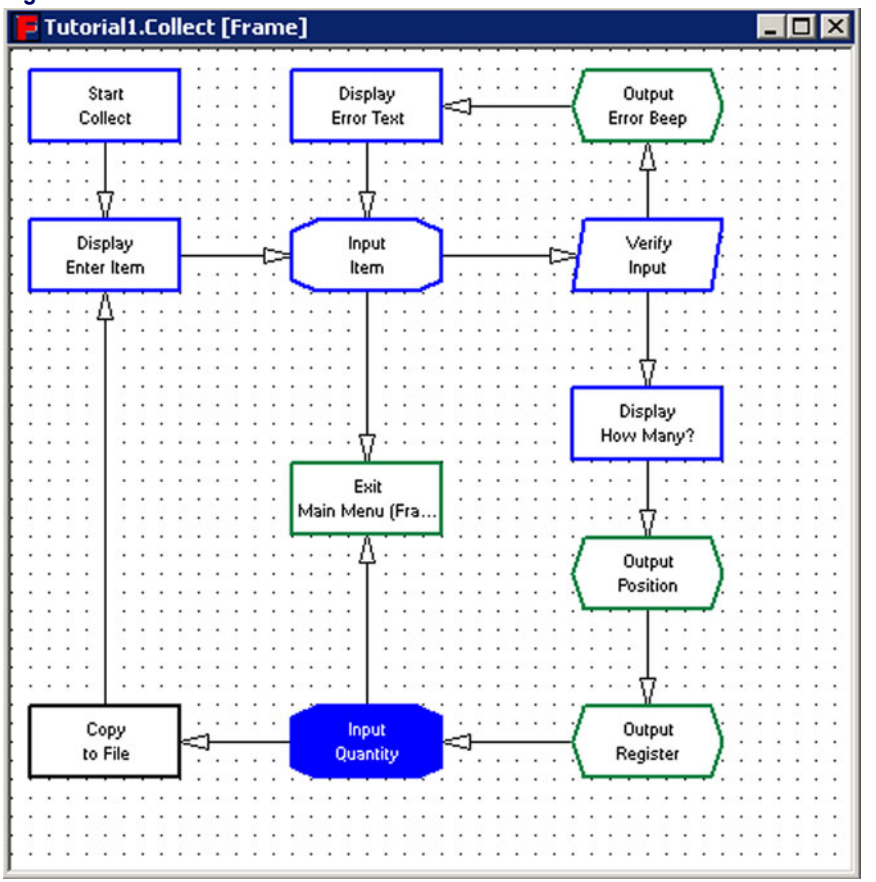
To delete a Link, use the mouse to drag its arrowhead away from a node, and double-click the left mouse button.

You can either delete existing Links and create new ones or drag the joints of the Links until they line up.

5. Adjust the Links from the **Copy** node to the **Display** node and from the **Input** node to the **Exit** node so that they are no longer jointed.

6. Add the new nodes and Links shown in Figure 81, and rename the nodes as shown.

Figure 101. The New Collect Data nodes



7. Select the new **Display** node (**Display: How Many?**).'
   - Enter **How Many?** on the 1st line and **Menu** on the 4th line.
   - Press **OK**.
8. Skip over the two **Output** nodes for now, and select the new **Input** node (**Input: Quantity**).
   - On the **Input From** tab, enable the **Data Key** and **Function Key** checkboxes. Make sure the **Scanner** checkbox is disabled.
   - Link the **Function Key** setting to **Frame Main Menu** and the **Data Key** setting to **Copy to File**.
9. On the **Display** tab, enable the **Echo to Display** checkbox.
   - Select **Specify Position** from the pull-down list, enter **1** in the **Row** pull-down list, and **0** in the **Col** box.
   - Press **OK**.

Creating the Fields

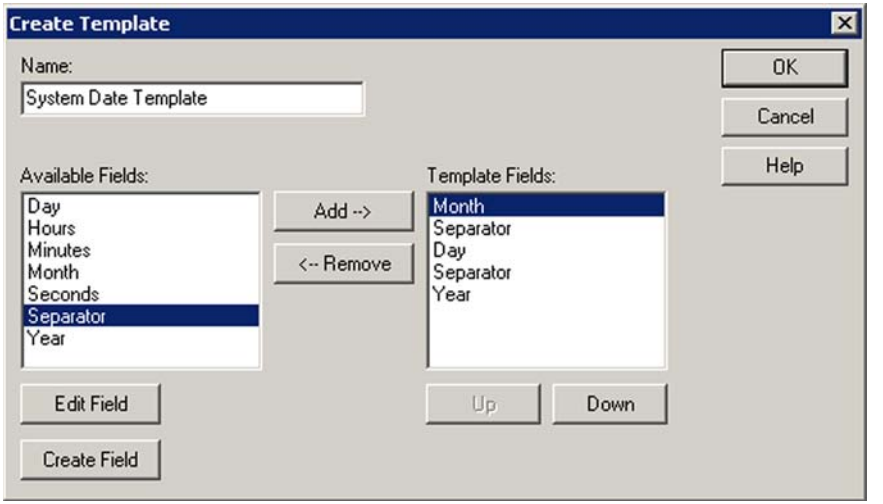
Create the template fields by completing the following steps:

1. On the **Store Info** tab on the **Input: Quantity** dialog, select **Register** as the **Data Destination** type. Select the **Inventory Register**.

Inventory is the same register used to store the item number. To keep one value from being overwritten by the other, you can create a template to divide the register into two fields: one for the quantity and one for the item number.

2. To create the template name, select **Field** as the **Write** type.

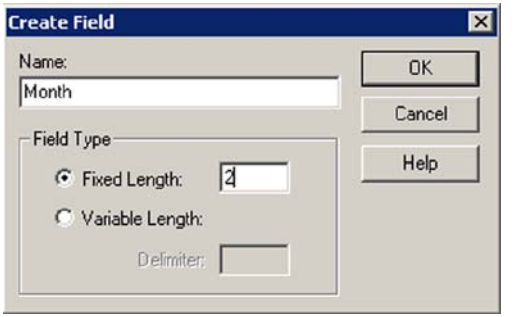
Figure 102. The Create Template Dialog



- Press the **New Template** button to open a **Create Template** dialog.
- Enter **`Combine`** for the name of the new template.

3. Create the field names and define their lengths.
   - Click on the **Create Field** button to display a **Create Field** dialog.

Figure 103. The Define Field Dialog Box



- Define two fields for this template: **Item** and **Quantity**. Enter **`Item`** in the **Field** box.
- To allow any length, select the **Variable Length** option and enter a comma (**`,`**) in the **Delimiter** field. This separates the two values with a comma. Press **Done**.
- The **Item** field should appear on the **Create Template** dialog in the list of available fields.

4. Select **Create Field**, and enter **Quantity** in the **Field Name** box.
   - Select **Variable**, enter a space in the **Delimiter** field and press **OK**.
   - The **Quantity** field should appear on the **Create Template** dialog in the list of available fields.
5. Define the order of the fields in the template.
   - Select **Item** from the available fields list and press the **Add** button to add it to the **Template Fields** pull-down list.
   - Select **Quantity** from the available fields list and press the **Add** button to add it to the **Template Fields** list.

You may need to scroll through the list to find the fields you want.

6. Press **Okay**. You can now use the templates and fields in the nodes.
7. On the **Store Info** tab, in the **Template Field**, select **combine**.
   - Set the **Field** to **Quantity**. This tells the program to store the value input after the **How Many?** prompt in the **Quantity** field of the **Inventory** register.
   - Press **OK**.
8. Specify storing the input item number in the **Item** field of the register. (The program will work correctly whether or not you perform this step.)
   - Select the **Input: Item** node and select **Field** as the **Write Type**.
   - Select **Combine** from the **Template** pull-down list, **Item** from the **Field** pull-down list, and press **OK**.
9. The two new **Output** registers allow you to display the **Item** value without overwriting the **How Many?** prompt.
   - Select the first one (**Output: Position**), and select the **Information to Output** tab.
   - The **Information to Output** field lets you send commands to the portable. To create a command, press the **Add** button.
   - From the **Select Operation** field, select **Move Cursor down/y columns right**. Enter values for the rows and column positions.

Columns and rows are numbered starting with 0, instead of 1. Row 0, Column 0 places the output on the first column of the first line of the display.

- Press **OK**.

10. To display the contents of the **Inventory** register at the cursor position on the portable's screen, select the **Output: Register** node, select **`Inventory`** from the **Register** pull-down list, and press **OK**.
11. Select **File > Save** to store the changes you have made.
12. Connect the portable to your PC as described in Loading the Program onto the Portable on page 126, and select **File > Download** from the menubar.
    - This compiles the new program and loads it onto the portable.
    - When it has finished downloading, you can experiment with collecting data using the new program.
    - After you enter the item and quantity values, both entries are displayed together on the third line, separated by a comma.

This is the end of the tutorial. What you have learned here should give you the understanding and background needed to develop custom portable programs.

Creating & Using Nodes on page 49 and Managing Data on page 77 provide all the required information and options.

Appendix B
Example Frames

This section provides examples of several commonly used **Frames** you can use in your custom PPG application. The program source files (**`*.scr`** file) for the example frames are installed during PPG installation; they are installed by default in **`c:\Program Files\PSC\PPG50\TIPSRC`**. Topics covered include:

If a **Frame** (refer to Frames on page 50) executes an action used in multiple locations, create a **Subroutine** (refer to Subroutines on page 51) to contain the action and execute it with a **Call** node (refer to Call Nodes on page 72).

Setting the Date and Time

All PSC portables include a clock that keeps track of the current date and time. To allow users to adjust the date and time settings, complete the following steps:

1. Create a new **Output** node.
2. Set the **Output Destination** to **`System`**.
3. Select **`Constant`** as the **Data Source**.
4. Enter this command as the constant:
   - To set the **time**: **`%-`**;
   - To set the **date**: **`%`**.
   - **Example**: **`%-%`** displays the old time or date.
5. Enter the new time or date; if the time or date is correct press **<ENTER>**.

Changing the Auto-Off Timeout

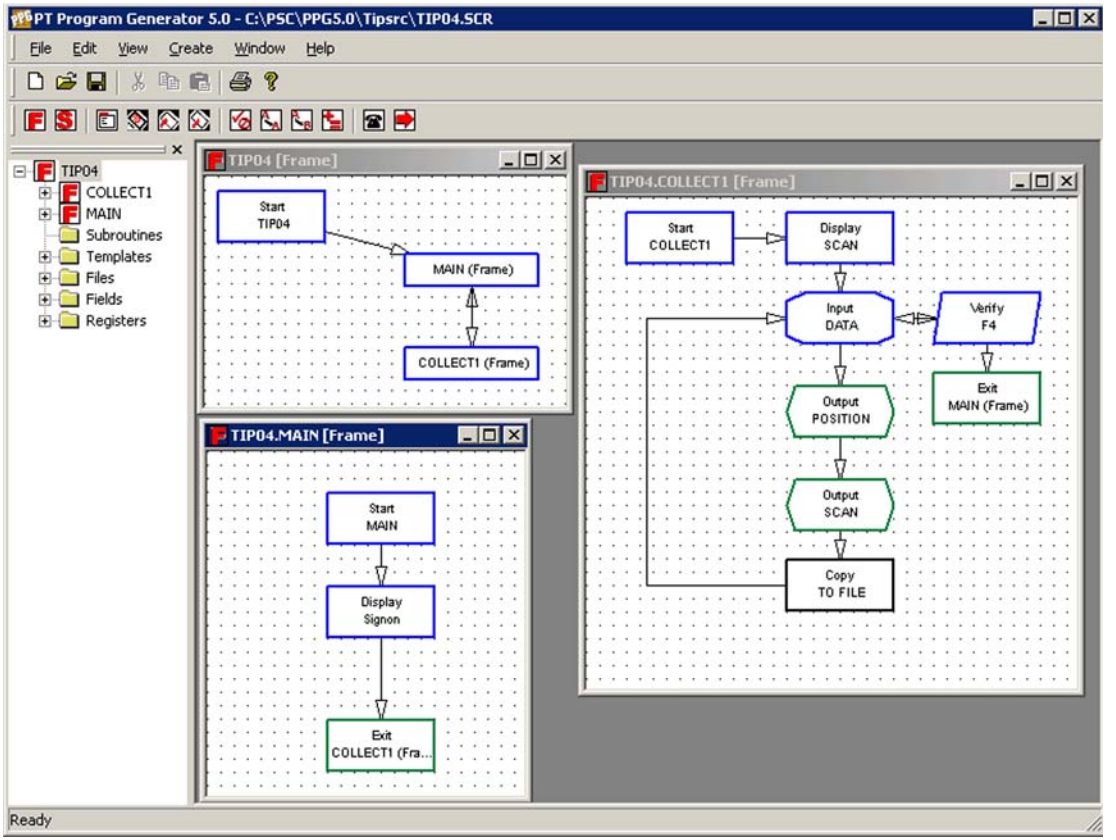
By default, the PSC portable powers off automatically after ten minutes of inactivity. To change this setting, complete the following steps:

1. Create a new **Output** node.
2. Set the **Output Destination** to **`System`**.
3. Select **`Constant`** as the **Data Source**.
4. Enter this command as the constant: **`$+$-B2nnEE`** where **`nn`** = the number of minutes of inactivity.
   - **Example**: **`$+$-B205EE`** sets the **Auto-off timeout** at 5 minutes.

Displaying the Contents of a Register

Tip04.scr, illustrated in Figure 104, displays the contents of a register on the portable, using two **Output** nodes as follows:

Figure 104. Tip04.scr Flow Chart



1. Creates a new **Output** node, called **Position**.This **Output** node sends information to the existing display and position the cursor within the display screen.
   - Selects **Output to Display**.
   - Chooses **Display Command** as the **Data Source**.
   - Selects **Add** to add the commands to move the cursor and erase text to the end of the line.

2. Creates a new **Output** node, called **Scan**. This **Output** node writes the register contents starting at the cursor position.
   - Selects **`Output to Display`**.
   - Chooses **`Register`** from the **Data Source** pull-down list.
   - Chooses **`Default Register`** from the **Register** pull-down list.

The first **Output** node prevents the register contents from being written on the last line of the display, which is not always desirable. The second output node sends the contents of the **Default Register** to the display.

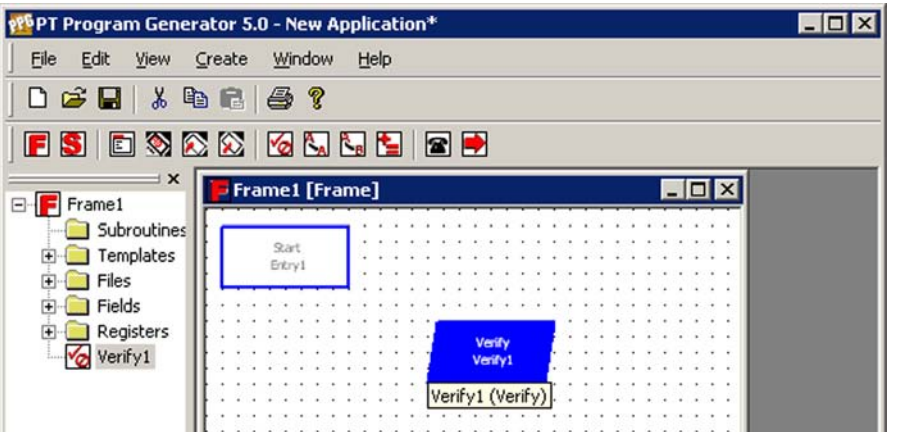
Sample Verification Methods

Verifying a Numeric Value

Often, collected values must conform to a specific type. PPG can check data to verify that it meets the user's criteria. Create an application to check to see if a value is numeric:

1. Create a **Verify** node.

Figure 105. Newly Created Verify Node

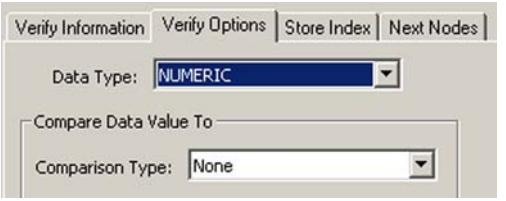


2. Select the location of the data value to be verified.

Figure 106. Verify Information Tab: Register Data Source

3. On the **Verify Options** tab, select **`Numeric`** as the **Data Type**.

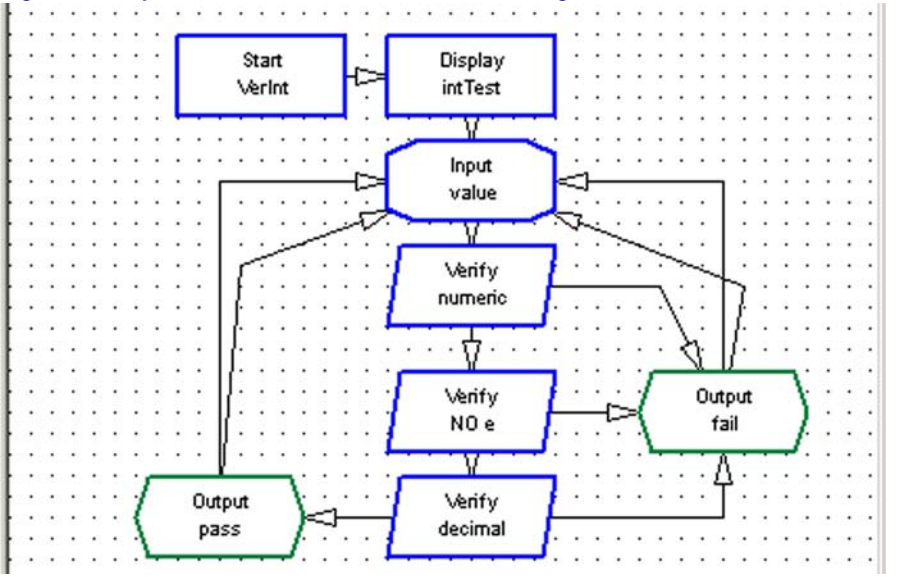
Figure 107. Verify Options Tab: Numeric Data Type



Verifying that a Number is an Integer

Another type check that may be needed is to confirm that data is an integer, rather than a fractional numeric value. This is done using a combination of **Verify** nodes to check the numeric value for characters that can not be integers.

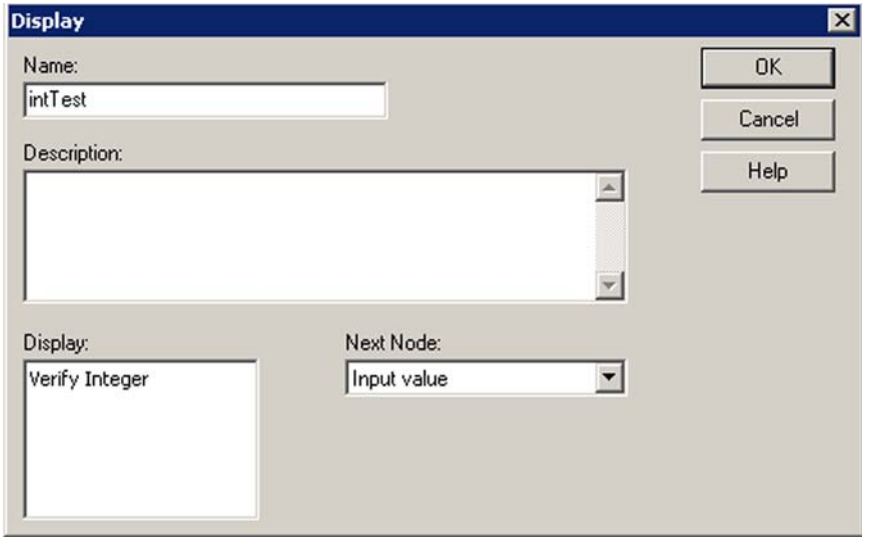
Figure 108. Tip15.scr Verifies that a Number is an Integer



Tip15.scr, illustrated in Figure 108 on page 139, confirms that data is an integer and performs the following steps:

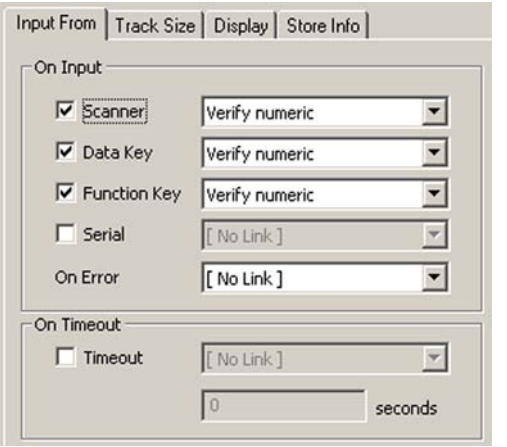
1. Display **Verify Integer.**

Figure 109. Display Integer Test



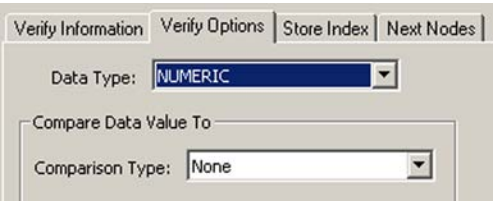
2. Enter the value to check.

Figure 110. Display Input Value



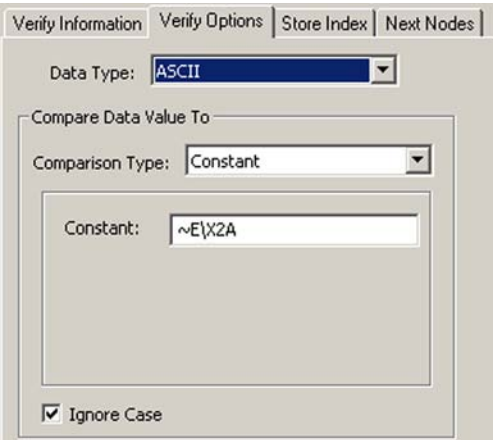
3. Verify that the value is numeric (checks for any valid floating point format).

Figure 111. Verify Numeric



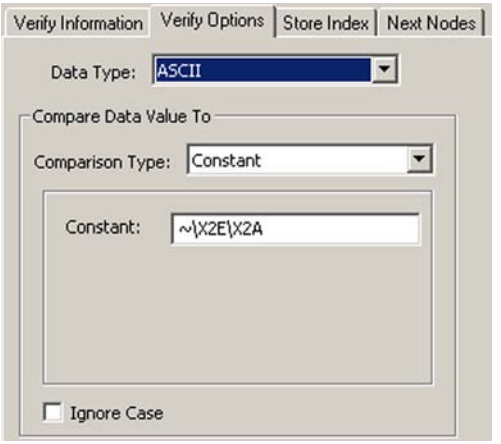
4. Verify that there is no **e** in the value (floating point allows for exponents. i.e. **1.25e-6** is a valid floating point value).

Figure 112. Verify No e



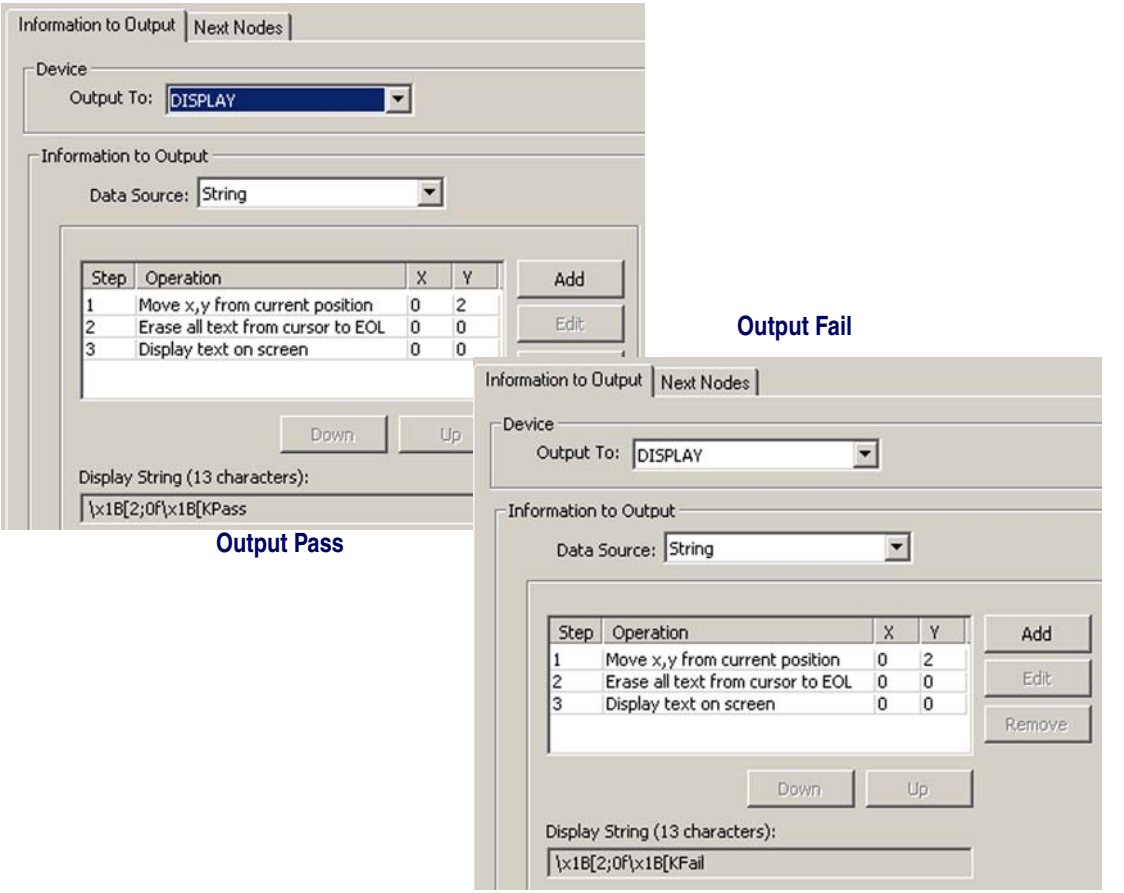
5. Check for a **.** (decimal point) (values with fractions are not integers).

Figure 113. Verify Decimal



6. Displays the result (**`pass/fail`**).

Figure 114. Displays Pass or Fail

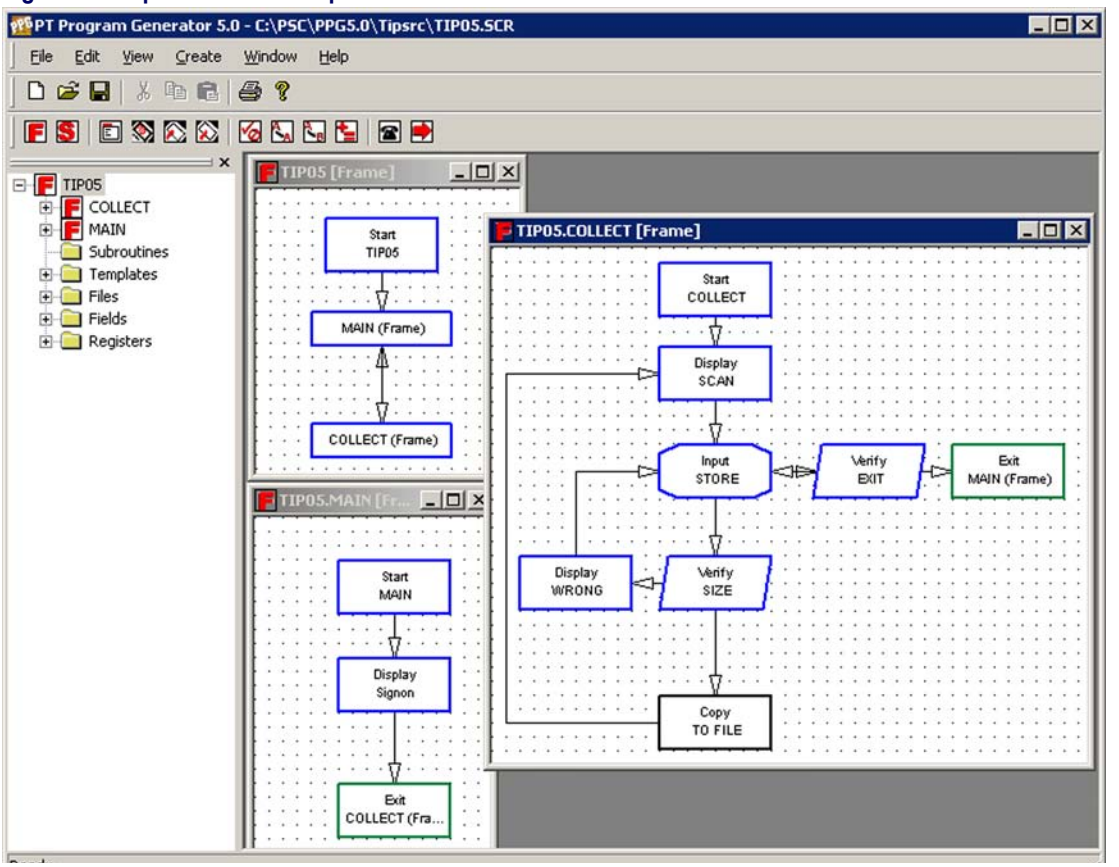


Verifying Input Size

To verify that a scanned or entered code is a given number of characters or within a given range, use the **Size to Register** option in the **Input** node collecting the data. This option stores the number of characters of the given input in a separate register, which can then be checked with a **Verify** node.

This example is illustrated in **`Tip05.scr`**, which is shown in Figure 115 on page 143.

Figure 115. Tip05.scr Verifies Input Size



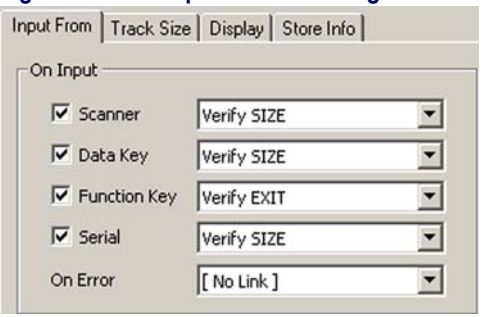
Display: SCAN Instructs the user to scan a bar code.

Input: STORE Stores the input code in the default register and (with the **Size to Register** option) stores the character length of the code in a register named **Input Size** (refer to Figure 116).

In the example, the **Input** node named **Store** puts the number of characters into a register using the size to register option. Be sure to use different registers to store the size and the input.

The **Verify** node named **Size** then verifies that the input is between **6** and **10** characters long. If the size is incorrect, the display named **Wrong** prompts the user to try again. If the size is correct, the scan is copied to a file and the program continues.

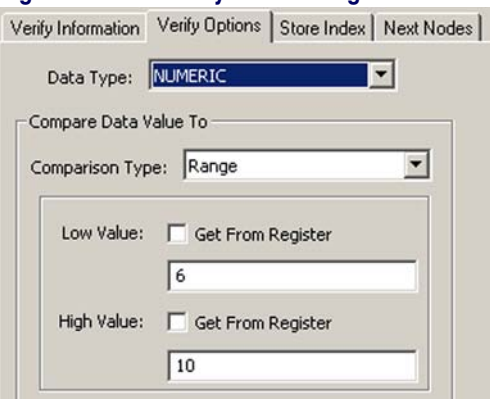
Figure 116. The Input: STORE Dialog



Verify: EXIT Checks to see if the user pressed **<F4>**. If so, it exits the frame.

Verify: SIZE Checks the value stored in the **Input Size** register. The options in its dialog box are set as shown in Figure 117.

Figure 117. The Verify: SIZE Dialog



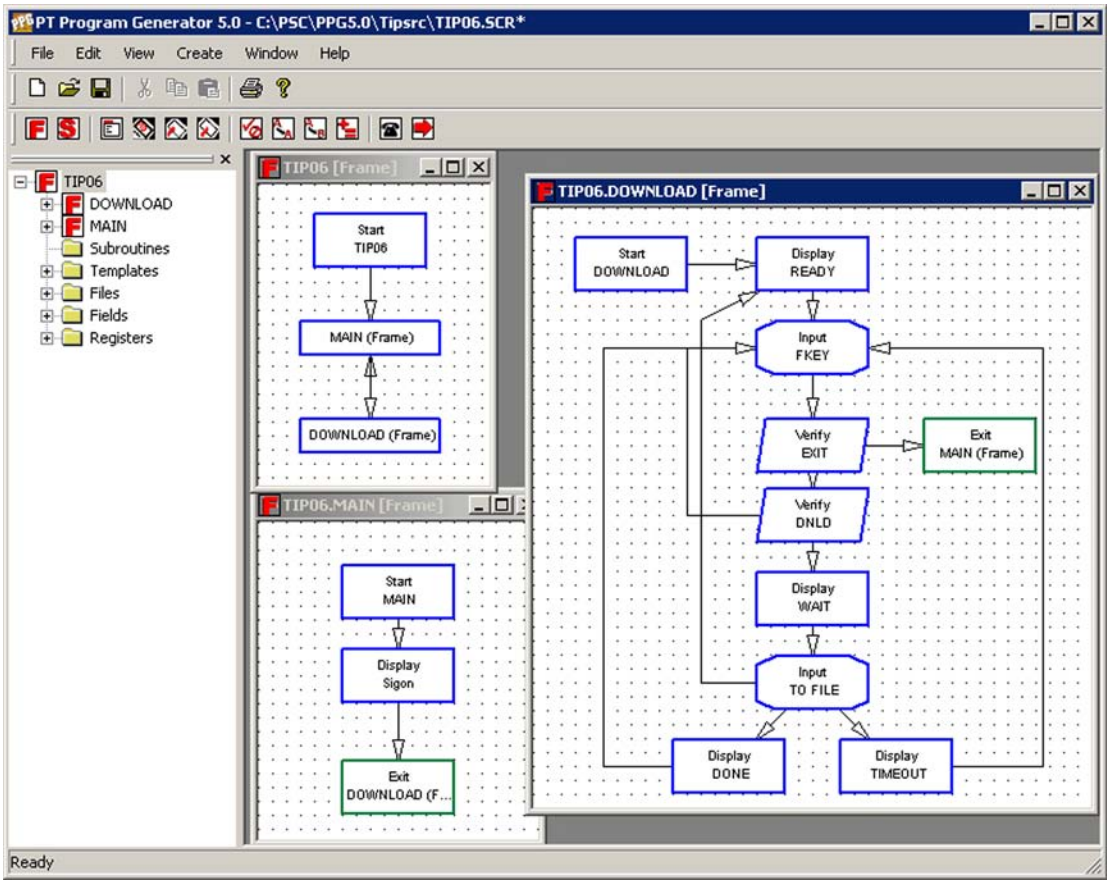
Copy: TO FILE Copies the scanned code from the default register into a file and loops back to the **Input: STORE** node if the **Input Size** value is within the given range (**6** to **10**) so that further codes can be scanned.

Display: WRONG Displays **INCORRECT INPUT; REENTER** if the **Input Size** value is outside the defined range, on the portable's screen and loops back to the **Input** node so that the code can be scanned again.

Downloading a File to a PSC Portable

Usually, users will need to upload files containing scanned or input codes to a host computer. However, it is sometimes necessary to download a file from a host to a portable. For example, you might have an inventory file that you need to check scanned codes against. **`Tip06.scr`**, shown in Figure 118, downloads a file from the host computer to a connected portable.

Figure 118. Tip06.scr Downloads a File to a PSC Portable



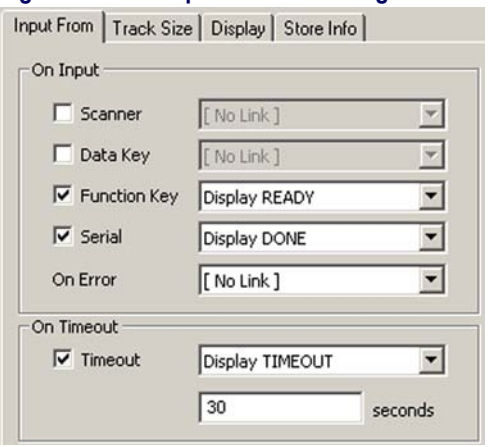
Display: READY	Instructs the user to press **<F3>** to download a file or **<F4>** to exit.
Input: FKEY	Accepts function key input.
Verify: EXIT	Checks to see if **<F4>** was pressed and, if it was, exits the frame.

Verify: DNLD Checks to see if **<F3>** was pressed and, if it was, continues to the **Display** node. If **<F3>** was not pressed, the program loops back to the **Input** node and waits for further input.

Display: WAIT Displays **Downloading, Please Wait** on the portable's screen.

Input: TO FILE Starts downloading the file. Options in its dialog box are set as shown in Figure 119 on page 146.

Figure 119. The Input: TO FILE Dialog



Display: DONE If downloading is successful, **Display: DONE** displays **DOWNLOAD DONE; <F3>= MORE; <F4>=QUIT** on the portable's screen.

Display: TIMEOUT If downloading is unsuccessful, **Display: TIMEOUT** displays **TIMEOUT EXCEEDED; <F3>=TRY AGAIN; <F4>=QUIT** on the portable's screen.

Input: FKEY Both these **Display** nodes loop back to the **Input: FKEY** node, which accepts the user's function key input.

To download a file to a portable, set options for the **Input** node as follows:

Serial Selected for the **Input From** option.

Time Out Selected for the **Input From** option. Should Link to a **Display** node that prompts the user to try again.

Destination Set to the desired file. Choose to replace existing data or place new data at the beginning or end of the file or at a given record number.

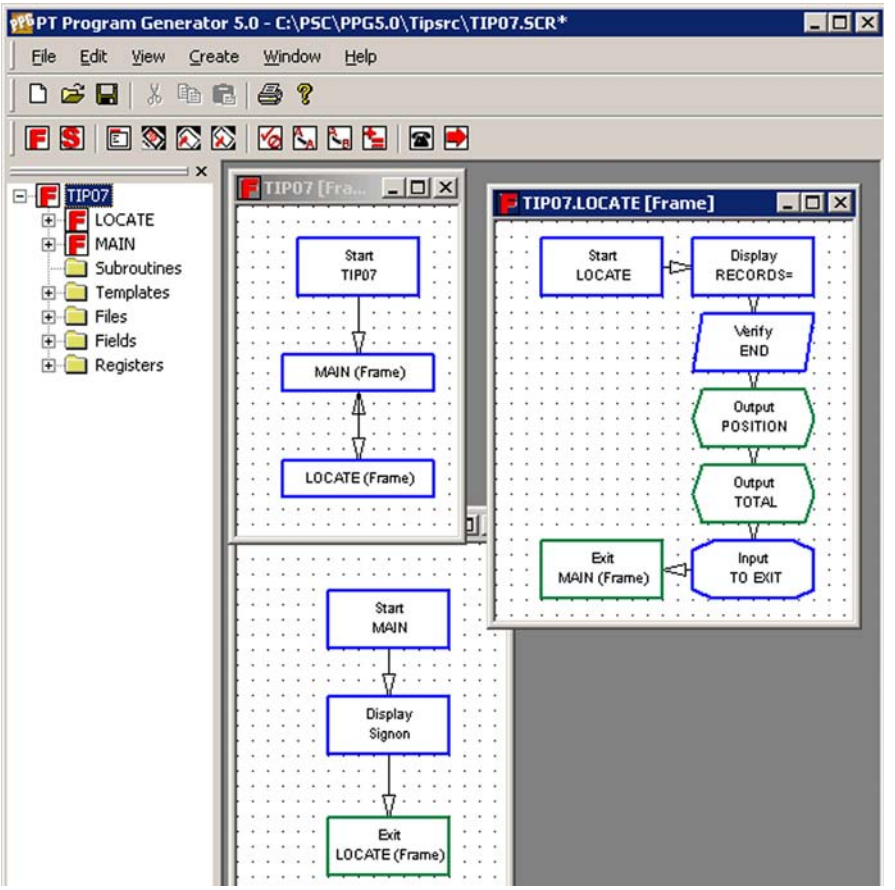
Echo to Display Enabled so that the user can see the file going into the portable unit.

Finding the Number of Records in a File

The easiest way to determine the number of records in a file is to use a **Verify** node with **Match** set to a value you know is not in the file and the **Store Index** in **Register** checkbox selected (with a register specified for storing the index value). Since it won't find a match, the program will return the file size, storing it in the index register.

Another method copies a known value to the end of the file, uses a **Verify** node to locate it, and then subtracts **1** from the **Location Index**. **`Tip07.scr`**, illustrated in Figure 120, demonstrates this method.

Figure 120. Tip07.scr Determines the Number of Records in a File



Display: RECORDS Writes **RECORDS=** on the portable's screen.

Copy: END	Copies the constant value “end” to the end of the file being checked.
Verify: END	Looks for the constant “end” in the file and stores the index value of the matching record in a register named INDEX.
Math: INDEX-1	Subtracts 1 from the index value.
Modify: DEL END	Deletes the “end” record so that the constant doesn’t corrupt the file.
Output: POSITION	Positions the cursor at column 8 in the first line, directly after **RECORDS=**.
Output: TOTAL	Displays the index value at the cursor position on the portable screen.
Input: TO EXIT	Waits for a function or data key to be pressed before returning to the Main frame.

Searching for a Partial Match

A partial match for data in a file may be searched for using the wild card characters “**~**” and “*****” and a **Verify** node. By inserting “**~,**” on the front and appending a ***** to the end of a register containing the desired partial match data and searching the file with that register, the first record with the beginning characters in the second field of the register will be found if one exists.

For example: to look up **Part #** in a comma delimited Default File with **Locations** and **Prices** by **Part #** such as:

```
Loc1,0001,1.00
Loc1,0010,2.00
Loc2,0100,10.00
Loc2,1000,100.00
Loc3,1001,250.00
```

enter **1000** at a prompt. To look up the **Price** for **Part # 1000**, insert “**~,**” in front of the register and append a “*****” to the end of the register so the result is:

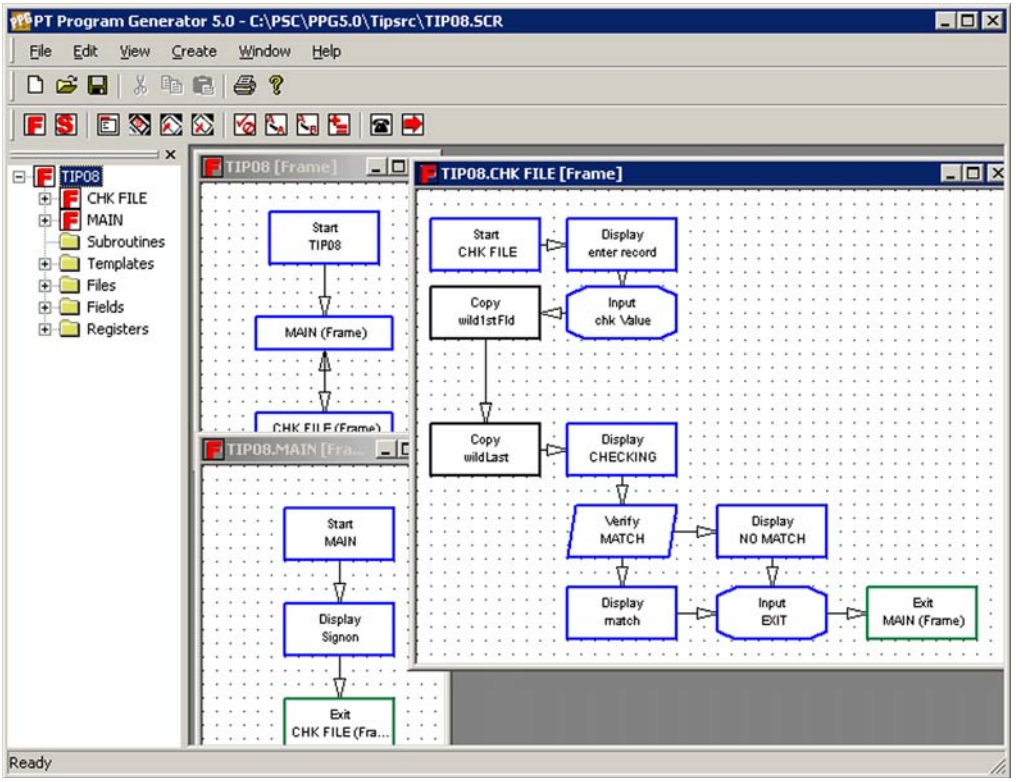
```
~,1000*
```

Use that register in a **Verify** node as the Comparison type against the Default File to determine whether there is a match.

To search for a partial match, complete the following steps:

1. Input **Item ID** into **Default Register** **overwriting**.
2. Copy insert “**~,**” into the **Default Register**.
3. Copy append “*****” to the **Default Register**

Figure 121. Tip08



4. In the **Verify** node **Verify Information** tab, select **`File`** as the **Data Type**. and **`Default File`** as the **File** type.

5. In the **Verify** node, **Verify Options** tab, select **`ASCII`** as the **Data Type**, **`Register`** as the **Comparison** type, and **`Default Register`** as the **Register** type.

Searching for Data in a File

A search of a multiple field file for data in one field of the file may be accomplished using the "**~**" and "*****" wildcard characters and a **Verify** node. Multiple files are not necessary.

For example: if the collected data in the **Default File** is comma delimited with the following structure:

```
Location
Asset #
Date
Time
```

Example data:

```
Room 1,12345,2/24/2003,13:39:53
Room 1,12346,2/24/2003,13:39:58
Room 2,12347,2/24/2003,13:45:33
Room 2,12348,2/24/2003,13:39:43
```

If duplicate Asset #'s are to be disallowed, the **Asset #** must be looked up in the second field and, if found, display a message and disallow the entry. Enter "**12347**" at the **Asset #** prompt and store it in the **Default Register** field **Asset #**, copy **Asset #** to the **Lookup** register, insert "**~,**" on the front of the entry and append "**,***" onto the end of the entry so the result is:

```
~,12347,*
```

Use the **Lookup** register in a **Verify** node as the comparison type against the **Default File** to determine the existence of a duplicate record.

To search for a data in a file, complete the following steps:

1. Input **Asset #** into **Default Register Asset #** field
2. Copy the **Default Register Asset #** field to the **Lookup** register
3. Copy insert "**~,**" onto the front of the **Lookup** register
4. Copy append"**,***" to the **Lookup** register
5. In the **Verify** node, **Verify Information** tab, select **File** as the **Data Type** and **File** as the File = **Default File** type.
6. In the **Verify** node, **Verify Options** tab, select **ASCII** as the **Data** type, **Register** as the **Comparison** type, and **Lookup** as the **Register** type.

Splitting Records into Two Files

This method is still valid, but no longer recommended since you can use Wildcards. Use Searching for a Partial Match on page 148, instead.

When verifying only a part of a record, you can accelerate the process by splitting the record into two different files and referencing each file's index position. For example, if you had a file with the following records showing item numbers and descriptions:

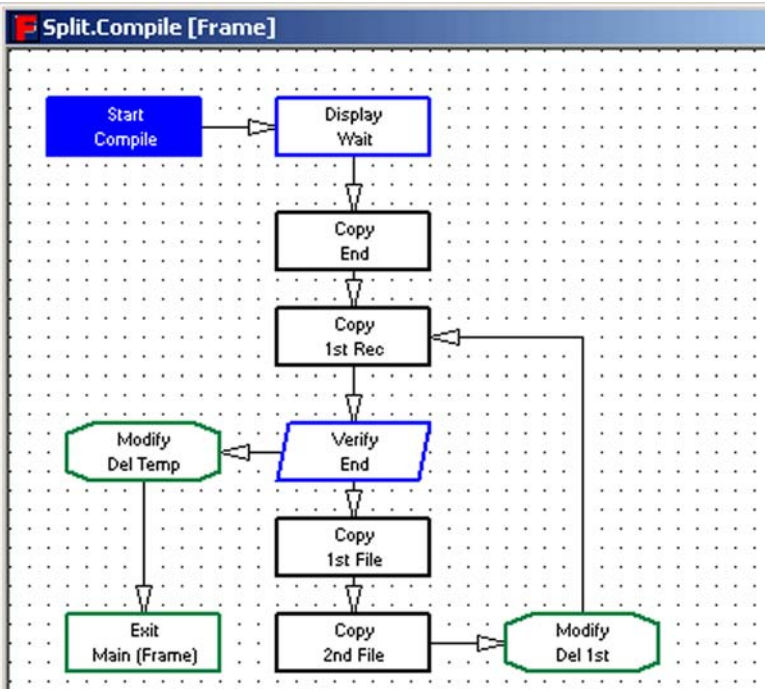
```
item1, desc1
item2, desc2
item3, desc3
```

you could divide it into two files as follows:

File1	File2
item1	desc1
item2	desc2
item3	desc3

Instead of searching through both item numbers and descriptions, your program could search through **File1**, which contains item numbers only. When the item number is found, you can use the same index number to find the matching description in **File2**.

Figure 122. Splitting Records into Two Files

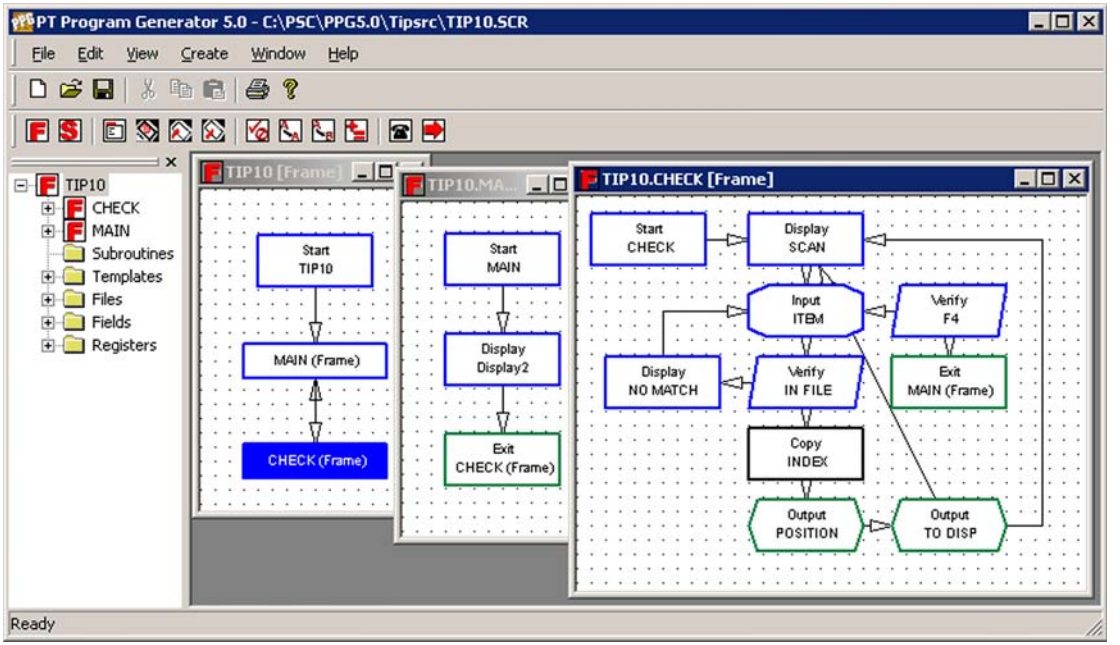


Display: WAIT	Instructs the user to wait while the PSC portable completes this process.
Copy: END	Places the constant “end” at the end of the file to mark the last record.
Copy: 1ST REC	Copies the first record in the file into the default register.
Verify: END	Checks to see whether the default register contains the constant “end”.
Copy: 1ST FIL	If the default register doesn’t contain “end”, **Copy: 1ST FIL** copies the first part of the record to a different file (1st file), and **Copy: 2ND FIL** copies the other part of the record into another file (2nd file).
Modify: DEL 1ST	Deletes the first record in the original (default) file; what was the second record in the file is now the first.
Copy: 1ST FIL	The program loops back to **Copy: 1ST FIL**, and the next record is split into two different files.
Modify: DEL TEMP	This loop continues until the program reaches the final record (containing “end”). At that point, the program knows it has reached the end of the file, and **Modify: DEL TEMP** deletes the default file to make sure it is clear for the next time it is used. The program then returns to the Main frame.

Referencing Two Different Files

`Tip10.scr`, illustrated in Figure 123 on page 153, uses two data files: one that contains item numbers and one that contains item descriptions. Records in both are sorted identically. By referencing data in both files, this example displays the description of an item whose number is entered by the user.

Figure 123. Tip10.scr References Two Different Files



Display: SCAN	Prompts the user to enter an item number or press **<F4>** to quit.
Input: ITEM	Stores the input entry in the default register.
Verify: <F4>	Checks to see whether the user pressed **<F4>**. If so, the program returns to the main frame.
Verify: IN FILE	Checks the contents of the default register against the file with the items in it. Figure 124 on page 154 shows the settings in the dialog box for the node.

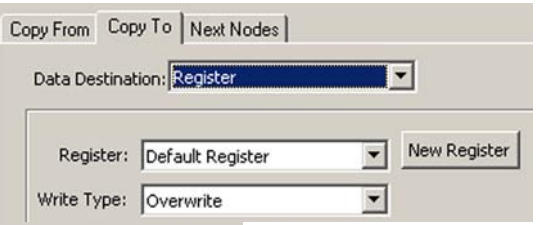
Figure 124. The Verify: IN FILE Dialog

Display: NO MATCH — If there is no match, **Display: NO MATCH** instructs the user to enter the item number again and loops back to **Input: ITEM**.

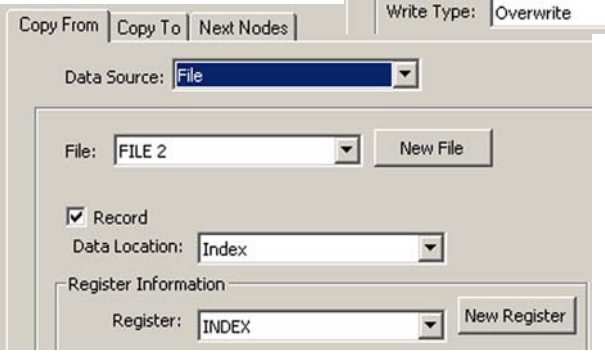
Copy: INDEX — If there is a match, the indexed position is put into a second register, and **Copy: INDEX** copies the record at that indexed position from the description file into the default register (refer to Figure 125 on page 154).

Figure 125. The Copy: INDEX Dialogs

Copy To Tab



Copy From Tab



Output: POSITION — Positions the cursor on the portable screen.

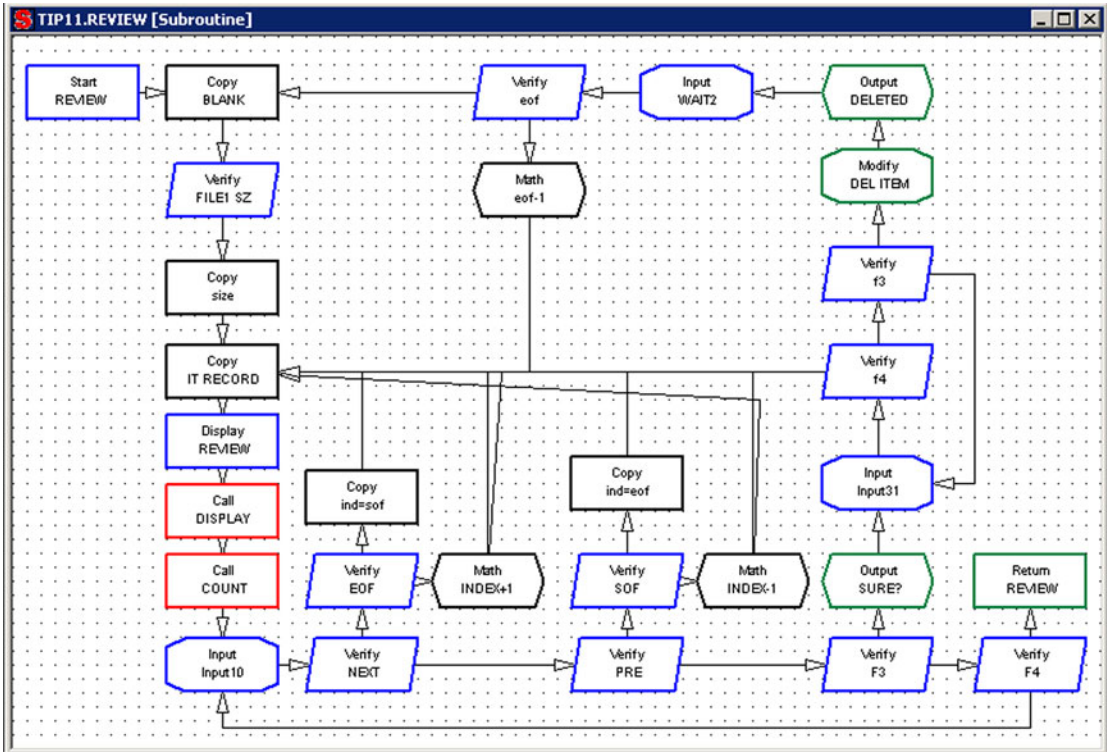
Output: TO DISP — Writes the item description at the cursor position.

Display: SCAN — The program returns to **Display: SCAN**, prompting the user to enter an item number again.

Reviewing a File

Tip11.scr, illustrated in Figure 126 on page 155, lets the user review the contents of a file, one record at a time.

Figure 126. Tip11.scr Reviews a File



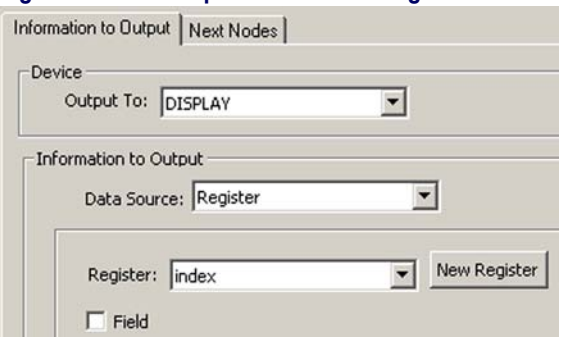
Copy: END Copies the constant “end” to the end of the default file to mark the last record.

Copy: INDEX=1 Copies the number 1 into a register named **Index**. This register will determine which record is displayed.

Verify: END Looks at the record at the position specified in the **Index** register. If the record contains “end”, this is the last record in the file, and the program deletes the “end” record and exits to the main frame. If it does not find “end”, the program continues to the **Output** node.

Output: INDEXED Displays the contents of the record at the position specified in the **Index** register on the portable’s screen. Figure 127 on page 156 shows the settings in the dialog box for the node.

Figure 127. The Output: INDEXED Dialog



Math: INDEX+1 Increments the value in the INDEX register by 1 so that the next record in the file is displayed.

Input: NEXT Keeps the record contents displayed until the user presses a key. The program then loops back to **Verify: END** so that the next record can be displayed.

The loop continues until the "end" record is reached, at which point the program deletes the "end" record and exits the frame.

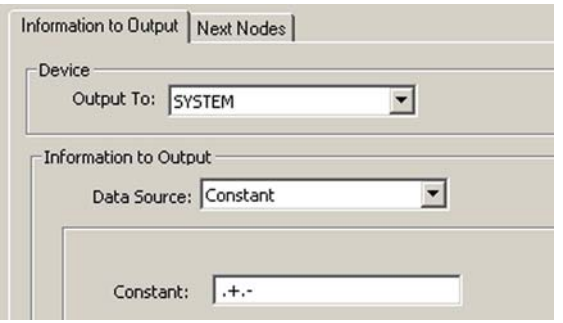
The file is displayed one record at a time on the screen. Each time the user presses a key, the next record is displayed on the last line, and the previous line moves up. The user can scroll the screen up to see previous entries in the file.

A variation of this example gives the user the ability to search through records in both directions: First, find the end of the file (refer to Finding the Number of Records in a File on page 147). Next, output the first record and give the option to see the next or the previous record. Then, increment or decrement the counter and verify that the range is between 1 and the end-of-the-file value.

Sounding a Beep

To sound a beep on a portable, use an **Output** node with the **Source** option set to **Constant** and **Destination** set to **System**.

Figure 128. Output Beep Node



In the constant field, enter the human readable text of one of the following codes:

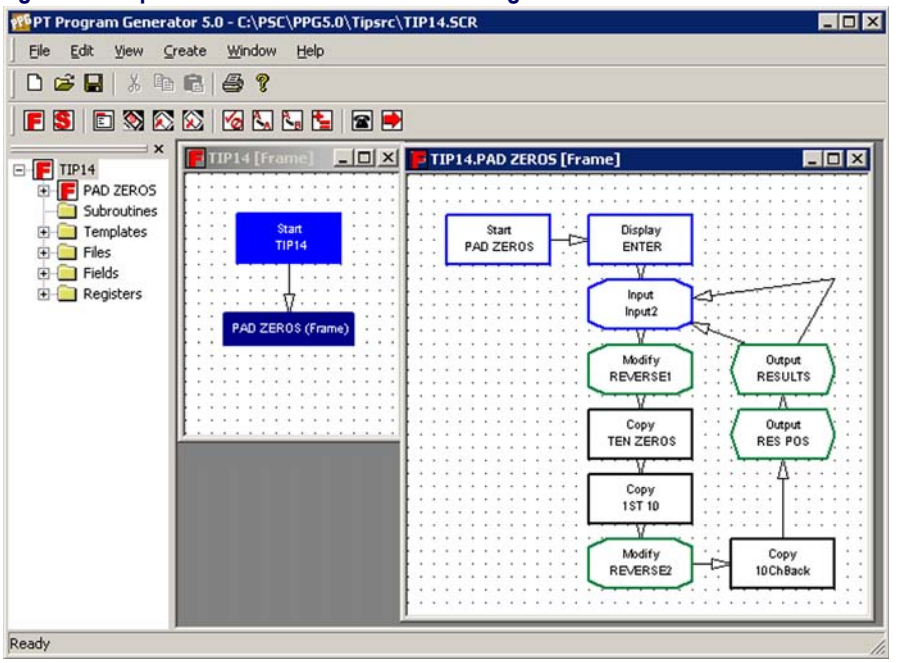
Sounds a high beep	. +
Sounds a low beep	. -

You can enter more than one code, for multiple tones. For example, **.+.-.+** sounds a high beep followed by a low beep followed by another high beep.

Padding a Number with Leading Zeros

Many database programs use fixed-length fields, which means that values stored in them must be a given number of characters long. Values with fewer than the required characters can be "padded" with zeros at the beginning; the value 12, for example, would appear as **0012**. **Tip14.scrn**, illustrated in Figure 129 on page 158 uses a combination of **Modify** nodes, **Copy** nodes, and two templates to pad a number with leading zeros.

Figure 129. Tip14.scr Pads a Number with Leading Zeros



Copy: QTY	Copies the quantity value in the default register into the INPUT SIZE register.
Modify: REVERSE1	Reverses the order of digits in the INPUT SIZE register.
Copy: ZEROS	Copies six zeros to the end of the value in the INPUT SIZE register.
Copy: 1ST SIX	Copies the first six digits in the INPUT SIZE register back into the Quantity field of the default register. Any zeros beyond the sixth digit are dropped.
Modify: REVERSE2	Reverses the six characters in the default register, returning the original input to the correct order with leading zeros.

This technique can be used with any fixed length by simply changing the fixed length of the second template and providing enough zeros in the **Copy** node.

Appendix C
The PPG Library

Overview

PSC offers a library of several sample PPG program source files which include examples of file manipulation, templates, and nodes. Several working programs are included, although many of them are only examples and do not provide any functional value. You can download these files from the **Technical Support** area of PSC's website at www.pscnet.com. This section briefly describes each of these files.

PPG Program Source Files

ASHOST.SCR	A data-collection program that allows a remote system to call up the portable via modem and receive the data.
AUTO.BAT	A batch file that uses the **SAMPLE2.SCR** program and automatically pulls files from the collect mode.
BASIC.SCR	A program with options for **Menu**, **Upload**, and **Erase** nodes completed. The **Collect** node is left empty for the user to set up.
CASHREG.SCR	A program that does all the basic things a cash register would do, including figure totals with taxes, figure change, and print a receipt.
CLOCK.SCR	A program that displays time and date. Formats are selectable, and an alarm capability is available.
COLLECT.SCR	The collect portion of the sample program that comes with each portable.
COLLTIME.SCR	A program that stamps all item entries with the date and time. **Output** format: date,time,item.

COMPILE.SCR A collect-only program that counts the number of duplicate entries in a file. **Output** format: item,repeats.

CONFIG.SCR A program that allows the user to scroll through and change system parameters from a list that is loaded into the portable.

FIELDS.SCR A short program that demonstrates template use by combining two inputs with a comma delimiter.

FIELDS1.SCR A template example where the first two characters are stripped out of the register.

HANGMAN.SCR A program that uses the classic word game as an excellent example of complex file manipulation. A word of up to nine characters is entered by a user. A second user then guesses the word. Each correct guess is filled into the appropriate blank, and each incorrect guess is displayed on the screen as **Hangman** is spelled out.

HOSPITAL.SCR A program designed to help nurses track patient medications and used items. It also has a reminder feature and a way to review each patient's file.

INSPECT.SCR A program that prompts the user with questions about a scanned item and records a pass or fail condition with comments.

ITQU.SCR The other portion of the standard sample program that comes with each portable. Item and quantity collection are featured.

LIBRARY.SCR An application to track checked in, checked out, and late books in a school library.

MATH.SCR An example of the math node. The register is multiplied by **3**.

METO5000.SCR An example of running a serial printer with the portable.

MODEM.SCR A complete example of a modem communications program designed to transmit and receive files.

MODIFY.SCR An example of the **Modify** node that includes options for all modify functions.

MONEY.SCR A program that keeps a running total on an item. A pick list file is downloaded into the portable, and as the items are matched, the user has the option to add or subtract a quantity from the total

MULTIPLE.SCR A multiple-option program that includes a **Collect** node with a compile option; an item/quantity option; a pick list; a calculator; and a clock option.

MULTPLE2.SCR A large program (342 nodes, with 8 separate programs) that has the same options as **MULTIPLE.SCR** plus a modem communications program, the hangman game, and a time tracker.

PICKLIST.SCR A program in which, as items are matched, they are erased from a downloaded pick list and moved to another file for uploading.

RANGE.SCR A sample of a range test, in which high and low numbers are entered and followed by a test number. In or out of range is then displayed.

TRACKER.SCR A sample of a minutes counter. A pick list is downloaded, and when a function is chosen, time (in minutes) is counted until the function key is selected. Total time is accumulated for each function.

TRACKER2.SCR A sample of a different approach to tracking time. As each function is scanned or typed in, the time is reset to zero. The clock updates every second, and the total time is then copied to the file in regular clock format.

UPLOAD.SCR A sample data-collection program that transmits data via a modem using Procomm Plus in host mode.

UPPRPLUS.SCR A sample data-collection program that transmits data to a host via a modem using **Procomm Plus** in host mode.

NOTES

Appendix D
PPG System Commands

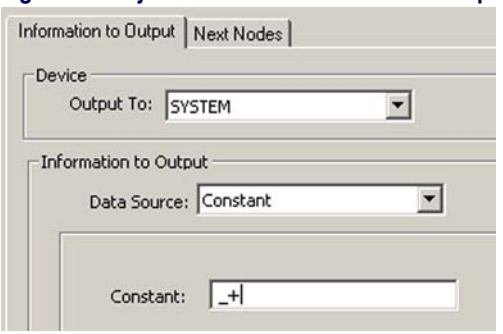
Overview

To use PPG to reset the default settings on the PDT, enter the human readable portion of these bar codes at the system command prompt. This is useful to automatically change modes for the user. The following bar codes are provided in this section:

- Using Predefined Defaults on page 164.
- Alternate Parameters on page 165.

Additional setting bar codes are provided in the **Programming** chapter in the PSC Falcon PT40 Product Reference Guide. Enter the human readable portion at the system command prompt in the **Output** node **Properties** dialog.

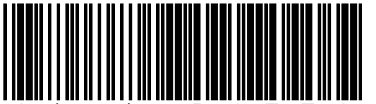
Figure 130. System Command Field in the Output Node



Using Predefined Defaults

The PSC Falcon PT40 use the following four sets of parameter defaults. Reset the portable to a predefined default set by scanning one of the bar codes in Table 3 on page 164.

Table 3. Predefined Defaults for the PT40

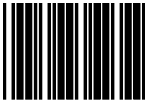
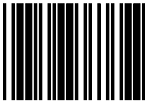
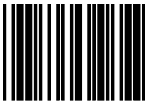
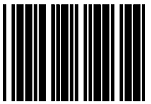
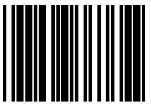
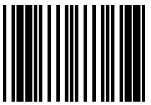
Predefined Defaults		
Default Name	**Bar Code**	**Description**
Predefined Default 0 (D0)		Turns every **ON/OFF** parameter **OFF** and sets all minimum and maximum lengths to zero.
Predefined Default 1 (D1)		Turns every **ON/OFF** parameter **ON**, sets all minimum lengths as low as possible, and sets all maximum lengths as high as possible.
Predefined Default 2 (D2)		Default set installed on the portable at the factory. This default set will work for most applications.
Serial Default		Restores the default serial communications settings.

Alternate Parameters

Enter these commands by scanning the bar codes with the PT40's laser or through the PC's serial port. You can also embed these codes in a PPG application.

The Falcon PT40 recognizes the bar code commands in Table 4 on page 165.

Table 4. Scannable Bar Codes of Alternate Settings for the PT40

Scannable Bar Codes of Alternate Settings for the PT40		
Setting Name	**Bar Code**	**Description**
Clear Mode		Has the same effect as the **<CLR>** key
Character Clear Mode		Has the same effect as the **<CLR>** key for the last character entered.
Receive File Mode		Prepares the portable to accept a program.
Low Beep Mode		Sounds a low beep on the portable.
High Beep Mode		Sounds a high beep on the portable.
Retrieve Data Mode		Retrieves data if the application program stops execution and gives the **PROGRAM FAILED** message. Connect the portable to the PC and start the communications program on the PC, then scan this bar code. The data will transmit, one file at a time.

CAUTION

Reset Mode		**Clears all memory and resets the portable.**

Appendix E:
ASCII/Hex Conversion Table

ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex
NUL	00	SP	20	@	40		60
SOH	01	!	21	A	41	a	61
STX	02	“	22	B	42	b	62
ETX	03	#	23	C	43	c	63
EOT	04	$	24	D	44	d	64
ENQ	05	%	25	E	45	e	65
ACK	06	&	26	F	46	f	66
BEL	07	&	26	G	47	g	67
BS	08	(	28	H	48	h	68
HT	09	)	29	I	49	i	69
LF	0A	*	2A	J	4A	j	6A
VT	0B	+	2B	K	4B	k	6B
FF	0C	,	2C	L	4C	l	6C
CR	0D	-	2D	M	4D	m	6D
SO	0E	.	2E	N	4E	n	6E
SI	0F	/	2F	O	4F	o	6F
DLE	10	0	30	P	50	p	70
DC1	11	1	31	Q	51	q	71
DC2	12	2	32	R	52	r	72
DC3	13	3	33	S	53	s	73
DC4	14	4	34	T	54	t	74
NAK	15	5	35	U	55	u	75
SYN	16	6	36	V	56	v	76
ETB	17	7	37	W	57	w	77
CAN	18	8	38	X	58	x	78
EM	19	9	39	Y	59	y	79
SUB	1A	:	3A	Z	5A	z	7A
ESC	1B	;	3B	[	5B	{	7B
FS	1C	<	3C	\	5C	|	7C
GS	1D	=	3D	]	5D	}	7D
RS	1E	>	3E	^	5E	~	7E
US	1F	?	3F	_	5F	DEL	7F

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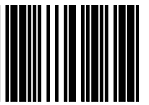
Appendix F
Useful Bar Codes

File Dump	
Program Mode	
Set Date	
Set Time	
<CR> Only Protocol	
ACK/NAK Protocol	
Xmodem Protocol	

Reset Factory Defaults	

Appendix G Troubleshooting

Overview

Use this section to solve common problems you might have while using PPG. Following is a list of troubleshooting topics:

- Fixing Corrupted Files on page 171.
- Error Messages on page 173.
- Technical Support on page 178.

Fixing Corrupted Files

Occasionally a file becomes corrupt and won't open. The **`.scr`** file is highly structured. Several things can cause this problem.

Open the **`.scr`** file using a word editor of some kind. Avoid any editors (such as Microsoft Word) which tend to add special control characters to the file. Notepad has been used successfully.

Table 5. Conditions That Can Cause File Errors

Broken lines	Output 'SET DATE'(/* 250 100 */ Source(LITERAL "%."), Special(), Destination(SYSTEM), Branch(Output "SET TIME" , Output "SET TIME " /* 435 120 */)), Output "SET TIME"(/* 250 150 */ Source(LITERAL "%-"), Special(), Destination(SYSTEM), Branch(Output "SET BC" , Output "SET BC")), As you can see the line after "SET TIME is out of place.

Nodes copied from another application	Call “REVIEW”(/* 420 30 */ Source(), Special(), Destination(), Branch(, Display “SCAN”)), Pasting can cause the Branch line to remain blank or to have invalid Links. To avoid this problem, do not edit files manually. Always rely on PPG to create and edit the application files.
Extra blank lines at the end of the file	Place the cursor at the end of the file. Delete any extraneous characters after the final ‘)’ character.

Downloading the Program to the Portable

If a few seconds pass with no messages, PPG was unable to make a connection with the portable

- Select a different serial port by selecting **Options > Settings**. Then select the **File > Program the Portable** to try again.
- Make sure that the cable is firmly connected at both ends.
- Try resetting the PT40 by pressing **<CLR>+<ENT>** while reloading the battery.
- If you loaded a different program into your portable since downloading the sample program earlier, the portable may not be set to allow serial input, or the serial parameters may not be set correctly. In this case, scan the following bar code or select options in the portable to prepare it for downloading.

Error Messages

This section lists error messages that you might come across in the PT Program Generator. Following each error message is a possible solution and, where applicable, a reference to the section of this manual in which you can find more information about solving the problem. If you continue to have trouble with your program, you can call PSC for technical assistance (refer to Technical Support on page 178).

PPG Error Messages

Table 6. PPG Error Messages

Error Message	Description
Cannot start the PPG Compiler	The PPG Compiler application must be located in the same directory as the PPG application. If the PPG Compiler (PPGComp.exe) is missing, reinstall PPG to restore all files.
Deleting the selected node(s) could cause undesired results. Continue?	You have selected one or more nodes to delete. Removing these nodes could cause your application to behave unexpectedly. If you are sure you want to delete the nodes, press **Yes**. If you want to cancel the delete command, press **No**.
Do you want to overwrite the existing file?	You have selected the name of a file that already exists. Select **Yes** to overwrite the existing file with new information or select **No** to cancel the save process.
Duplicate node type and name. Enter a unique name for this node.	Each node in a frame or subroutine must have a unique type and name. You can have a copy node named “Start” and a Modify node named “Start” but you cannot have two copy nodes both named “Finish”. Rename one node so that each node has a unique type and name.
Error Connecting Nodes	The `.scr` file indicates a Link to a node that does not exist. This usually indicates that the `.scr` file has been corrupted. Contact Technical Support for assistance.
Error opening file	The file name may have been typed incorrectly or the file has been renamed or deleted.

Error Message	Description
Invalid file access code. 1 – 3 valid.	Contact PSC Technical Support
Invalid grid value. Enter any non-zero numeric value in both grid size fields and select OK.	You have entered a zero or no value for one or both grid size fields. Set both grid size fields to non-zero values and press **OK**.
Invalid function node size. Enter any non-zero numeric value in both size fields and select OK.	You have entered a zero or no value for one or both function node size fields. Set both function node size fields to non-zero values and press **OK**.
Invalid operation node size. Enter any non-zero numeric value in both size fields and select OK.	You have entered a zero or no value for one or both operation node size fields. Set both operation node size fields to non-zero values and press **OK**.
Multiple-byte character sets are not supported by this version of PPG.	This is not an international version of PPG. To support multiple-byte character sets such as Chinese, you must obtain the international version of PPG.
No active frame	The **`.scr`** file has been corrupted. Contact Technical Support for assistance
Please enter a name	The node has a blank name. Please enter a name up to 32 characters long.
PPG Graphics Library error. Contact PSC technical support.	An internal PPG error has occurred. Call PSC technical support for assistance.
Subroutines cannot contain frame nodes	The **`.scr`** file indicates a frame within a subroutine. This usually indicates that the **`.scr`** file has been corrupted. Contact Technical Support for assistance
Subroutines cannot contain subroutine nodes	The **`.scr`** file indicates a subroutine within a subroutine. This usually indicates that the **`.scr`** file has been corrupted. Contact Technical Support for assistance
Too many display characters. Change your operation or create a new Output node.	Each output node can display up to 132 characters. To display more characters, create a second output node.
Unexpected type in destination	An unexpected value has been found in a node destination. This usually indicates that the **`.scr`** file has been corrupted. Contact Technical Support for assistance

Error Message	Description
Unrecognized node type found	An unrecognized node type has been read. This usually indicates that the `.scr` file has been corrupted. Contact Technical Support for assistance.

PPGComp Error Messages

Table 7. PPGComp Error Messages

Error Message	Description
Can't access PPGXFER tool to download application	The PPGXfer application must be located in the same directory as PPGComp. If the PPGXfer (PPGXfer.exe) is missing, reinstall PPG to restore all files.
Can't allocate scanner to analyze source code	These errors indicate that there is insufficient memory available to run PPGComp. Close other applications and try again. If no other applications are open, you may need to reboot your PC before trying again.
Error creating <file name>	An error occurred while creating the file. The directory may be write-protected or the drive may be full. Make sure there is room for the file and you are able to create files in that location.
Error finding character	The specified character's bitmap could not be found. Contact PSC Technical Support for assistance.
Error locating bitmap file	The file containing bitmaps for the selected language cannot be found. Reinstall PPG to restore all files. If the message persists, you may be running an outdated version of PPGComp. Contact PSC Technical Support for assistance.
Error opening <source file name>	Error <source file name> is empty

Error Message	Description
Error with <source file name>	An error occurred while reading the source file. Make sure you selected the correct source file. Open the file with PPG and verify that it appears as expected. If the message persists, contact PSC Technical Support for assistance. Your program may have too many nodes in a frame or have too many fields defined in a template. The application may be too large or complex for the available memory in the compiler. Using PPG, modify your application to make it smaller and try compiling again.
Language not supported	This version of PPGComp does not support the selected language. Contact PSC Technical support for assistance.
Syntax Error in <node name>(line <line #>)	This message indicates an error in the source file. It usually means that some required information is missing. Determine which node is the problem, open the application with PPG, locate the problem node and view its properties. Make sure all required options are selected. Save the application and select File->Download to compile and download the application.

PPGXfer Error Messages

Table 8. PPGXFER Error Messages

Error Messages	Description
Application is too large to load, it must be < FFFFH.	The application is too big to be stored on the PDT. The download cannot be completed. Using PPG, modify your application to make it smaller and try downloading again.
Buffer allocation error	This error occurs when insufficient memory exists to run PPGXfer. Close other applications and try again. If no other applications are open, you may need to reboot your PC before trying again.
Error opening hex file	This error indicates that the selected hex file could not be opened. Make sure that the file exists and it is not currently being used by another application
NAK received - Re-sending.	This error indicates that PPGXfer received an unexpected response from the PDT. PPGXfer will try again without any further action from the user.

Error Messages	Description
Portable successfully programmed	The application was successfully downloaded to the PDT.
BEL received - Aborting.	These errors indicate that PPGXfer received an unexpected response from the PDT. Reset the PDT and try the download again.
No response - Aborting.	
Too many NAKs - Aborting	
Unknown response - Aborting.	
COM port error	These errors indicate problems communicating with the PDT via the serial port. Make sure the cable is securely connected to both the PC and the PDT. Verify that the correct serial port has been selected and that the serial port is functioning.
Open COM error	
Set COM state error	
TimeOut exceeded	
WriteComm error - Aborting.	
PDT does not support application file. Recompile for Falcon PT40.	This error indicates that the application was created for a different PDT than you are downloading to. Open the application `.scr` file in PPG. Select the **File > Customize Application** command and select the correct PDT type. Save the application and select **File > Download** to compile the file and download it to the PDT.
User aborted	The user aborted the download process.

Technical Support

PSC Website Support

PSC's website (www.pscnet.com) is the complete source for technical support and information for PSC products. The site offers PSC's new TekForum, product support, product registration, warranty information, product FAQs (frequently asked questions), product manuals, product tech notes, software updates, patches, demos, and instructions for returning products for repair.

PSC Website TekForum

Search for information on the TekForum by clicking on the **Support** link at the top of PSC's home page. Browse the TekForum at PSC's website to find answers to your questions about common technical issues. Register with TekForum to submit a question to the PSC Technical Support Staff and receive a solution to your question posted on TekForum within 48 hours.

Reseller Technical Support

An excellent source for technical assistance and information is an authorized PSC reseller. A reseller is acquainted with specific types of businesses, application software, and computer systems and can provide individualized assistance.

Telephone Technical Support

If you don't have access to the internet or email, contact PSC technical support on (800) 547-2507 (toll-free in the USA) or (541) 683-5700.

Appendix H
Glossary

This section contains definitions for terms used in this manual. Review and familiarize yourself with these terms before using PT Program Generator (PPG) to create custom programs.

Call node — A **Call** node executes a branch to a subroutine.

columns — The display screen of your PSC portable is divided vertically into sixteen columns, numbered 0 through 15.

Copy node — A **Copy** node is used to transfer information from one file or register to another file or register.

data collection — Data collection is the process of gathering information by scanning bar codes or using data keys to enter values into a portable.

Display node — A **Display** node is used to define messages to appear on a portable's screen.

field — A field is a place in a register for the entry of or access to a specified type of data. Fields and their locations in a register are defined by templates.

file — A file is a storage location for data. Flow charts you create in PPG are stored in files on your PC. Portables use a different type of file for storing collected or downloaded data (see portable file).

Frames — Frames are the objects you use to create the general flow chart of your data-collection tasks. Each frame in a program flow chart represents a major function or option. Typically, a program's frames include a **Main Menu** frame and a frame for each option on the menu. Links connect the frame in a way that indicates program flow.

Function Nodes — **Frames** and **Subroutines** are referred to as **Function Nodes**. Refer to Operation Nodes for **Menu**, **Display**, **Input**, **Output**, **Verify**, **Copy**, **Modify**, **Math**, and **Call**.

parse — To divide or dissect data into logical component parts.

index — An index is a number used to access a single record in a file.

input	Input is the information gathered during data collection or the action of gathering the information.
Input node	An **Input** node designates what type of portable input is acceptable and where the input is stored.
jointed Link	A jointed **Link** is a **Link** that has two or more segments intersecting at an angle/
Link	A Link connects two frames or nodes with an arrow directing the program to the next step. A Link pointing to a frame or node shows how it is accessed. A Link pointing away from a frame or node shows where the program goes next.
Math node	A **Math** node performs mathematical operations on given data.
Menu node	A **Menu** node presents a menu of options on the portable's screen and specifies what actions will occur when the user presses function keys associated with those options.
Modify node	A **Modify** node changes given data.
node	A node is a shape in a program flow chart that represents one step in the program. There are different types of nodes for each kind of action that can be performed by the program. Detailed instructions for the action are specified by settings in a dialog box associated with the node. A connected set of nodes makes up one frame or subroutine. of a program flow chart.
Operation Nodes	**Menu**, **Display**, **Input**, **Output**, **Verify**, **Copy**, **Modify**, **Math**, and **Call** nodes are types of Operation Nodes. Refer to Function Nodes for **Frames** and **Subroutines**.
object	An object is the generic term for a frame, node, or Link.
Output node	An **Output** node is used to transfer data to a portable's display or to the host computer.
portable file	Data that has been either input via a portable's scanner or data keys or downloaded from a PC file through the serial port is saved in a portable file. Each entry in the portable file is called a record, and the records in each portable file are numbered, starting with 1 for the first record.
program source file	Program flow charts created with PPG are stored in DOS data files called program source files. A program source file must be compiled (using PPGComp) before it can be loaded into a portable.
record	A record is a set of related data fields stored as a single line in a file.

register	A register is a temporary holding place for up to 128 characters of data. When you scan a bar code with a portable, the code is stored in a register until it is verified and copied into a file for safekeeping. The contents of the register are overwritten each time you scan a code.
rows	The display screen of the PSC Falcon PT40 is divided horizontally into rows, numbered 0 through 5. Refer to Default Language on page 29 for more information on the number of rows allowed, depending upon the selected language.
Subroutine	A subroutine contains nodes that execute program steps, very much like a frame. The difference is that a subroutine is not connected to other objects. It contains functions that can be referenced from any of the program's frames with a Call node.
template	A template is a structure that you can define and impose on data. It lets you alter the way in which collected data is stored. The most common use of a template is to take data from two or more registers and tie them together in a single register.
Verify node	A **Verify** node checks data against specified requirements.

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R44-2342 (Rev C) (7/04)