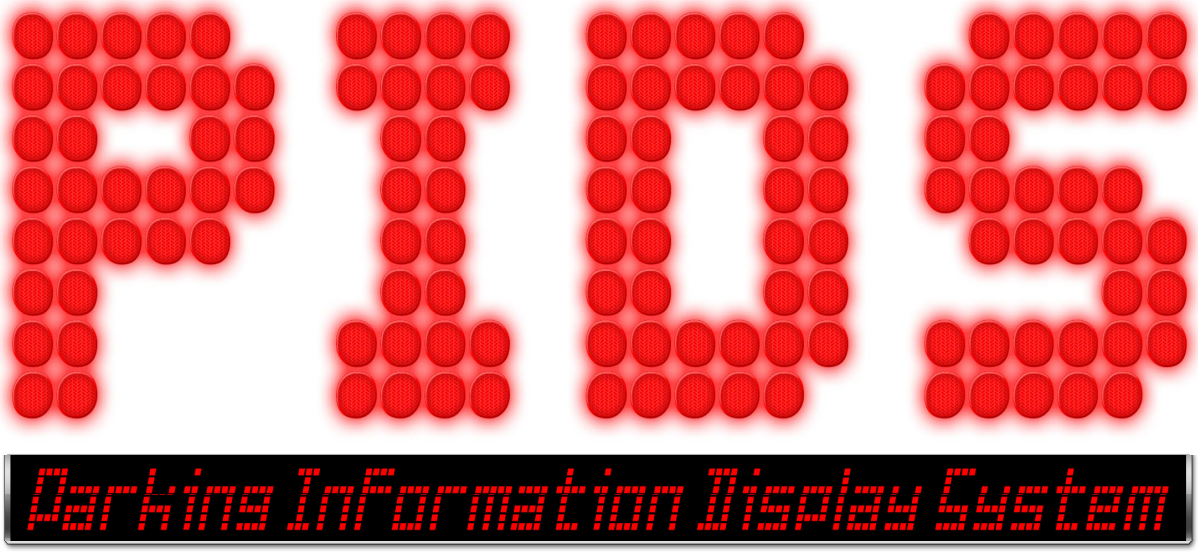


Software Manual
Version 1.1

(10/23/2001)

Table of Contents

Introduction

What is PIDS?

In many urban areas parking spaces are hard to find. This has facilitated the need for multilevel parking garages, many of which are already built and commonly used in larger cities. The advent of parking garages, though, has introduced new problems. How does a motorist know whether or not there is a free space available in the parking garage before actually entering it? Also, if the garage is full, where can the motorist go to find alternate parking spaces? PIDS was designed to handle these problems by electronically monitoring free parking spaces and distributing that information over a network of electronic signs.

PIDS is an acronym that stands for Parking Information Display System. PIDS is the control software developed to bridge vehicle counting systems with electronic signs. PIDS runs on Windows compatible PCs. PIDS has been fully tested running on the Windows 2000 operating system (although officially unsupported, it should also work with other Microsoft operating systems such as Windows 98 and Windows NT). The PIDS software is designed to run on multiple computers networked together using the standard TCP/IP protocol.

Purpose of This Manual

This manual provides a general description and operating instructions for PIDS. It is intended for general user interaction and technician setup. Although subjects relating to networking are referenced in this manual it is not intended to be exhaustive on the subject. It is assumed that personnel using and setting up the PIDS software have a working knowledge of computer hardware and software as well as basic networking skills. An understanding of TCP/IP and UDP protocols is also of benefit to the user.

Some of the setup procedures outlined in this manual require manual editing of ASCII text and INI files. These files contain important configuration information that adheres to a sensitive structure. It is therefore recommended that only users who already have some experience editing these types of files manipulate them, so as not to trigger unnecessary troubleshooting.
This manual follows a consistent format in describing each of the four software modules that comprise PIDS. First, a general description is provided, explaining the purpose and function of the module. Then, an item-by-item explanation of the user interface is explained, detailing the use of GUI components. Next, when applicable, a line-by-line description is given of INI files related to the module and their significance. Finally, a step-by-step procedure is outlined showing how to set up the PIDS module. Our intent is to make it easy for a user or technician to gain access to relevant information quickly, without scanning through the whole manual to find it.

Conventions Used In This Manual

Typographic Conventions

The following conventions will be used throughout this manual.

Directory Structure:

All of the software will be installed in a single subdirectory on the drive you specified during the installation process. Although you need not install every software module on every PC on the PIDS network, the modules you do install should have the same root directory name and this name should be the same for all computers. The default root directory is C:\PIDS. Therefore, subdirectories referred to in this documentation are located in this main directory. (For example, if the discussion refers to the Count Server Folder, the actual path might be C:\PIDS\COUNTSERVER.)

Typefaces:

ALL CAPS	Computer keys, mouse buttons, directories, (e.g., ENTER, C:\LIGHTWAVE\OBJECTS, CTRL+P, etc.).

Bold Names Names of interface menus, fields, buttons, etc. are set in bold type.

Keystroke Combinations

KEY1 + KEY2 Simultaneous keystrokes. Hold the first key and press the second key.

Mouse Operations

LMB Left mouse button

RMB Right mouse button

Selecting Single-clicking an element with the LMB so that it becomes active or selected.

Deselecting Single-clicking an element with the LMB so that it becomes inactive or unselected.

Activating Selecting an option by clicking on its radio button.

Deactivating Unselecting an option by clicking on its radio button.

Clicking Placing your mouse pointer over something and then pressing a mouse button. This nearly always means the LMB.

Right clicking Clicking an element with your RMB.

Double clicking Rapidly clicking an element twice.

Dragging Selecting an element with your mouse pointer and continuing to hold the mouse button down as you move your mouse. This nearly always means with the LMB.

Note, Hint, and Warning Symbols

The warning symbol will highlight a discussion that warns the user about something. You should pay special attention to text marked with this symbol.

The note symbol will highlight a discussion that is particularly noteworthy.

The hint symbol will highlight tips and suggestions that are usually of a timesaving nature.

Working With The Interface

In no time, you'll find yourself mastering PIDS' intuitive interface. Most user interface functions are listed on the interface panels in plain text. Listed below are a few other conventions involved with the PIDS interface:

Button A button refers to an area on the screen that you click on with your mouse to cause some function to occur. Generally, only a single click is required. There are also special types of buttons, like toggle, pop-up menu, etc. Some buttons become highlighted, indicating a chosen or active status.

Dialog Box	Dialog boxes appear on the screen for operations like file loading and saving. This term also refers to smaller windows that appear requesting the user to input data into various fields.
Data Grids	Data grids are database style table structures that graphically look like a grid of boxes organized into rows and columns. Along the top of the grid are column names, these are field names in the case of a database table. A horizontal row of the grid is comprised of the data entries under each column. In the case of a database table, this data represents an individual record. PIDS allows the user to enter data directly into the grid by simply selecting a cell with the LMB and typing alpha/ numeric symbols into the cell. Some data grids can be resized, scrolled and otherwise manipulated to easily view, store, and retrieve records in the fields of the table.
Hints	Hints are small text boxes that appear when the mouse cursor or pointer hovers over a button. The hint text will further identify the button or its function, thus helping you navigate the user interface more efficiently.
Information Display	Information Displays are text displays found throughout the different panels. These displays cannot be changed directly and simply provide information and feedback.
Input Field	Input fields are areas on the screen where you can enter data.
Pop-up Menu	Pop-up menus (sometimes called a “context” menu) offer a convenient way to select program commands or options. To use, right click on an area in the program. The menu will pop up and as you move your pointer over the menu, each item will become highlighted. When the desired selection is highlighted, click the LMB. If you decide not to select an item, simply move the pointer off the menu and click the LMB in an unrelated area of the screen.
Radio Button	A radio button is a small button that becomes highlighted with a dot when clicked. This indicates the adjacent feature is active. These buttons usually operate in together in groups of two or more.
Check Box	A check box is a small box that can be checked or unchecked when clicked. This indicates the adjacent feature is active.
Scroll bar	A scroll bar allows you to navigate a window’s contents by dragging the slider’s button along the bar. Alternatively, you can click to the right, left, top or bottom of the button or use the arrow buttons at either end to incrementally change the position of the button. The effect is a scrolling of the content of a window within the defined space of that window.

System Overview

The PIDS System - How Does It Work?

PIDS is a software solution that works in harmony with two other hardware/software systems. One of those systems is the vehicle counting system (VCS), which is located inside the parking structure. The other is the electronic display, which is usually located somewhere outside the garage or on the street.

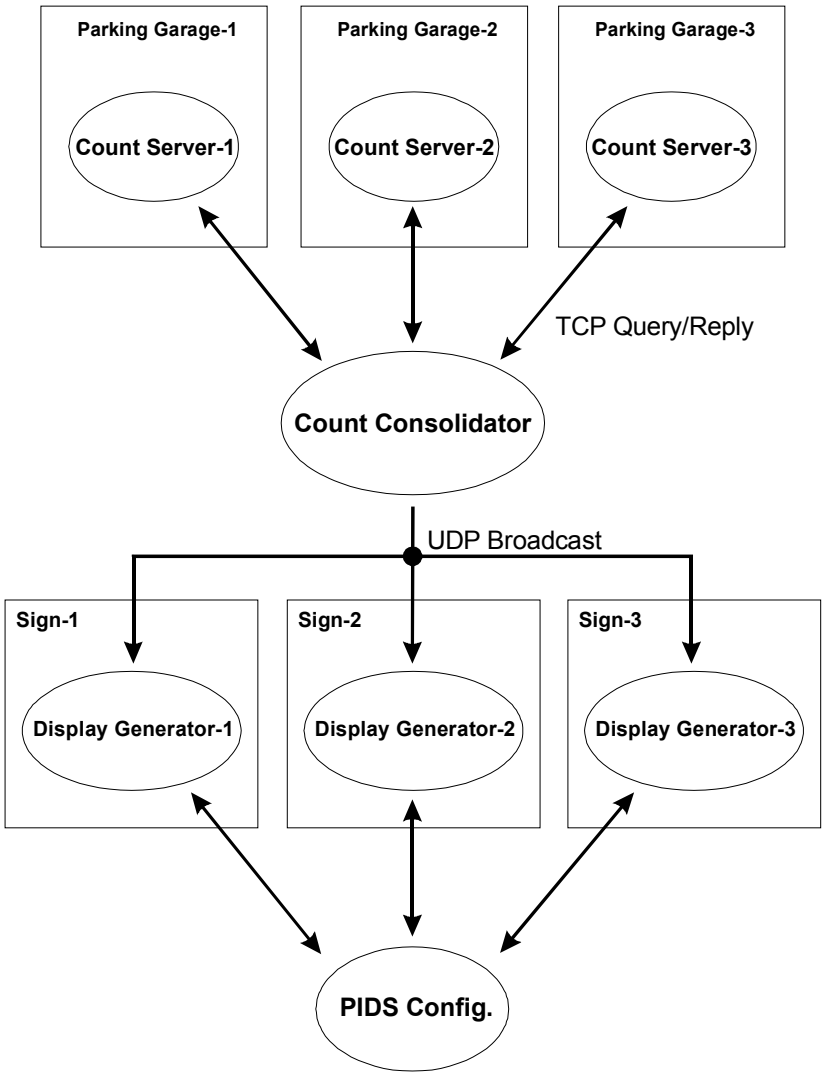
The main purpose of the vehicle counting system is to keep track of free parking spaces in a single parking structure. Using sensors and control equipment physically located in the garage, the system is able to monitor how many spaces are free and how many are in use at any given moment in time. In order to give PIDS access to the information, the VCS software periodically updates an XML file located the computer's hard drive. There is generally one of these VCS computers (IBM compatible PCs) in each garage. As the sensors trigger events to VCS computer, dynamic parking information is updated in the XML file.

The other hardware/software system is the electronic display itself. This is an electronically controlled sign, typically LED, that can dynamically display text and graphics. Since electronic signs work differently, PIDS may require tailoring to work with a specific manufacturers display. Each electronic display is controlled by a unique sign computer (i.e. IBM compatible PC).

How does the information generated by the vehicle counting system communicate with the electronic sign and get displayed on its screen? This is where PIDS comes in. PIDS is the link between the vehicle counting system and the electronic display. PIDS software runs on the VCS computer/(s), a dedicated count consolidator PC (optionally), and each electronic sign PC. The PIDS software is able to receive dynamic parking space information from the VCS, stuff that data into a pre-programmed text/graphics frame, and send it out to each electronic sign for display. PIDS can also be programmed to display a variety of non-parking related messages, including advertisements. A more comprehensive description of each of the PIDS software modules is described in the next section.

PIDS Software Overview

PIDS is made up of four main software modules that run on multiple computers (PCs), all networked together using TCP/IP. These modules are Count Server, Count Consolidator, Display Generator, and PIDS Config:



Logical schematic of the PIDS network *(Figure 2.1)*

The first software module is called a *Count Server* and it typically runs on the same PC that is already in place and used by the Vehicle Count Display System. There is generally one Count Server assigned per parking structure. The function of the Count Server application is to respond to queries over the network by reading the current garage information from the XML file and sending back a reply with this information. Count Server always re-reads the XML parking information file for every query, so the information sent back in the reply is a reflection of the XML file contents. Since the XML file is periodically updated by the VCS software, the Count Server reply always contains the most accurate, up-to-date parking space availability information.

When a PIDS system will be used with several garages, the *Count Consolidator* application needs to be set up. This application can be run on a dedicated PC, a sign PC, or even a VCS PC. It doesn't really matter which of those computers Count Consolidator runs on, as long as it is connected to the PIDS network and configured for TCP/IP. Only one consolidator is needed for each group of garages. Periodically, it queries the Count Servers and

"consolidates" the count data into a single table with all the count information for the garages in its group. This table is then broadcasted to all listening *Display Generators*.

Display Generator is the application that finally uses the parking count information to "generate" a visual display. Each Display Generator application runs on an electronic sign PC. It listens for count table broadcasts from the Count Consolidator and uses this data to create the parking information displays (text and pictures) of count and directional indicators. All display images are passed to the sign hardware for display on the electronic display screen. Display Generators are also able to switch from a parking display mode to a general display mode. When in the general display mode, Display Generators can play out to the electronic sign single frame bitmaps (BMPs), AVI movies or pre-programmed time, date, and temperature messages. These files can be arranged in sequences using a loopable play list and played back to the electronic sign indefinitely. This dual functionality greatly expands the usefulness of the electronic display, allowing the sign face to display any graphical or text information intended for public viewing.

Display Generators utilize a special file call a "Frame" file (.FRM) to define the content and layout of dynamic information messages. The dynamic information can be parking, time, or temperature data. FRM files are ASCII text files that contain a description of the frame content as well as other parameters that define the text font, position and sizes. FRM files can also store bitmaps and simple shapes. The FRM file format is discussed at further length in the Appendix.

The final PIDS software application is called *PIDS Config*. As the name implies, this application is used to configure the PIDS system. It is used to set up garage, sign, and direction information, which are stored in a database file. The database is sent to and stored on each Sign PC where it is used by the Display Generator application to create the dynamic parking information displays.

Since PIDS software can potentially run on so many computers at the same time, is it possible to interact with each PIDS computer from only *one* computer on the network? The answer, thankfully, is yes. Multiple computers on the PIDS network can be accessed from any one computer using standard Windows remote control/file transfer software (during our development, we used *pcAnywhere*, a commercial software package designed to remote control other PCs). Remote control/file transfer software should be considered a standard addition to the PIDS software package. In addition, PIDS has some troubleshooting and testing utilities that can be used remotely from any PC on the network.

Common Features

Communication Scheme: Applications communicate with one another via messages sent across the network using TCP/IP and UDP socket communications.

File Transfer/Remote Configuration and Control: Windows remote control/File Transfer software (the manual assumes Symantec pcAnywhere) is used for file transfers, remote monitoring and status, and remote configuration of the various software applications.

Local Event Logging: Each software application outputs notifications, faults, and error conditions to a log file stored in the executable directory. This log can be downloaded or viewed remotely to determine status and fault conditions. Each log is an ASCII text file stored in the local directory of each corresponding PIDS application. There is a 5 Megabyte file size limit for these log files.

Configuration Settings: Application configuration settings are stored in an INI file located in the executable directory. This file can be modified to change the settings.

Socket communications Ports: Default Winsock ports are defined as follows:

Count Server Port	= 8026
Count Consolidator Port	= 8027
Display Generator Port	= 8028

Message/Packet Communications: Applications will send data and messages to one another using a simple data

packet protocol. The messages are sent over the network using fixed length 20-byte data packets. A variable length payload can accompany certain message packets.

Installer/Directory Structure: Each application comes with a single file installer. The default install location is C:\PIDS\<subdirectory>. The actual subdirectory will be different for each application. For example:

C:\PIDS\COUNTSERVER
C:\PIDS\CONSOLIDATOR
C:\PIDS\DISPLAYGEN
C:\PIDS\PIDSCONFIG

PIDS Config

What is PIDS Config and What Does It Do?

PIDS Config is the database configuration center for the system. It is used to set up garage information and sign information. The main purpose of PIDS Config is to give a name to each garage and each sign in the system as well as define the locational relationship between them. Each electronic sign is configured to display directional arrows that point a motorist to a corresponding garage when needed.

Before even running any configuration software, several logistical decisions must be made to define the system. First, names must be chosen to explicitly define each garage and each electronic display. These names must be unique, free from any punctuation symbols, and are case sensitive. Text spaces are allowed. The next set of decisions involves network addressing and naming for each computer on the PIDS network. Static IP addresses should be assigned to each computer by this stage. Host computer names should also be assigned.

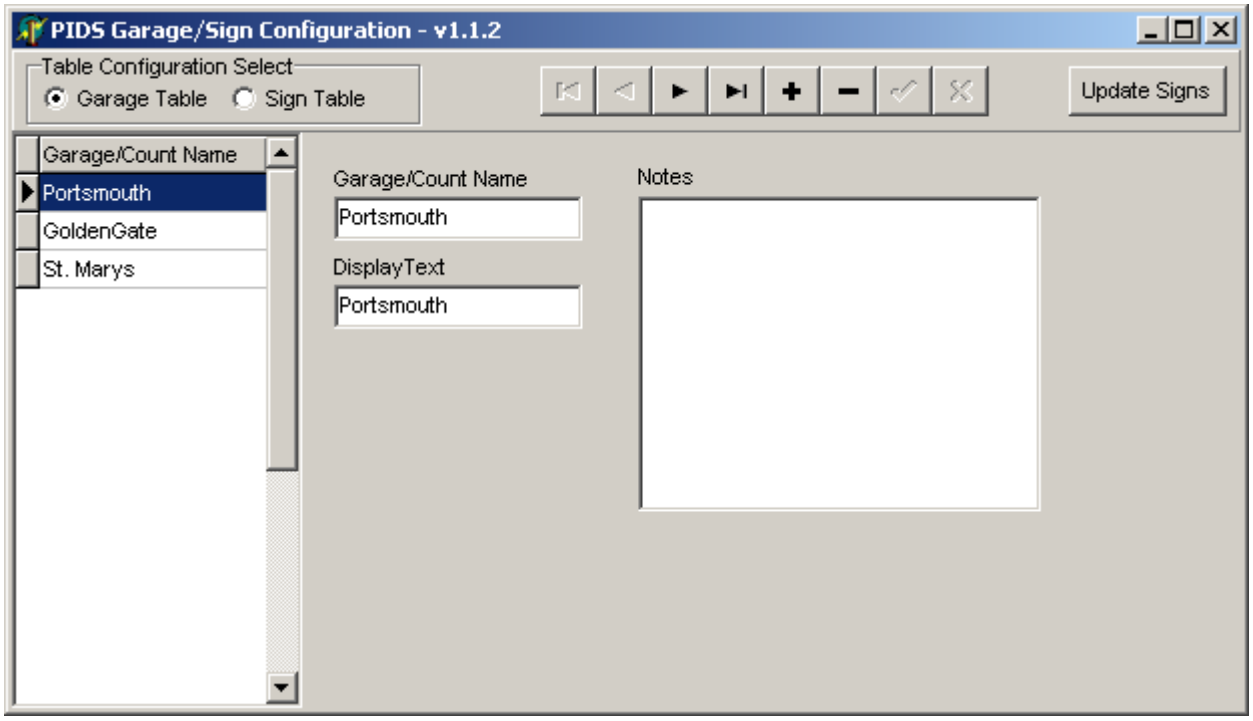
The general location of each electronic display in relation to all of the parking garages should be known. This is mainly only of concern when electronic displays are used to direct traffic to a single garage or multiple garages. This location information will be needed in order to decide which direction display arrows should point on the actual sign display. The goal is to direct automobile traffic that is looking at the electronic sign to garages in its vicinity with free parking spaces.

Main configuration information is stored in three database tables stored in one database (CDS) file. The configuration tables are sent via pcAnywhere to each Display Generator PC.

The PIDS Config User Interface

The user interface of PIDS Config resembles a simple database form. On the top of the form is the **Table Configuration Select**, a radio button selector that lets the user toggle between the garage database table and the sign database table. The form area directly below this selector updates when the corresponding radio button is selected. To the right of that is a standard **Database Record Toolbar**. This bar lets you add, delete, and navigate through records located in each table. When you hover the mouse cursor over each record tool button, a hint will appear that indicates the function of that button. To the right of the record tool bar is the **Update Signs** button. When this button is clicked, the configuration file and message files will be sent to each sign PC using an executable file defined in the sign table. This is discussed in further detail, later.

Below is a screen shot of the **Garage Table** form. ***(Figure 3.1)***



PIDS Config - Garage Table Form View *(Figure 3.1)*

As records are added using the **Database Record Toolbar**, the far left side of the **Garage Table** form displays them in the **Garage/ Count Name** data grid. Selecting any record in the grid will update the right side of the form to display the data associated with that record. The grid can be navigated using the scroll bar, by selecting record text within the cell area of the grid, by selecting the arrow indicator to the left of the record text, or with the keyboard cursor keys (arrows).

Each garage must have a unique Garage/Count name and be given a DisplayText name that is formatted to be readable on the electronic display. The **Garage Table** allows the user to assign unique names to individual parking garages on the PIDS network. These names are also associated with the PIDS Count Server software running on VCS (vehicle counting system) PCs. Therefore, each **Garage Name** record corresponds to only one unique Count Server (stored in its INI file) which reads data from on one unique VCS PC. Garage Names are referenced in PIDS Config, their corresponding Count Server INI file, and in message (FRM) files. It is very important that all instances of these names match, that is they must be spelled correctly and match case.

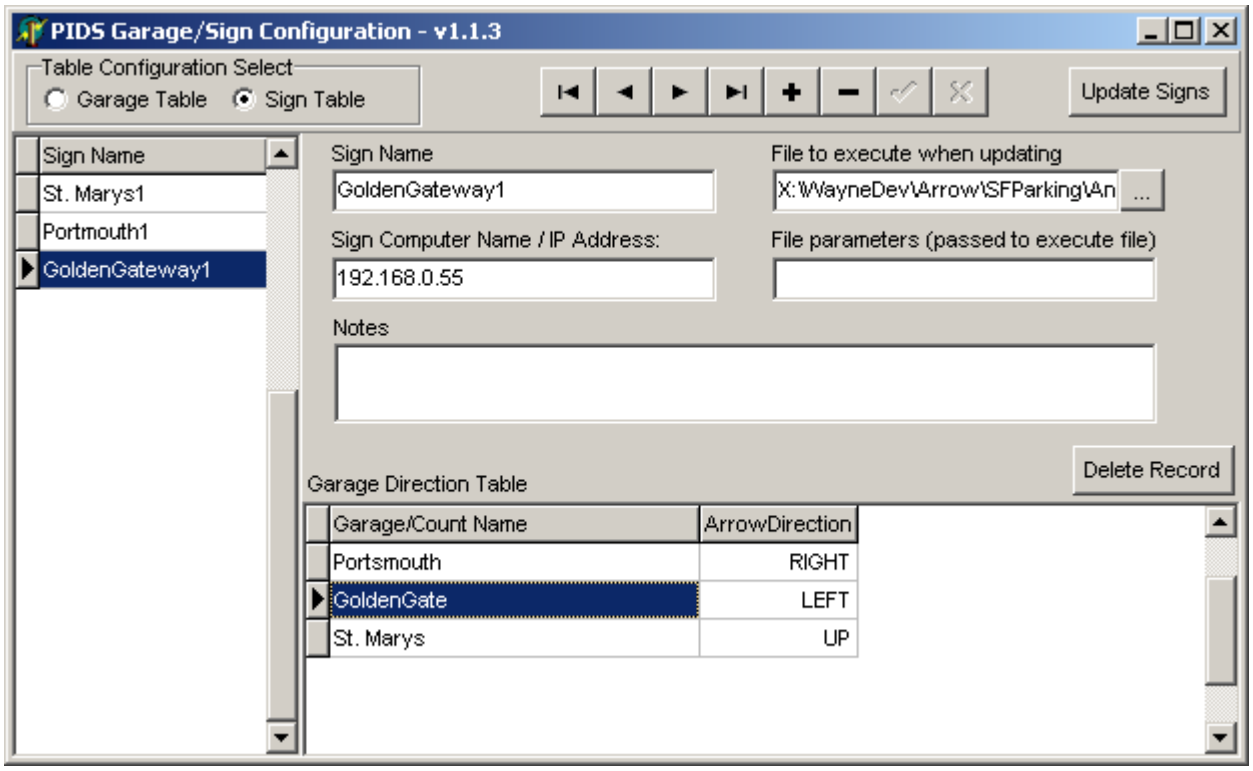
Garage/Count Names are case sensitive. The spelling of the name in PIDS Config must exactly match other instances in other files.

The **Garage/ Count Name** field is where you type in the name of each garage in your system. The **Display Text** field represents the actual text that will be displayed on the electronic sign. Care must be taken to make sure the text will fit in the display area of the sign.

The **Display Text** name you choose is largely dependant on how many pixels the electronic sign can utilize and the design and layout of the FRM files the text is being referenced from.

The last field on the Garage Table form is a simple **Notes** field. Users can type in general information about the garage's location or other relevant information intended to be viewed later. This field is not associated with an electronic sign and will not be displayed on it.

The Sign Table will be discussed next. It is shown below. ***(Figure 3.2)***



PIDS Config - Sign Table Form View *(Figure 3.2)*

On the far left of the form is another data grid, the **Sign Name** grid, which is similar to the **Garage Table** data grid. As records are selected in the grid, the right side of the form will update to reflect sign information related to each sign name record. The **Sign Table** allows the user to assign unique names to individual electronic signs in the PIDS network. These names are also associated with the sign PCs that are running the PIDS Display Generator software. Each **Sign Name** record corresponds to only one unique Display Generator (stored in its INI file) running on its corresponding sign PC, which drives a single electronic display.

The first field of the **Sign Table** form is the **Sign Name** field. Sign names are referenced in PIDS Config database, and in their corresponding Display Generator INI file. It is very important that all instances of these names match, that is they must be spelled correctly and match case.

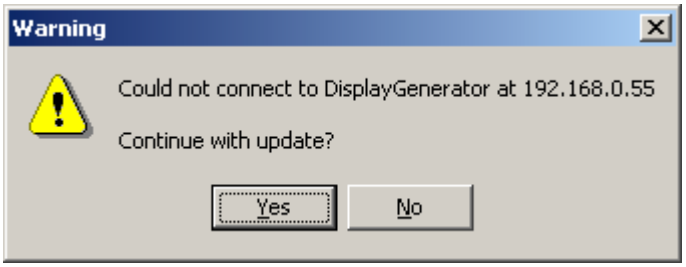
Sign Names are case sensitive. The spelling of the name in PIDS Config must exactly match other instances in other files.

The **Sign Computer Name/ IP Address** field stores the Host computer name or IP address of a corresponding sign PC.

The **File to execute when updating** field stores a path and file name of an executable file, batch file, shortcut, or a pc Anywhere CHF file. You can type in the path and filename, or select the **…** button to open a file requestor dialogue box. Whatever the type of file is, the intent is to execute or automatically run it when the **Update Signs** button is pressed. Typically, this field would contain the path and filename of a pc Anywhere CHF file, which would automatically transfer the configuration data to all the sign PCs. This CHF file would also be configured to transfer the actual message files (AVIs, BMPs, and FRMs) to each sign PC in a pre-defined directory structure.

On the sign PC, the PIDS Config database tables are stored in a file named "GarageSignDB.cds" in the DISPLAYGEN folder. The individual sign message files (AVIs, BMPs, and FRMs) are typically stored in the DISPLAYGEN\PIDMESSAGE folder.

When the Display Generators are not running, or there are network errors, then a warning dialog box will pop up requesting user input. If you choose to continue with update, the updater files will still execute and the program will attempt to update any remaining signs **(See *figure 3.3)***.



Update Signs Warning Dialog Box *(Figure 3.3)*

Related to this is the **File parameters** field. When you run some executable files, you can pass certain parameters to control how it functions, or to limit it to specific tasks. This field allows you to type any appropriate switches or parameters the program expects, if any. In the case of executing pcAnywhere CHF files, this field would typically not be used.

The **Notes** field stores general information about the sign's features, specifications, location or any other relevant information intended for later viewing. This field will not be displayed on any electronic sign.

The lower right part of the **Sign Table** form is the **Garage Direction** table data grid that stores direction arrow information. This detail table is updated when a different **Sign Name** record is selected in the main **Sign Table**. The main purpose of this data grid is to establish and record directional relationships between the sign names in the **Sign Table** and all the parking structures that belong to the PIDS network. The user would first have to determine the location of the sign from a viewer's perspective. From that vantage point, the user would decide which direction a motorist would have to follow in order to get to the specified garage. For instance, the motorist could turn left, turn right, travel straight ahead, or ahead and to the left. Each of the eight directions corresponds with a text setting in the **Arrow Direction** field. For example, when you want the motorist to travel straight ahead, you would type **UP** into the **Arrow Direction** field. On the electronic sign, a graphical arrow pointing up would be displayed, directing the traveler to go forward. The following table enumerates all the possible input choices for this field ***(Figure 3.4)***:

Direction to Parking Structure	Field Input Text (Long Name)	Field Input Text (Abbreviated)
Straight Ahead	UP	U
Turn Right	RIGHT	R
Turn Left	LEFT	L
	DOWN	D
Ahead And Turn to the Right	UPPER-RIGHT	UR
Ahead And Turn to the Left	UPPER-LEFT	UL
	LOWER-LEFT	LL
	LOWER-RIGHT	LR

Arrow Direction Input Values *(Figure 3.4)*

The user must type the selection into the **Arrow Direction** field. Input text does not have to match the exact case of text displayed in the field.

Learn to use the abbreviated input text to save time.

To add records to the Garage Direction table, you must use the ARROW keys on your keyboard. First you must select the grid area with your mouse, and then you can use the DOWN ARROW key to add a new record. Once the record is created, you can select from a drop-down text box a **Garage/ Count** name and type in the subsequent **Arrow Direction**. To delete records from the grid, you can simply select the record with your LMB and press the **Delete Record** button.

Once the record is deleted; it cannot be reclaimed. You will have to add a new record again and start over.

Complete the Garage Table BEFORE editing the Garage Direction table. This will allow you to use the "drop-down" box to select Garage/Count names from a list when entering records in the Garage Direction table.

PIDS Config Setup Procedure

To set up PIDS Config for the first time, follow this step-by-step procedure using the conventions described in the previous section:

1. Open PIDS Config by double clicking its .exe file or shortcut.
2. Activate the **Garage Table** radio button in the **Table Configuration Select** box.
3. Add a new record by selecting the **"+"** button on the **Database Record Toolbar**.
4. Enter the **Garage/ Count Name** of your first parking garage and corresponding Count Server.
5. Enter the **Display Text** to indicate how you want the text to appear on the electronic sign.
6. Add some descriptive notes for the garage in the **Notes** field, if desired.
7. Repeat steps 3-6 for each garage on your PIDS network.
8. Activate the **Sign Table** radio button in the **Table Configuration Select** box.
9. Add a new record by selecting the **"+"** button on the **Database Record Toolbar**.
10. Enter the **Sign Name** of your first electronic sign and corresponding Display Generator running on its corresponding Sign PC.
11. Enter the corresponding sign PC's IP address or Host name in the **Sign Computer Name/ IP Address** field.
12. Type into the **File to execute when updating** field (or select from the file requestor) a path and filename of your desired executable file. As an example, when using pcAnywhere, you might enter; C:\PROGRAM FILES\SYMANTEC\PCANYWHERE\Sign1Xfer.CHF
13. Type in program switches in the **File Parameters** field, if any.
14. Add some descriptive notes for the garage in the **Notes** field, if desired.
15. Add a record in the **Garage Direction** data grid by first clicking your mouse in the grid area, and then pushing your DOWN ARROW key on your keyboard.
16. Select from the **Garage/ Count Name** drop-down box your first **Garage/ Count Name** record.
17. Decide and type in a direction (see *Figure 3.4*) in the **Arrow Direction** field. This would indicate the direction someone viewing the sign (indicated in the currently selected **Sign Name** record) would have to travel to get to the garage you just entered in the currently selected **Garage/ Count Name** record.
18. Repeat steps 15-17 for each **Garage/ Count Name** in the drop-down box list.
19. Repeat steps 9-18 for each Electronic sign in your PIDS network.

20. Finally, if your network is configured and Display Generators running, click the **Update Signs** button. If you are using pcAnywhere and configured it correctly; and if you entered an appropriate CHF file in the **File to execute when updating** field, then the PIDS Config database file you just created (GarageSignDB.cds) will be sent to each sign PC on your PIDS network and stored in the proper drive and folder. If you set up pcAnywhere to transfer message files from your computer to the sign PCs, then clicking **Update Signs** would have also transferred those files into their proper drives and folders as well.

Count Servers

What Are Count Servers and What Do They Do?

PIDS Count Server is the software that bridges the gap between the PIDS system and the vehicle counting system. The VCS system has computers in each garage that control garage counting systems. The VCS PCs must be connected to the PIDS TCP/IP network to make them accessible to the PIDS systems. The Count Server would typically be installed to run as a service on these VCS computers. The VCS software makes the count information available by periodically writing to an XML text file.

Count Server operates in the following manner:

1. A count query is received from Count Consolidator (or Display Generator if so configured).
2. Count Server reads the XML data file and interprets the data.
3. A reply is sent back to the requester with the current count information.

The VCS data file is an XML ASCII text file that is typically located on the same computer as Count Server. Datapark's (vehicle counting system provider) software periodically writes the parking data to the file: C:\DATAPARK\vehicle_count.xml. This is the file that Count Server looks for by default. Since the VCS software periodically updates this file, it should contain current and valid count information. A time stamp in the file is passed on in the reply for later use by the Display Generator to determine if the count information is up-to-date. When this time stamp is passed on, it is temporarily converted to a file age. Count Consolidator converts it back to a time-stamp for storage. Avoiding the transmission of absolute time values between PC's allows for accurate time accounting without requiring the PC time of day clocks to be synchronized.

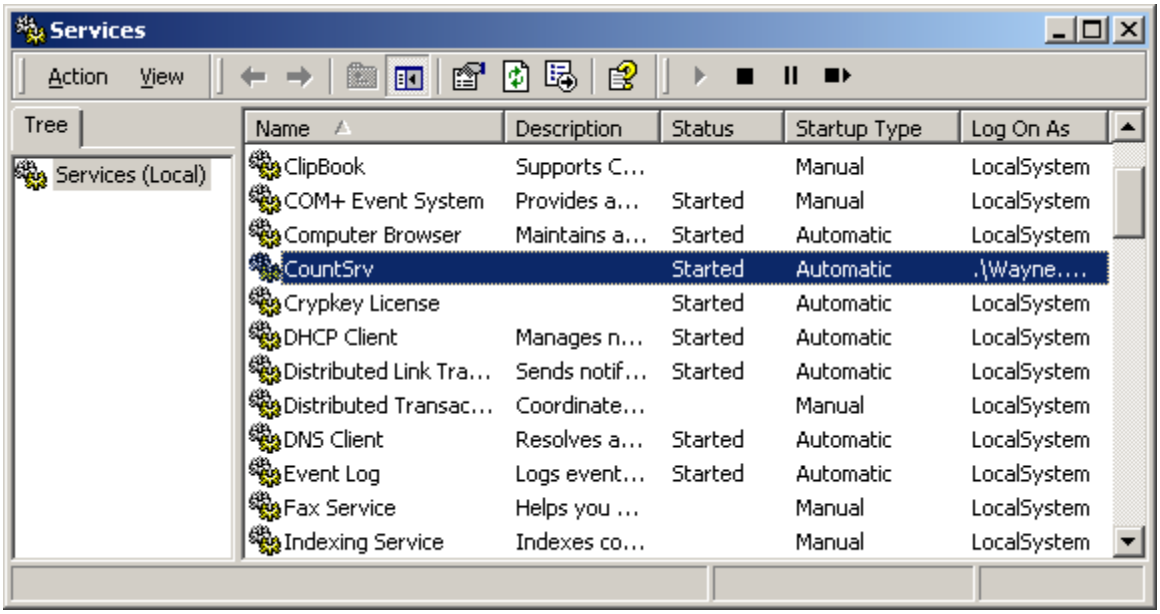
The count information in the XML file is comprised of the garage name, number of free spaces, capacity, display status, and a time stamp. All of this data is sent in the reply except for the GarageName field. Count Server supplies it's own CountName, which is taken from the CountServer.INI file.

Count Server can respond to queries that arrive over TCP and UDP including UDP broadcasts.

How Count Servers Are Run

Count Servers are run as a real service in Windows 2000 and NT, and a pseudo-service on Windows 9x. This means that they run transparently from the user's perspective, and they automatically start when the computer boots up (even if no one is logged on). Since they run in the background you won't see a GUI when they are running. The installation program, by default, will place all needed Count Server files in the PIDS\COUNTSERVER folder.

To stop the Count Server Service, or to edit its start up behavior, on Windows 2000/NT you can access the service by running the services snap-in (applet) from Administrative Tools in the Windows Control Panel. The Services snap-in is shown in ***Figure 4.1***.



Windows 2000 Services MMC Snap-In *(Figure 4.1).*

The Count Server installer will also create shortcuts that make it convenient to install, uninstall, start, and stop the service. You have the option of using these shortcuts instead of the Windows Services applet. The shortcuts are an option on Windows 2000/NT. On Windows 9x, since there is no service manager the shortcuts must be used to control the service.

Count Server Properties and Settings

Errors, Faults, and notifications are written to the CountServer.log file located in the same folder as the Count Server executable. This file can grow to about 5 MB after which time it will not accept any more log entries.

The log file should be checked occasionally to see if there are any problems with the system. If it is full, it should be renamed or deleted or future events will not be logged. If no event log file exists, a new one will be created automatically.

If Count Server is not functioning properly, check the log file first to see if the event log provides clues to the source of the problem.

The configuration settings for the Count Server service are stored in an INI file (CountServer.ini) located in the same directory as the service. The INI file configuration settings are as follows:

When Count Server is run for the first time, it automatically generates its INI file using default values. It is best to leave these alone under most circumstances. However, "CountName" is one INI setting that will require editing since it should be different for each Count Server on the PIDS network.

NetworkPort This is the network port that Count Server listens for queries on. The default port is 8026.

DebugMsg This is a Boolean value (0 or 1) that turns Debug mode on or off. When debug mode is on, extra event messages are recorded in the log file. The default is set to 0 (off)

CountName This is a text string value that identifies the Count Server. This item has a default value of "DefaultCount", but the setup technician should replace this with the actual count name. This name must be unique to each Count Server and must correspond with each Count Server's **Garage/Count Name** field in the PIDS Config **Garage Table**.


CountName values are case sensitive. The spelling of the name in the INI file must exactly match other instances in PIDS Config and FRM files.

Notes This is a text string value that can optionally be used to record any relevant information regarding the specific Count server. This line will only be displayed when using the Find PID Service utility application (see Appendix B).

CountFile This is a text string value that lists the path and filename of the vehicle counting system XML control file. Typically, this would be stored on a local drive, but could also be stored on a mapped network drive or network share. This item has a default value of "C:\DATAPARK\vehicle_count.XML"

Count Server Setup Procedure

To set up PIDS Count Servers for the first time, follow this step-by-step procedure using the conventions described in the previous section:

1. Install the Count Server by running its installer application.
2. Navigate to the Count Server's folder and edit its INI file. The default path is C:\PIDS\COUNTSERVER.
3. Double click CountServer.INI and it should open up the file in Windows Notepad text editor.
4. Leave all except two of the line items alone. Only edit those items if deemed necessary.
5. On the CountName= line item, type in the name of the local Count Server. This name corresponds with the local Count Server's **Garage/Count Name** field name in the PIDS Config **Garage Table**. Make sure there are no spaces before or after the = sign.
6. If necessary, edit the CountFile= line item, type in the path and filename of the vehicle counting system control file. Datapark's default file path for its VCD control file is C:\DATAPARK\vehicle_count.xml. Make sure there are no spaces before or after the = sign.
7. Save the INI file and exit Notepad.
8. Restart the Count Server service to force it to read the updated INI file (There is a shortcut in the COUNTSERVER directory to make this easy.)
9. Repeat steps 1-8 for each Count Server program on each VCS PC on the PIDS network.

Count Consolidators

What Are Count Consolidators and What Do They Do?

Count Consolidator is a PIDS software application that runs on a central PC. Only one consolidator is needed for each group of garages. Periodically, it queries the Count Servers and consolidates the count data into a single table with all the count information for the garages in its group. It then broadcasts this table for all listening Display Generators. Because it uses UDP broadcasts, Display Generators that require data from a Count Consolidator usually must be on the same network subnet.

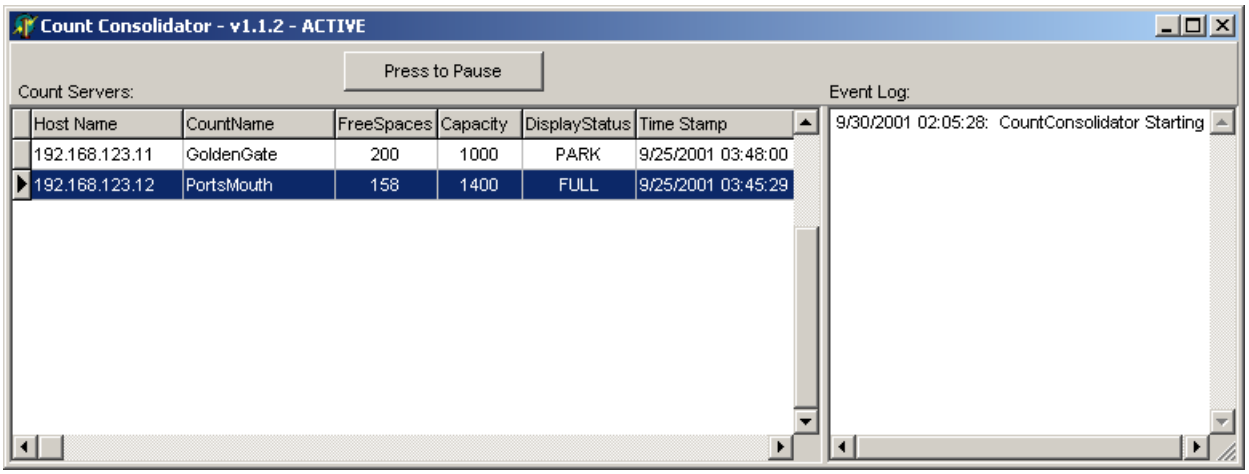
When Count Consolidator receives responses from the Count Servers, a time stamp is included with the count data. The time stamps are actually transmitted between applications as a "count age" value. Avoiding the transmission of absolute time values between PC's allows for accurate time accounting without requiring the PC time of day clocks to be synchronized. Count Consolidator queries the Count Servers periodically, based on the *QueryPeriod* set in the INI file. The default time period is set to query every 60 seconds (60000 ms).

The Count Consolidator User Interface

The main purpose of the Count Consolidator user interface is to monitor and control Count Servers. Only Count Servers that appear in the **Count Servers** data grid will be queried and broadcast by Count Consolidator to Display Generators. A user can set up all Count Servers to be broadcast, or just a few. Count Consolidator's user interface also displays important information you may use to diagnose problems or to just keep track of PIDS network activity.

Only Count Servers that appear in the **Count Servers** data grid will be queried and broadcast to all the listening Display Generators.

The user interface of Count Consolidator resembles a simple database form. There are two modes of operation. The first mode is *active mode* ***(See Figure 5.1)***, where Count Consolidator is performing its designed function of querying the Count servers and broadcasting that data to the Display Generators. The second mode is *paused mode* ***(See Figure 5.2)***, where the program is temporarily halted from its querying tasks so that the user can edit some of the fields in its data grid. To switch between modes, simply click the **Press to Pause** button along the top of the form when in active mode, or click the **Press to Activate** button when in paused mode.



Count Consolidator in Active Mode *(Figure 5.1)*

In active mode, the user interface is designed to only display information, not to allow the user to interact with it. On the lower left of the form is the Count Servers data grid. Each record in the grid displays relevant information of each Count Server that is currently running on the PIDS network. A description of each field is as follows:

Host Name This field displays the IP address or Host name of the PC that the corresponding Count Server program is running on.

Count Name This is the name of the Count Server itself. The technician chose this name when the Count Server was first set up and stored it in that Count Server's corresponding INI file. This Count Name is also identical to the Corresponding Count Server name chosen and stored in the **Garage/Count Name** field in the **Garage Table** of PIDS Config.

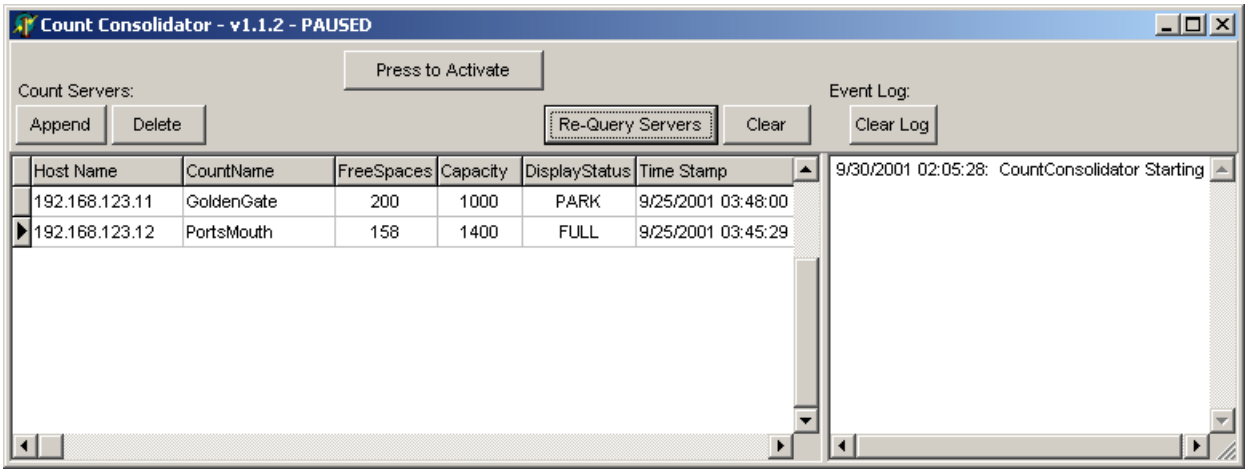
Free Spaces This field indicates the number of free parking spaces currently available for each of the Count Server garages on the PIDS network.

Capacity This field indicates the total number of parking spaces (or capacity) contained in each of the Count Server garages on the PIDS network.

Display Status This field indicates the display status of each Count Server on the PIDS network. This information is read directly from the vehicle counting system's control file. There are three states for the display status: PARK, FULL, and NULL. The status information is passed on to all listening Display Generators to tell them what to actually display on their corresponding electronic signs. When the **Display Status** says PARK, then the Display Generator that corresponds with that garage name will play messages from the main play list (normally containing parking space messages). When the **Display Status** says FULL, then the corresponding Display Generator will still play the main play list, but the vehicle count will be indicated as "Full" for that sign. When the **Display Status** says NULL, then the Display Generator for that garage name will switch to its auxiliary play list (normally containing non-parking related messages, i.e. advertisements or public service announcements). This feature is explained further in the "Display Generator" section of this manual.

Time Stamp This information comes through Count Server from the VCS control file. This field indicates the time the VCS last updated the control file contents with current parking data. If the **Time Stamp** is outdated, this would indicate the VCS is not updating its control file properly. This might be caused by a problem with the corresponding VCS PC, or possibly a networking problem.

In the lower right area of the Count Consolidator form is an area displaying an **Event Log**. This is a preview log only to provide a quick view of events and errors. The permanent event log is stored on disk in a file (see following section). Every time program events or errors occur, it is logged in chronological order in the **Event Log**. This is a convenient way for a user to keep track of what is going on with the PIDS network. This **Event Log** will show a maximum of the last 1000 events. To clear the log, you must be in paused mode. Clearing the log does not affect the main log stored on disk.



Count Consolidator in Paused Mode *(Figure 5.2)*

When in paused mode, a user can interact with the **Count Servers** data grid and **Event Log**. Typically a technician would enter this mode to add or remove Count Servers form Count Consolidators list and/ or clear the **Event Log**. A technician may also modify certain fields in the **Count Server** data grid. New groups of buttons appear on the top of the form when you enter paused mode.

After doing edits in "Pause" mode, don't forget to put Count Consolidator back in "Active" mode. If left in "Pause" mode, it will not broadcast to the Display Generators.

A description of each button and its function is as follows:

Append Pressing this button will add a new, blank record to the bottom of the **Count Server** data grid.

Delete Pressing this button will delete a selected record in the **Count Server** data grid.

Re-Query Servers Pressing this button will cause Count Consolidator to find and query each Count Server that is currently running on the PIDS network. All new Count Servers that are found will then be added to the Count Server data grid. This is a quick way of checking the status of your Count Servers and adding them to Count Consolidator without having to manually type in the Host name field.

If you want the Count Consolidator discovery broadcast to find all of your Count Servers, make sure they are running on all your VCD PCs *before* you click the **Re-Query Servers** button. Pressing the **Re-Query Servers** button will normally only find Count Servers on the same subnet.

Make it a habit to use the **Re-Query Servers** button to save time.

Clear Pressing this button will delete all records in the **Count Server** data grid.

Use the **Clear** button when you want to start over to save time.

Clear Log Pressing this button will delete all entries in the on-screen **Event Log**.

The final user interface item that can be manipulated while in paused mode is the **Count Server** data grid. Users can manually edit fields in the grid to make changes if they desire. Users can also re-size field widths and scroll through records using their mouse.

Although all fields can be edited, only the **Host Name** field needs to be changed. This field must correctly indicate the IP address or host name of a Count Server. All other fields are filled in automatically from the Count Servers, and will be re-populated with accurate data the instant Count Consolidator is activated. A technician can manually enter the IP address of a certain Count Server if it resides on another subnet, or if a Count Server is currently not responding for some reason.

Count Consolidator Properties and Settings

The Installation program will place all needed Count Consolidator files in the PIDS\COUNTCONSOLIDATOR folder. It also installs a shortcut to CountCosolidator.exe in the "Startup" folder so Count Consolidator automatically runs after a reboot.

Errors, Faults, and notifications are written to the CountConsolidator.log file located in the same folder as the Count Consolidator executable. This file can grow to about 5 MB after which time it will not accept any more log entries.

The log file should be checked occasionally to see if there are any problems with the system. If it is full, it should be renamed or deleted or future events will not be logged. If no event log file exists, a new one will be created automatically.

If Count Consolidator is not functioning properly, check the log file first to see if the event log provides clues to the source of the problem.

The configuration settings for Count Consolidator are stored in an INI file (CountConsolidator.ini) located in the same directory as the program.

When Count Consolidator is run for the first time, it automatically generates its INI file using default values. It is best to leave these alone under most circumstances. However, there are a few INI settings that you may want to edit.

The INI file configuration settings are as follows:

QueryPeriod	This is the time interval that Count Consolidator will query the VCS control file in milliseconds. The default value is 60000 (every 60 seconds).
BroadcastAddr	This is the IP address that the Count Consolidator sends UDP broadcasts to when doing a Count Server discovery, and when broadcasting to Display Generators. The default address is 255.255.255.255.
ConsolidatorPort	This is the network port Count Consolidator listens on to respond to queries sent it by diagnostic utilities. The default port is 8027.
CountServerPort	This is the network port Count Consolidator will query Count Servers on. The default port is 8026.
DisplayGenPort	This is the network port Count Consolidator broadcasts on. Listening Display Generators receive broadcasted data packets from Count Consolidator on this port. The default port is 8028.
ConsolidatorID	A unique name identifying the Count Consolidator.
Notes	This is a text string value that can optionally be used to record any relevant information regarding Count Consolidator. This line will only be displayed when using the Find PID Service utility application (see Appendix B).
DebugMsg	This is a Boolean value (0 or 1) that turns Debug mode on or off. When debug mode is on, extra events are recorded in the log file. The default is set to 0.

Count Consolidator Setup Procedure

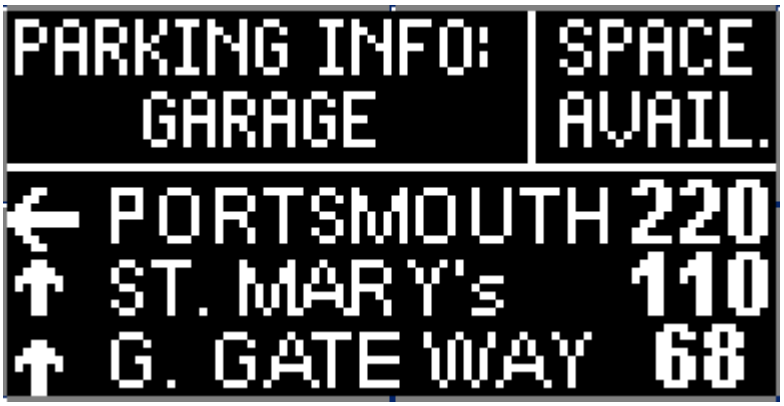
1. Install Count Consolidator on an appropriate PC on the PIDS network.
2. Edit the CountConsolidator.ini file located in the \PIDS\COUNTCONSOLIDATOR folder. The main entry that should be changed is the ConsolidatorID. This should be unique among Consolidators. Notes can also be added if desired.
3. Reboot the PC to make sure Count Consolidator runs automatically on startup.
4. Click the **Press to Pause** button on the form to set Count Consolidator to paused mode.
5. While in paused mode, click the **Re-Query Servers** button to query all the Count Servers on the PIDS network and automatically record their settings in the **Count Servers** data grid. Make sure to have all Count Servers running on their corresponding VCS PCs before clicking the **Re-Query Servers** button if you want all of your count servers to appear automatically.
6. Manually edit any Count Server **Host Name** fields, if desired.
7. Manually add any Count servers by clicking the **Append** button and filling out the **Host Name** field, if desired.
8. Click the **Press to Activate** button to set Count Consolidator to active mode. When in active mode, Count Consolidator will be reading VCS control files at pre-defined time intervals and broadcasting out the information in its **Count Servers** data grid to all listening Display Generators.
9. Leave Count Consolidator running in a window, or minimize the window, if desired.

Display Generators

What are Display Generators and What Do They Do?

This application runs on a Sign PC and controls what is actually displayed on the electronic display. It listens for count table broadcasts from the Count Consolidator and uses this data to generate displays for count and directional information. All display frames are passed to the sign hardware for display on the sign face. Messages play from one of three user selectable sources: (1) the count play list, (2) the Aux. play list, or (3) the Instant message function.

Display Generator's main function is to play messages out to the sign. Messages are stored as files on the sign PCs local hard drive. Currently, message file formats that are supported by Display Generator are 24 bit-uncompressed Windows BMP files, 24 bit-uncompressed AVI files, and Display Generator's proprietary FRM file format. The FRM file format is basically a specialized ASCII text file that allows for dynamic updates of parking data. A technical description of the FRM format is contained in Appendix C. BMP and AVI messages should be pre-formatted to match the pixel dimensions of the electronic sign they are intended to play on.



Sample FRM file when displayed in Display Generator *(Figure 6.1)*

Message files are sent to the "message" folder on each Display Generator PC, using file transfer software (i.e. pcAnywhere). The Default directory for these files is PIDS\DISPLAYGEN\PIDMESSAGE. Display Generator software can be controlled and configured across the network using pcAnywhere.

Messages can be sequenced in Display Generator's play lists. There are two play lists that are accessible from the GUI: a **Main Play List** and an **Auxiliary Play List**. Play lists are actually comma-delimited text files located in the same directory as the executable (MainList.csv and AuxList.csv). They are visible in the interface at run time. There is no built-in limitation to the number of messages that can be included in the play lists. Play lists automatically loop, that is they repeat from the top of the list when the last message on the bottom of the list is finished playing.

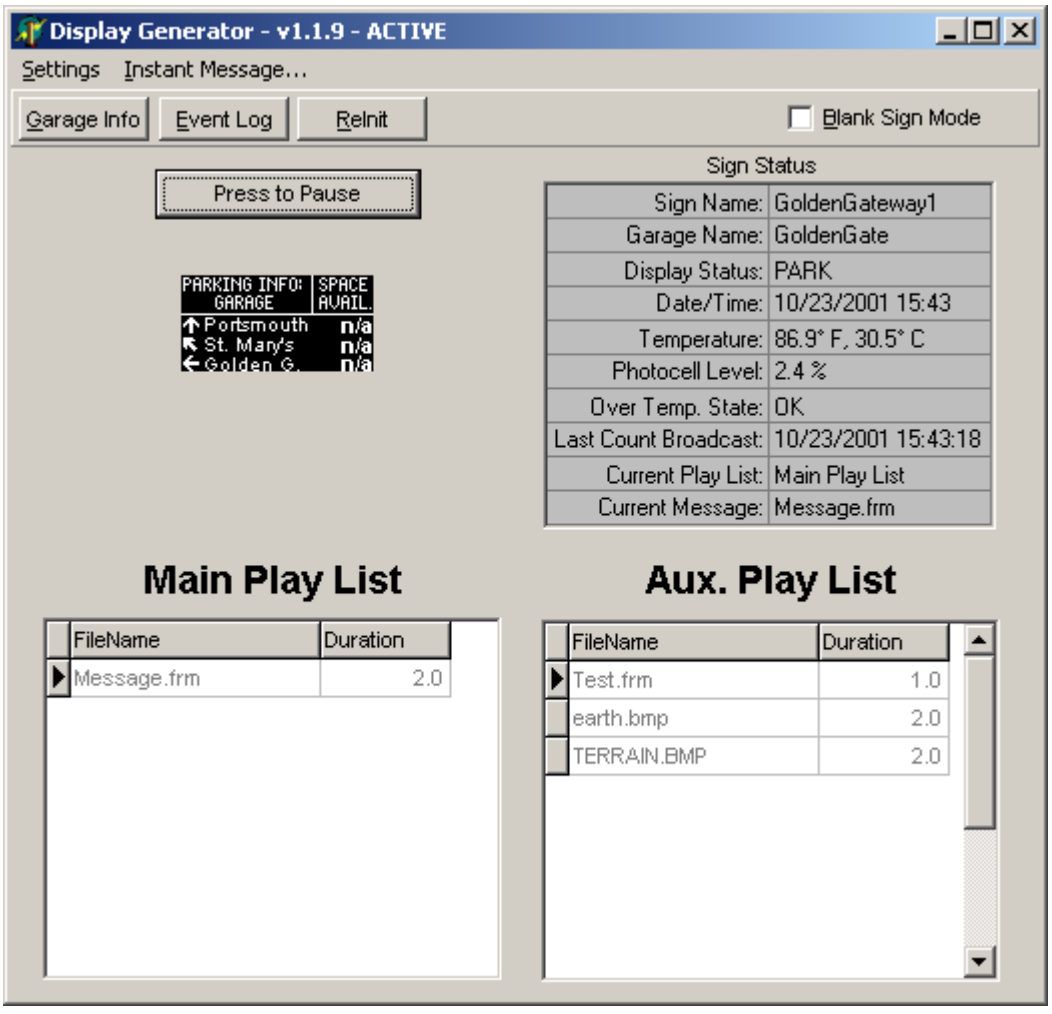
The main play list typically contains FRM files set up to display updated parking information. The user may want to include other messages to suite their needs, such as time and temperature message, for example. The active play list is ultimately determined by the Display Status field in the VCS control file (vehicle_count.XML). The data from this file makes it's way to Display Generator through Count Server and Count Consolidator. This field tells Display Generator which play list to play. If Display generator receives a PARK or FULL status value, then it will play the **Main Play List**. If Display Generator receives a NULL value, then it will switch to playing the **Aux. Play List.** Typically the auxiliary play list would be used to play non-parking related messages, like advertisements or public service announcements.

The Display Generator User Interface

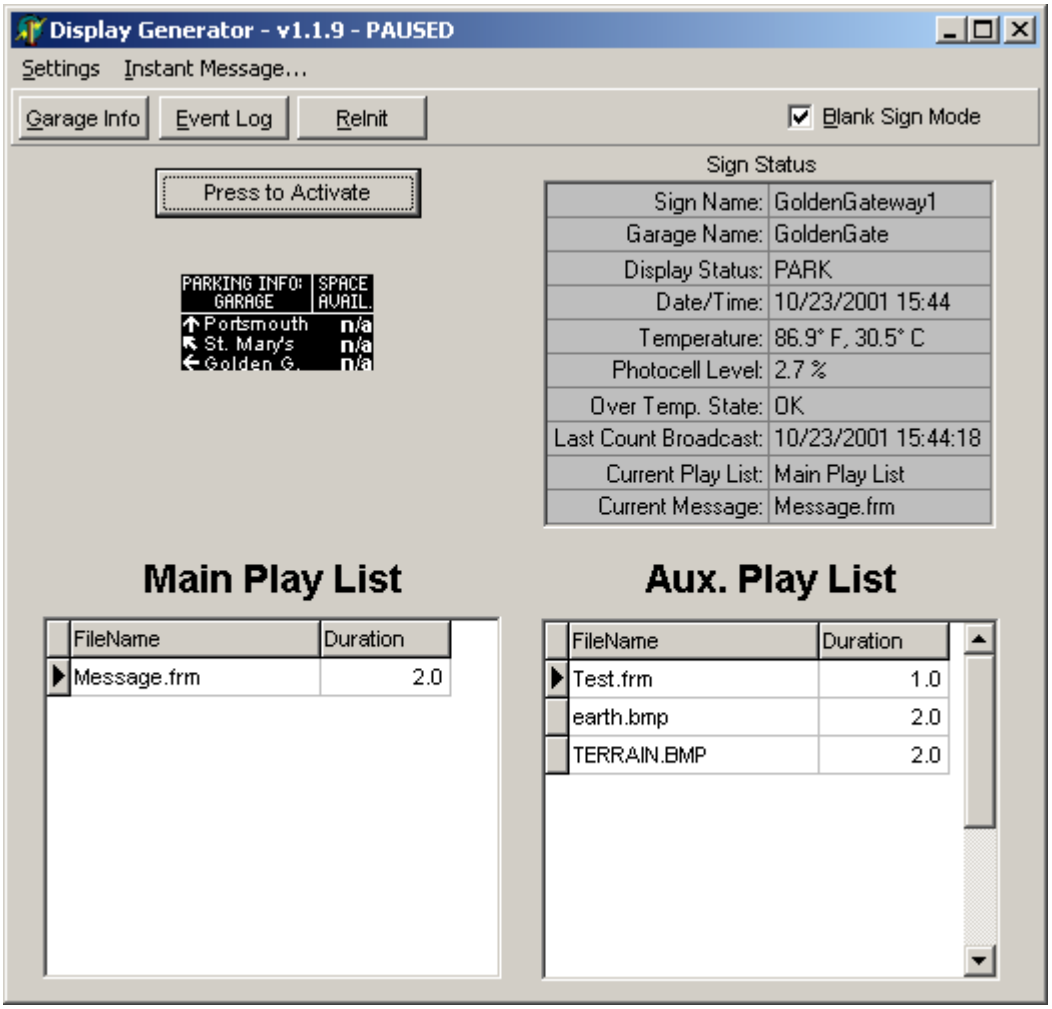
The main purpose of the Display Generator user interface is to monitor and control messages that are displayed on its corresponding sign PC. The user can edit the play lists, pause the playback, blank the sign screen, send an instant message to the sign screen, view garage and parking information, view the sign's status, and view the event log file.

The user interface of Display Generator resembles a simple database form. There are two modes of operation. The first mode is *active mode* ***(See Figure 6.2)***, where Display Generator is performing its designed function of playing back messages in its play list to the electronic sign face. The second mode is *paused mode* ***(See Figure 6.3)***, where the program is temporarily halted from its play back tasks so that the user can edit some of the fields in its play list's data grid. To switch between modes, simply click the **Press to Pause** button along the top of the form when in active mode, or click the **Press to Activate** button when in paused mode.

When running Display Generator, play lists can only be edited when the sign is "Paused".



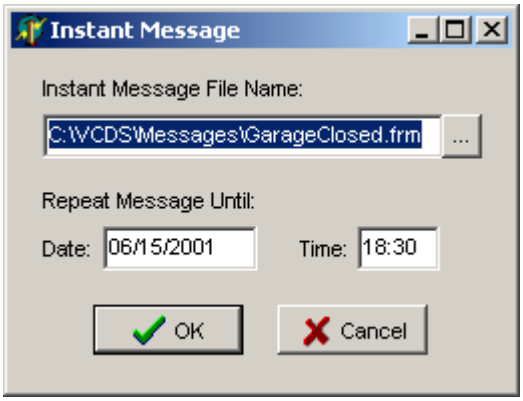
Display Generator in Active Mode *(Figure 6.2)*



Display Generator in Paused Mode *(Figure 6.3)*

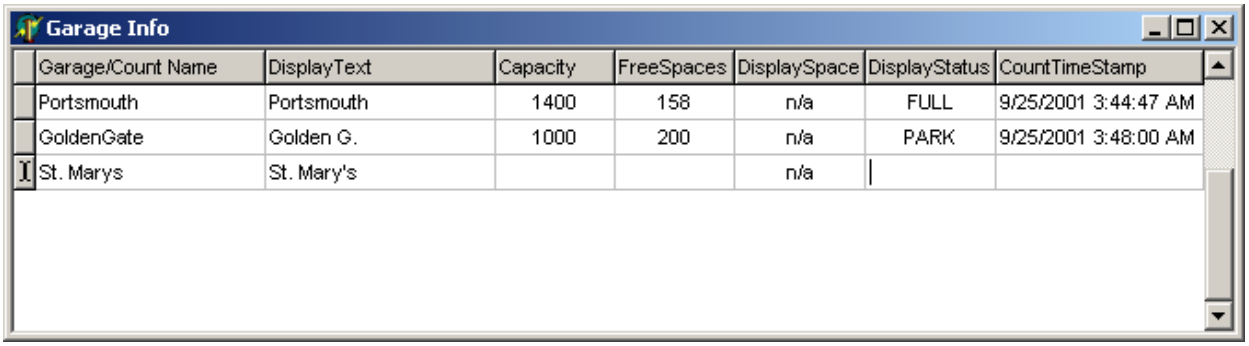
Across the top of the form are a couple of menu items. Clicking on the **Settings** menu item will open the settings menu, which has two additional items. The first settings item is **Garage Info**… Clicking on this menu item will display a data grid with garage and parking information. The same data grid is displayed when you click the Garage Info button on the main form. The garage info table contents will be discussed further later on. The second settings menu item is **Enable Message Preview**. This is a toggle item, showing a check mark when it is enabled. The message preview is an area on the form that will allow the user to see the message in the preview area as they are being played on the sign. When this item is disabled, the preview area of the form will remain blank.

The second menu item is **Instant Message**… Clicking this item will open the **Instant Message** dialog box ***(Figure 6.4)*** that will enable the user to select a message file that will interrupt the current play list and play the instant message file to the sign. The **Instant Message File Name** field stores a path and file name of message file (FRM, BMP, AVI) that you want to instantly display on the sign screen. You can type in the path and filename, or select the **…** button to open a file requestor dialog box. The **Repeat Message Until** fields allow the user to set a day and time value they want the instant message to play until. The default values for these fields are the current date and time of the sign PC's clock.



Instant Message Dialogue Box *(Figure 6.4)*

Returning now to the main form, we will examine the three buttons on the tool bar at the top. The first one on the left is the **Garage Info** button. Selecting this opens the **Garage Info** data grid ***(Figure 6.5)***.



Garage Info Data Grid *(Figure 6.5)*

The grid is for display purposes only, so interaction with the fields is not possible. This grid is similar in appearance to the **Count Servers** data grid in Count Consolidator. A description of each field is as follows:

Garage/Count Name This is the name of the each garage and its corresponding Count Server. This is the **Garage/Count** name that was entered into the **Garage Table** when the system was configured using PIDS Config. It should match the *CountName* that is entered into the cooresponding CountServer.INI file.

Display Text This field displays the Actual text that will be shown on the sign's screen for the cooresponding garage. This information comes from the **Display Text** field that was filled out in PIDS Config.

Capacity This field indicates the total number of parking spaces (or capacity) contained in each of the Count Server garages on the PIDS network.

Free Spaces This field indicates the number of free parking spaces currently available for each of the Count Server garages on the PIDS network.

Display Space This field indicates the actual text that will be shown on the sign's screen to indicate available spaces. The Sign will show three possible values in its display space, FULL, N/A or the actual numeric value of free parking spaces in each corresponding garage. The logic for those values is as follows:

1) If Count time stamp is expired then show 'n/a'
Otherwise
2) If DisplayStatus = FULL then show 'FULL'
Otherwise
3) If FreeSpaces >= 0 then show FreeSpaces value
Otherwise
4) show 'n/a' (FreeSpaces is negative – something is wrong)

Display Status This field indicates the display status of each Count Server on the PIDS network. This information comes from the vehicle counting system's control file. There are three states for the display status: PARK, FULL, and NULL. The status information is passed on to all listening Display Generators to tell them what to actually display on their corresponding electronic signs. When the **Display Status** says PARK, then the Display Generator will display the number of free parking spaces on its corresponding sign. When the **Display Status** says FULL, then the Display Generator will display the word "Full" on its corresponding sign. When the **Display Status** says NULL, then the Display Generator will switch to its auxiliary play list and display non-parking related messages (i.e. advertisements or public service announcements) on its corresponding sign.

Count Time Stamp This information is read directly from the vehicle counting system's control file. This field indicates the time the VCS last updated its control file. If the **Time Stamp** is outdated, this would indicate the count information is not being received properly. It may be a problem with the corresponding VCS PC (perhaps it is not updating the vehicle_count.xml file), or possibly a network problem.

To the right of the **Garage Info** button is the **Event Log** button. Clicking on this will automatically load Display Generator's DisplayGen.Log file in Windows Notepad and display it in a separate window. Errors, Faults, and notifications are written to the event log file, which is located in the same folder as the Display Generator executable. Every time program events or errors occur, it is logged in chronological order in the **Event Log.** This file can grow to about 5 MB after which time it will not accept any more log entries.


The log file should be checked occasionally to see if there are any problems with the system. If it is full (file size around 5 MB), it should be renamed or deleted or future events will not be logged. If no event log file exists, a new one will be created automatically.


If Display Generator is not functioning properly, check the log file first to see if the event log provides clues to the source of the problem.

To the right of the **Event Log** button is the **Re-Init** button. Clicking this button will cause Display Generator to refresh its settings by re-reading its INI file and its garage info and play list database files. Typically this would be used to refresh changes made to these files without having to re-start Display Generator.


Closing Display Generator will overwrite settings in its database files. Therefore, always Re-Init before closing the program if you manually made changes to those files while Display Generator was still running.

The next item on the top of the form in the toolbar is the **Blank Sign Mode** check box. Clicking this will instantly blank the sign screen that Display Generator is controlling, so nothing at all will be playing on it. This box is automatically checked every time the user goes into paused mode.

The **Sign Status** window shows updated status information of several sign properties. Each status line and its description are listed as follows:

Sign Name The name of the sign taken from the DisplayGen.INI file. This must match the corresponding **Sign Name** that was given in the PIDS Config **Sign Table**.

Garage Name This field displays the garage name stored in Display Generator's local INI file. Usually, sign will be associated with a single garage, this name must match the **CountName** that was entered into the corresponding Count Server's INI file. With this properly configured, it allows the VCS control file of this garage to determine which play list Display Generator will play. If this line is left blank, then Display Generator will only play back messages from its **Main Play List**.

Display Status This field indicates the display status of the associated garage (see Garage Name entry). This information comes from the associated garages VCS control file. There are three states for the display status: PARK, FULL, and NULL. When the **Display Status** says PARK, then the Display Generator will display the number of free parking spaces on its corresponding sign. When the **Display Status** says FULL, then the Display Generator will display the word "Full" on its corresponding sign. When the **Display Status** says NULL, then the Display Generator will switch to its auxiliary play list and display non-parking related messages (i.e. advertisements or public service announcements) on its corresponding sign.

Date/Time Current date and time (read from the local sign PC's system clock).

Temperature The current outdoor temperature of the electronic sign. This data is read from a sensor typically located on the sign cabinet and is fed to the interface hardware of the local sign PC. This temperature value is used when displaying Time/ Temp messages.

Photocell Level This field indicates the current status of the photocell as a percentage. At the time the electronic display was set up, the technician entered photocell thresholds into the DisplayGen.PictureSettings configuration file. This file tells Display generator when to adjust the signs dimming capabilities according to photocell readings. Typically, the lower the percentage value is, the dimmer the sign will become, because it is approaching nighttime. Likewise, a higher percentage indicates daytime conditions and the sign will be output at proportionately brighter levels.

Over Temp. State This field will tell the user whether or not the temperature in the sign cabinet is exceeding safe levels. A status value of OK indicates safe operation. A status value of OVERTEMP FAULT will indicate an overheating condition that requires attention.

Last Count Broadcast
This value indicates in date/ time format the last time a broadcast was received from Count Consolidator.

Current Play List This field indicates which play list is currently playing.

Current Message This field indicates which message is currently playing from the current play list.

The final areas of Display Controller's user interface are the play list data grids. Play lists can be manipulated using drag-and-drop with the mouse. Records in the **Aux. Play List** can be dragged and dropped into the **Main Play List** and vice-versa. Drag-and-Drop works within the same play list as well, for re-ordering of records. Keyboard keys can be used to interact with the grids. The DELETE key removes a message. The INSERT key inserts a new record. Other than this, the data grids behave similarly to other data grids mentioned previously in this manual.

Use drag-and-drop between play lists and within a play list to save time.

There are two fields in each play list data grid that users can manipulate. The first is the **File Name** field. To add messages to the play list, double click the record cell, and a file requestor **…** button will appear. You can select the **…** button to open a file requestor dialog box and navigate to the message files you want to add to the play list. The **Duration** field applies to still image messages (BMP and FRM). This is the duration (in seconds) you want the message to appear on the sign screen before the next message in the play list starts to play. AVI files ignore this field and play their programmed duration.

Display Generator Properties and Settings

The Installation program will place all needed Display Generator files in the PIDS\DISPLAYGEN folder. It will also place a shortcut to DisplayGen.exe in the startup folder to allow Display Generator to automatically run after a reboot.

The configuration settings for Display Generator are stored in an INI file (DisplayGen.ini) located in the same directory as the program.

When Display generator is run for the first time, it automatically generates its INI file using default values. It is best to leave these alone under most circumstances. However, there are a few INI settings that will be necessary to edit on each Display Generator on the PIDS network.

The INI file configuration settings are as follows:

DisplayGenPort This is the network port that Display Generator listens on for Count Consolidator broadcasts. The default port is 8028.

CountTimeToLive This value represents how old a count value can get before it becomes invalid. The unit is seconds and the default value is 900 sec. (15 min.)

CountTableRecvTimeOut
This value represents the maximum amount of time to wait for Count Table broadcasts from Count Consolidator. If timeout expires, attempts will be made to connect directly to a local Count Server (if assigned) to get the free-space count. The unit is in seconds. Default value is 600 sec. (10 min)

CountServerHostName
IP address or host name of a local Count Server. This line is used to hard code a specific Count Server you want the local Display Generator to receive parking data from in the event that Count Consolidator goes off line.

CountServerPort This is the network port Display Generator will query a Count Server on. The default port is 8026.

SignPixelWidth Horizontal width of local electronic sign's screen measured in pixels.

SignPixelHeight Vertical height of local electronic sign's screen measured in pixels.

SignName Text string that uniquely identifies the sign that is being controlled. This must match the sign name given it in PIDS Config.

Notes This is a text string value that can optionally be used to record any relevant information regarding Display Generator. This line will only be displayed when using the Find PID Service utility application (see Appendix B).

DebugMsg This is a Boolean value (0 or 1) that turns Debug mode on or off. When debug mode is on, extra events are recorded in the log file. The default is set to 0.

MessageDir This is the path of the folder that stores all the local Display Generator message files. The default is path is <drive>:\PIDS\DISPLAYGEN\PIDMESSAGE.

MDLRefreshTime This indicates the time in milliseconds that LED modules get their programmable brightness data refreshed. This value is used in dimming the sign. The default value is 100000 (100 seconds)

GarageName This value indicates the name of the Count Server garage that this local Display Generator is associated with to determine which play list will be played. This value must identically match the corresponding **Garage/Count Name** in the garage table of PIDS Config. Display Generator will switch between its main and auxiliary play lists depending on the **Display Status** data sent from this Count Server garage.

MessagePreview This is a Boolean value (0 or 1) that turns **Message Preview** mode on or off. When Message Preview mode is on (1), messages appear in the user interface as they are played from the play list. Otherwise, the preview area is left blank. The default value is set to 1.

EnableOperatingHours
This is a Boolean value (0 or 1) that enables operating hours (1) or disables them (0). Enabling operating hours will allow the user to program the daily operating hours of the sign. The start time and stop time values listed next are related to the start time the user wants to turn on the sign, and the stop time the user wants to shut down sign operation (leave blank). The default value is (0).

StartTime Time in military units (00:00) the user wants to start sign operation every 24-hour period. This only applies when the Enable Operating Hours value is set to (1).

StopTime Time in military units (00:00) the user wants to stop sign operation every 24-hour period. This only applies when the Enable Operating Hours value is set to (1).

Display Generator Setup Procedure

To set up PIDS Display Generators for the first time, follow this step-by-step procedure using the conventions described in the previous section:

1. Install the Display Generator by running its installer application.
2. Navigate to the Display Generator's folder and edit its INI file. The default path is C:\PIDS\DISPLAYGEN.
3. Double click DisplayGen.INI and it should open up the file in Windows Notepad text editor.
4. Leave all except eight of the line items alone. Only edit those items if deemed necessary.
5. On the CountServerHostName= Line, enter the IP address or host name of a corresponding Count Server, if you want the local Display Generator to receive parking data from it in the event that Count Consolidator goes off line. Make sure there are no spaces before or after the = sign.
6. On the SignPixelWidth= Line, enter the horizontal width of the local electronic sign's screen measured in pixels. Make sure there are no spaces before or after the = sign.
7. On the SignPixelHeight= Line, enter the vertical height of the local electronic sign's screen measured in pixels. Make sure there are no spaces before or after the = sign.

8. On the SignName= Line, enter a text name that uniquely identifies the sign that is being controlled. This must match the sign name given it in PIDS Config. Make sure there are no spaces before or after the = sign.
9. On the GarageName= Line, enter the name of the Count Server garage that this local Display Generator is associated with (This allows the corresponding garage to determine which play list is currently active will be played). This value must identically match the corresponding **Garage/Count Name** in the garage table of PIDS Config. Display Generator will switch between its main and auxiliary play lists depending on data sent from this Count Server garage. Make sure there are no spaces before or after the = sign.
10. On the EnableOperatingHours= Line, enter a value of (1) if you want to schedule sign operating hours. Otherwise, leave this line alone. Make sure there are no spaces before or after the = sign.
11. On the StartTime= Line, enter a time in military units (00:00) that you want to start sign operation every 24-hour period. This only applies when the Enable Operating Hours value is set to (1). Otherwise, leave this line alone. Make sure there are no spaces before or after the = sign.
12. On the StopTime= Line, enter a time in military units (00:00) that you want to stop sign operation every 24-hour period. This only applies when the Enable Operating Hours value is set to (1). Otherwise, leave this line alone. Make sure there are no spaces before or after the = sign.
13. Save the INI file and exit Notepad.
14. Run Display Generator by double clicking its icon.
15. Click the **Press To Pause** button to halt display activity and edit the play lists.
16. Double click in a blank record in the **File Name** field of the **Main Play List** data grid (if no blank records are visible use the keyboard down arrow key to create one at the end of the list). A file requestor button **…** will appear.
17. Click the file requestor button **…** and navigate to a message file (BMP, AVI, or FRM) you want to play first in your play list. The messages should have already been transferred to your message directory (PIDS\DISPLAYGEN\PIDMESSAGE is the default). These message files should be the same pixel dimensions as those on the electronic sign.
18. Double click in the adjacent **Duration** field and enter in seconds the duration you want your still image message (i.e. BMP or FRM) to play. AVI messages ignore this field.
19. Repeat steps 17-19 for each message file you want to add to your **Main Play List**. Feel free to re-arrange them by dragging and dropping with your mouse, if you desire.
20. Double click in a blank record in the **File Name** field of the **Aux. Play List** data grid (if no blank records are visible use the keyboard down arrow key to create one at the end of the list). Repeat steps 17-20 for each message file you want to add to your Aux. Play List.
21. Click the **Settings** menu item in the menu area of the form. Make sure **Enable Message Preview** is checked in the **Settings** menu. This will allow you to view messages as they are being played from the play list.
22. Click the **Re-Init** button to re-initialize the data in Display Generators database files and INI file.
23. Click the **Press to Activate** button to set Display Generator to active mode. Display generator will immediately start playing messages from the active play list. If you set up PIDS Config, your Count Servers, and Count Consolidator properly, and if you have them running on the PIDS network, then you should be playing messages from the **Main Play List**.
24. Leave Display Generator running in a window, or minimize the window, if desired.
25. Repeat steps 1-24 for each Display Generator program on each sign PC on the PIDS network.

Appendices

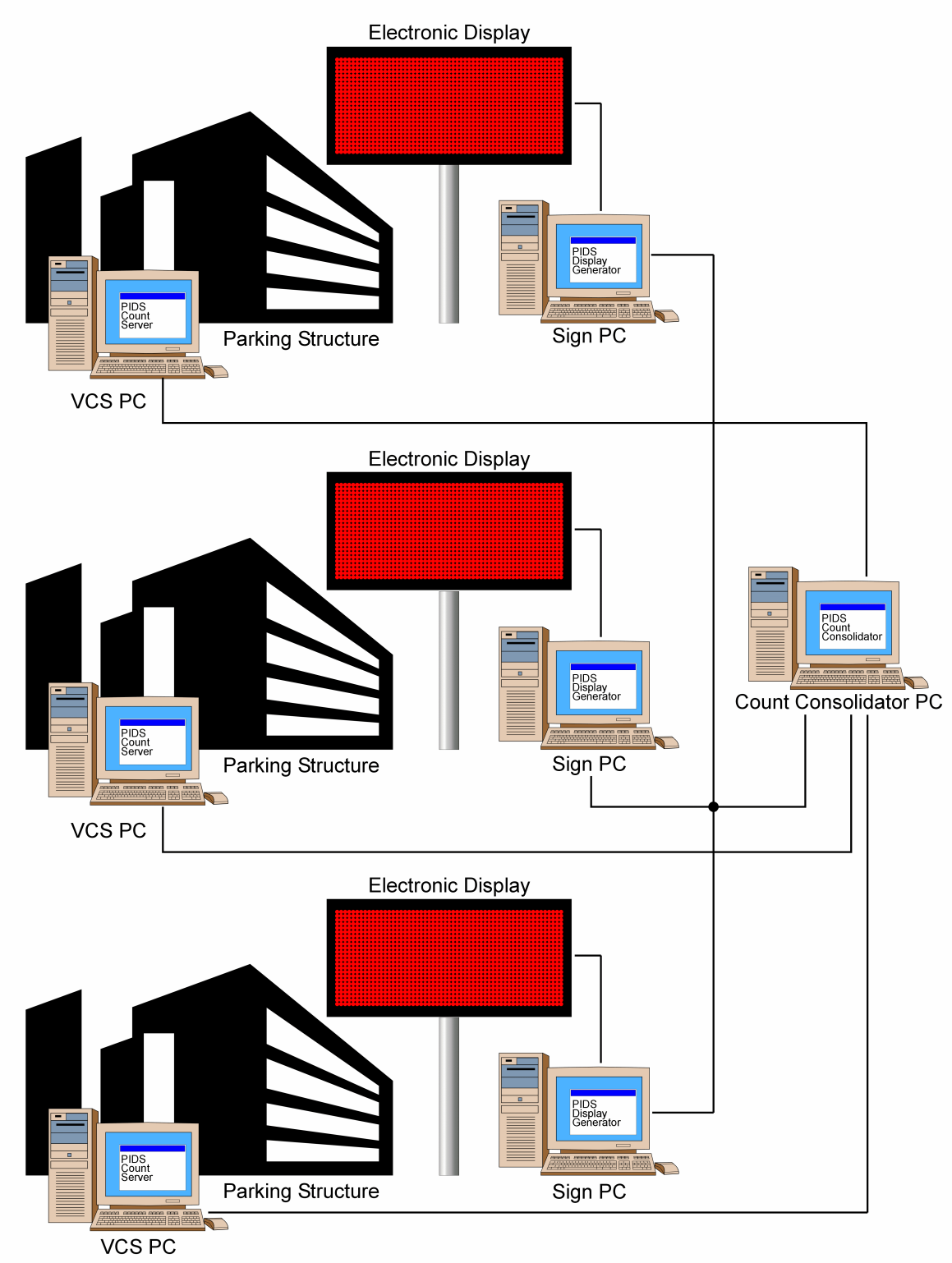
Appendix A: Setup Tutorial/Example

Setting up PIDS in a real world parking garage environment

Overview

For the sake of this tutorial let's say a civic organization owns three parking garages in San Francisco. The garages have three separate existing Vehicle Counting Systems (VCS), one in each garage. They want to be able to direct motorists to garages that have free parking spaces when other garages are full. They install three electronic outdoor displays that are compatible with PIDS, one sign per garage. These signs each have their own sign PC, which controls the display.

For this installation, as is typical, each of the three VCS computers will be setup with it's own PIDS Count Server application. For clarity in this tutorial, we will run PIDS Count Consolidator on a dedicated PC, although this is not mandatory (it may also be run on a VCS computer or sign PC). PIDS Display Generator will be installed on each of the three sign PCs. So our PIDS network for this example consists of seven computers running PIDS software that are connected using standard TCP/IP networking (See Figure 7.1).



Logical Layout of the PIDS network for this tutorial *(Figure 7.1)*

Preparation and Planning

Before getting involved in the actual process of setting up and testing PIDS, proper planning is in order. You need to decide the *hostname* and *IP address* for each computer on the PIDS network. For the three VCS computers, you also need to assign a *count/garage name*. Likewise, you need to assign a *sign name* for each sign PC. Each name must be unique to each computer, and it is a good idea to name these according to their perspective functions. It is very helpful to record all these names in a portable format, either on paper or in electronic form, so you can carry and reference them at all times.

Count Servers

IP Address	Host Name	Count/Garage Name
192.168.1.1	FirstStCount	FirstStreetGarage
192.168.1.2	EvansRdCount	EvansRoadGarage
192.168.1.3	MainStCount	MainStreetGarage

Count Consolidator

IP Address	Host Name
192.168.1.21	ConsolidatorPC

Display Generators

IP Address	Host Name	Sign Name
192.168.1.51	FirstStSign	FirstStreetSign
192.168.1.52	EvansRdSign	EvansRoadSign
192.168.1.53	MainStSign	MainStreetSign

Example IP Assignments/Naming Scheme *(Figure 7.2)*

Computer/Network Setup

At this point, we can set up and connect all the computers using standard TCP/ IP networking. It is recommended that each computer use the static IP address that you previously recorded. It is also recommended that all computers on the PIDS network be part of the same subnet. This is a typically requirement for all Display Generator PCs and the Count Consolidator PCs since Count Consolidators use UDP broadcasting to transfer count data to Display Generators. Count Server PCs aren't required to be on the same subnet, but it is easier to configure Count Consolidator if they are (you can automatically fill in configuration data by clicking the "Re-query Servers" button instead of manually typing it in). In general, it is more reliable to reference each computer on the PIDS network by its IP address as opposed to its hostname. In this tutorial, we will reference them by IP address when configuring all the PIDS software modules. Make sure to test the network after all configuration settings are made, but before any PIDS software is installed. This will make it easier to diagnose any problems that may occur later.

Remote Control/File Transfer Software

After setting up the basic network, install pcAnywhere on all computers. Follow the instructions in the documentation provided with the product in order to do this. Set up pcAnywhere to automatically run at startup, so file transfers and remote computer control can be accomplished from any computer to any computer on the PIDS network.

Count Server Setup

Next, we need to set up each Count Server service on each of the three VCS PCs. Follow the Count Server Setup Procedure on page 16 of this manual for instructions. After all Count Servers are installed, configured and running, you can test them using the Query Count utility, referred to in Appendix B. If you see responses for the three Count Servers and the response information is correct, then you know the Count Servers are working properly. If individual Count Servers do not show up, or they display wrong information, then repeat the Count Server Setup Procedure, making sure the Count Name and Count File lines are correct.

Count Consolidator Setup

At this time, you can set up Count Consolidator on its dedicated PC. Follow the Count Consolidator Setup Procedure on page 20 of this manual for instructions. Leave Count Consolidator running. After Count Consolidator is installed and configured, you can test it using the Query Consolidator utility, referred to in Appendix B. Run Query Consolidator on each sign PC (Display Generator PC), one at a time in order to verify that they are receiving Count Consolidator broadcasts. If you see a response from Count Consolidator, and the response information is correct, then you know Count Consolidator is working properly. If no information is displayed, or the information is wrong, then repeat the Count Consolidator Setup Procedure, making sure the Host Name fields for each sign PC are correct, and that Count Consolidator is actually running (the "Click to Activate" button was pressed).

Final Setups - Display Generator and PIDS Config

Next, we need to install and initiate set up for each Display Generator on each of the three sign PCs. After installing each Display Generator program and before configuration, it would be good to copy some test messages to the DISPLAYGEN\PIDMESSAGE folder on each sign PC. Use a sample bitmap file (BMP) and message frame file (FRM) for test messages. Follow the Display Generator Setup Procedure on page 28 of this manual for instructions on configuring each Display Generator. At this time, only follow steps 1-13 for each sign PC **(*do not run Display Generator software yet*)**.

Next, install and run PIDS Config. For our tutorial, we will use the Count Consolidator PC for this. Follow the PIDS Config Setup Procedure on page 13 of this manual for instructions. At this stage, it is recommended to set up three separate pcAnywhere Remote Connection Files (.CHF) corresponding with each of the three Display Generators on the PIDS network. Set these CHF files up to transfer message files stored on the Count Consolidator PC to the PIDS\DISPLAYGEN\PIDMESSAGE folder on each sign PC. Also, each CHF file should be set up to transfer the GarageSignDB.cds file generated by PIDS Config to the PIDS\DISPLAYGEN folder on each sign PC. The CHF files would be entered into the "File to execute when updating" field for each sign in the "Sign Table" of PIDS Config. After completing step 20 of the PIDS Config Setup Procedure, you will see an "Update Signs Warning" dialog box prompting you to continue with the update. Click on the "yes" button. Do this each time you are prompted. Close PIDS Config.

Finally, finish the setup procedure for each Display Generator (steps 14- 25 of the Display Generator Setup Procedure on page 29 of this manual). By this time, you should have at least the test messages transferred to their respective sign PCs that you can schedule in the Main and Aux. play lists in Display Generator. If your standard FRM files and BMP files were already created and transferred beforehand, then they could be added to the play lists instead. After activating Display Generator on each sign PC, monitor the status window of Display Generator to make sure it is receiving UDP Broadcasts by checking to see that Last Broadcast Date and Time information is being updated. Go out and view the electronic display to visually verify that the correct messages are playing in the correct order.

Troubleshooting Tips

If things aren't working properly with each PIDS software module, first check the log file of the PIDS program you are having trouble with. The log files are found in the respective program's folder (a sub-directory of the main PIDS folder). Events logged in the Log File often provide the necessary clues to diagnose a problem. Make sure the Log is not full (around 5 MB file size). If it is, then rename or delete it so a new one will be created to replace it.

Use the diagnostic utilities found in Appendix B of this manual to test the operability and functionality of all PIDS software on the PIDS network.

If you are having trouble with Display Generators, look at the Garage Table in the software to verify that settings are correctly configured. The Garage Table often reveals causes to many common problems.

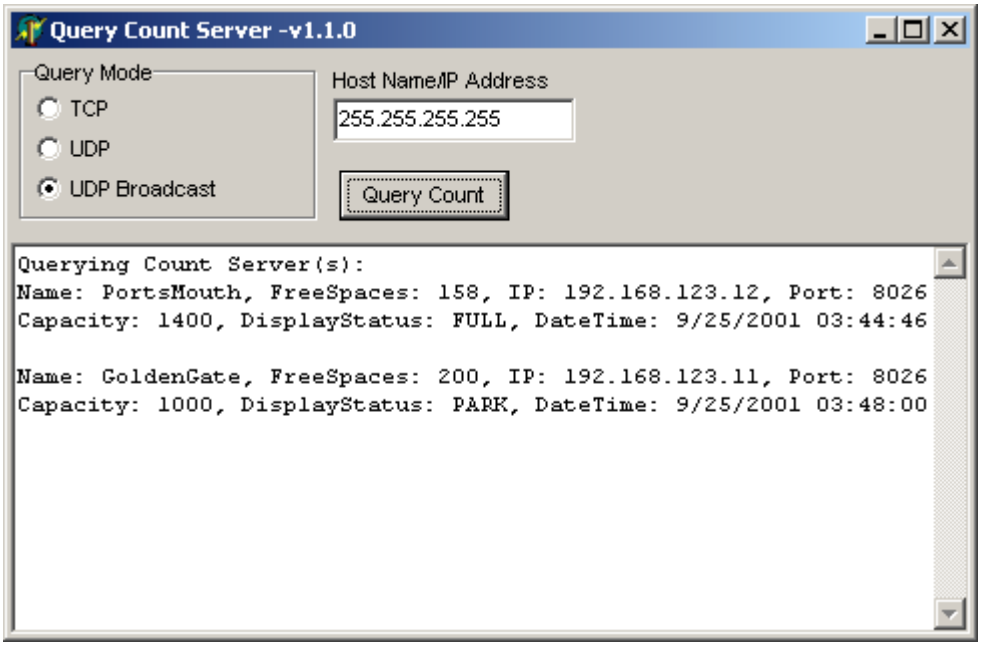
Follow the procedures in this manual carefully. Do not skip or omit steps. Make sure case sensitive names are entered and spelled properly in PIDS Config, Count Consolidator, and all respective INI files.

Appendix B - PIDS Utilities

Included with the four main PIDS software modules are a few diagnostic and monitoring utilities that may come in handy for technicians and users. This provision in the manual is just a brief summary of what each utility does. No support is provided for these applications.

Query Count

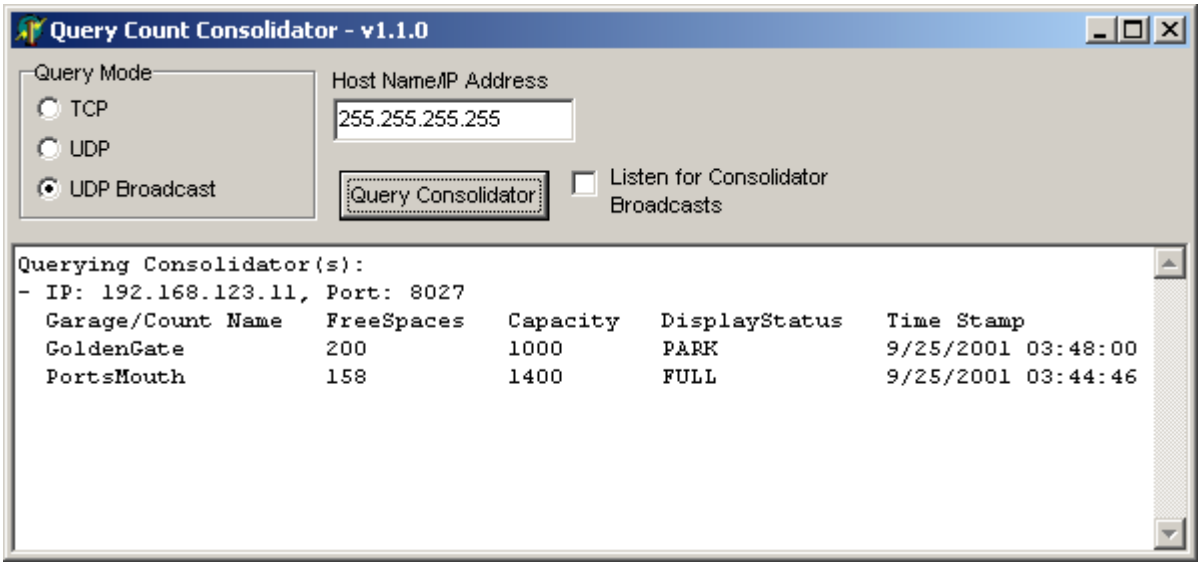
Query Count runs on Win9x/WinNT/Win2k (tested on Win98 and Win2k). This provides a way to test the Count Server Services to get the current count. When the **Query Count** button is pressed, in broadcast mode a list of all running Count Servers and their relevant information will be displayed. In TCP or UDP mode, a specific Count Server can be queried by it's IP address. Query Results are displayed in the memo area.



Query Count Utility *(Figure 7.3)*

Query Consolidator

Query Consolidator runs on Win9x/WinNT/Win2k (tested on Win98 and Win2k). It is used to verify that Count Consolidator is functioning properly.

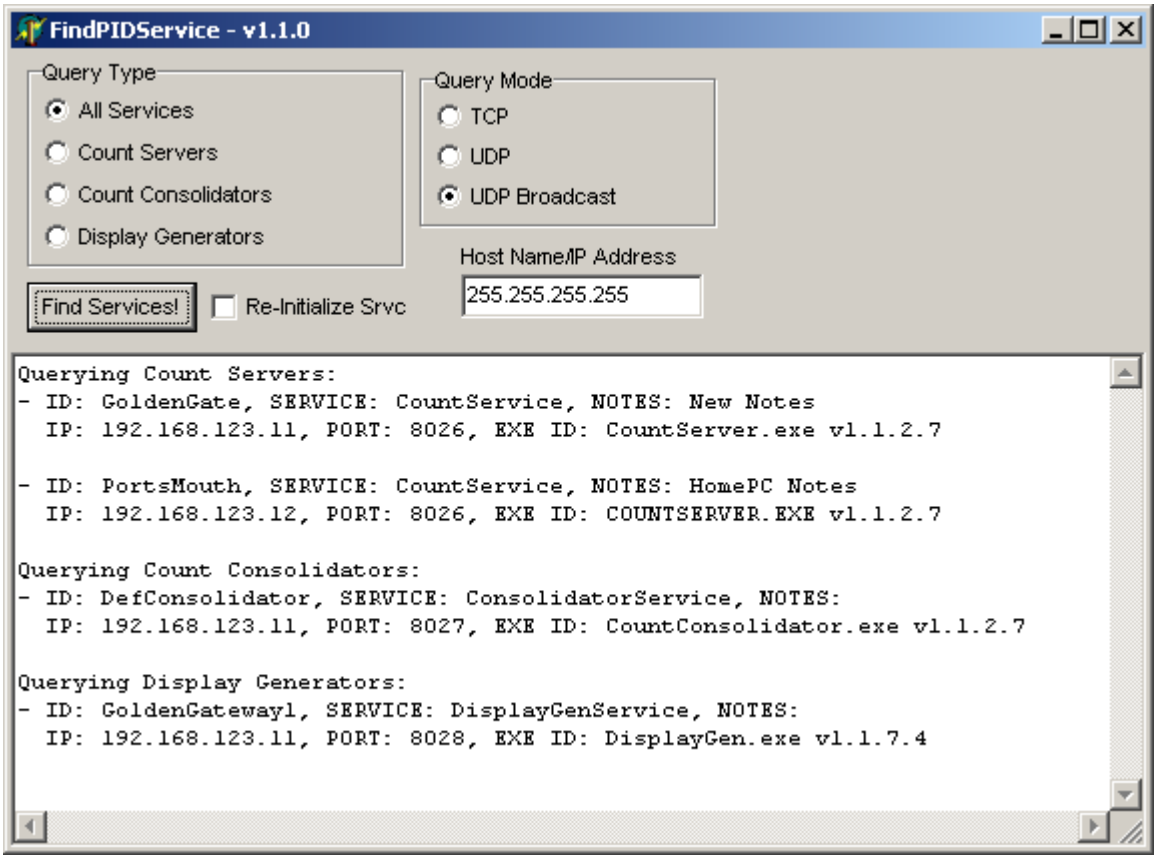


Query Count Consolidator Utility *(Figure 7.4)*

In Query Consolidator, clicking on **Listen for Consolidator Broadcasts** will display any broadcasted count tables that are received from Consolidators. This is similar to the way display generators will receive the count table. You cannot run Query Consolidator in Listen mode and Display Generator on the same PC at the same time since they will try to listen on the same port for Consolidator broadcasts. An explicit query can be performed with the Query Consolidator button. This query is done in one of three modes, broadcast mode to all Consolidators on the subnet, or to a specific computer in TCP or UDP mode.

Find PID Service

Find PID Service runs on Win9x/WinNT/Win2k (tested on Win98 and Win2k). This allows all PID services to be queried from across a network, or on the local machine. When **Re-Initialize Srvc** is checked, the services will be sent the Re-Init command, which causes them to reload their configuration from the INI and database file(s) on the hard disk.



Find PID Service Utility *(Figure 7.5)*

Appendix C: PIDS Frames

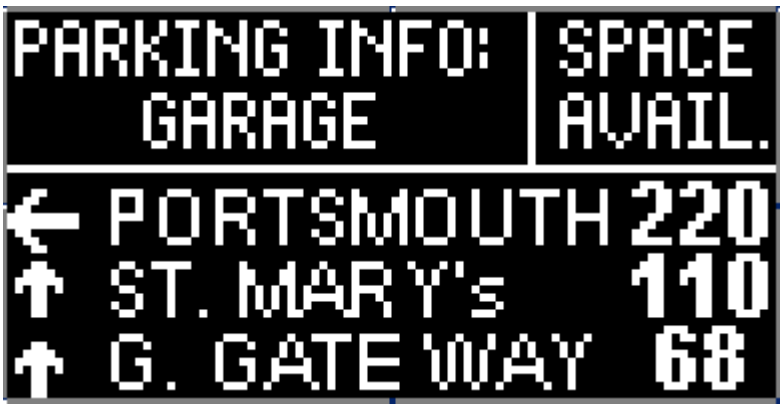
Technical Overview of the FRM File Format

A custom message format is required to display count information and time/temperature. These message files are text files with an FRM file extension. These files can be used to display images, graphics and text on the display. FRM files are used for dynamic text display such as garage count values, time and date, and temperature.

Initially, information message files will be constructed using a text editor. Boland's Delphi 5 IDE can also be used to construct the FRM files. The FRM files can make use of the following graphical/text components:

TSignFrame – basic container for the frame elements. (also has a background bitmap property)
TShape – Basic shape element. (Circle, square, rectangle, etc)
TLabel – basic text element
TImage – bitmap container.
TTimeDateText– Text and Time/Date info.
TDirectionArrow – Arrow indicator (gets direction from database)
TGarageTableText– Garage Name and Free Space (gets text from database)
TTemperatureText – Text indicating current temperature on 64K card sensor.

For example, a FRM file can define a frame that looks like this:



Sample FRM file when displayed in Display Generator *(Figure 7.5)*

The file format for the above screen would be similar to the following:

```
object SignFrame: TSignFrame
  BackBitmap.Data = {
    B6160000424DB61600000000000036000000280000006000000014000000010 0
    ...(omitted many lines here)...
    000000000000000000000000000000000000000000000000000000000000}
end
ChildCount = 9
object TGarageTableText
  Left = 11
  Top = 18
  Width = 3
  Height = 13
  Font.Charset = DEFAULT_CHARSET
  Font.Color = clWhite
  Font.Height = -10
  Font.Name = 'Arial'
  Font.Style = []
  ParentFont = False
  Transparent = True
  CountName = 'Portsmouth'
  LookupFieldName = 'DisplayText'
end
object TGarageTableText
  Left = 11
  Top = 28
  Width = 3
  Height = 13
  Font.Charset = DEFAULT_CHARSET
  Font.Color = clWhite
  Font.Height = -10
  Font.Name = 'Arial'
  Font.Style = []
  ParentFont = False
  Transparent = True
  CountName = 'St. Marys'
  LookupFieldName = 'DisplayText'
end
object TGarageTableText
  Left = 11
  Top = 38
  Width = 3
  Height = 13
  Font.Charset = DEFAULT_CHARSET
  Font.Color = clWhite
  Font.Height = -10
  Font.Name = 'Arial'
  Font.Style = []
  ParentFont = False
  Transparent = True
```

```
  CountName = 'GoldenGate'
  LookupFieldName = 'DisplayText'
end
object DirectionArrow5: TDirectionArrow
  Left = 1
  Top = 21
  Width = 8
  Height = 8
  CountName = 'Portsmouth'
end
object DirectionArrow6: TDirectionArrow
  Left = 1
  Top = 31
  Width = 8
  Height = 8
  CountName = 'St. Marys'
end
object DirectionArrow7: TDirectionArrow
  Left = 1
  Top = 40
  Width = 8
  Height = 8
  CountName = 'GoldenGate'
end
object TGarageTableText
  Left = 93
  Top = 18
  Width = 3
  Height = 14
  Alignment = taRightJustify
  Font.Charset = DEFAULT_CHARSET
  Font.Color = clWhite
  Font.Height = -11
  Font.Name = 'Arial'
  Font.Style = [fsBold]
  ParentFont = False
  Transparent = True
  CountName = 'Portsmouth'
  LookupFieldName = 'DisplaySpace'
end
object TGarageTableText
  Left = 93
  Top = 28
  Width = 3
  Height = 14
  Alignment = taRightJustify
  Font.Charset = DEFAULT_CHARSET
  Font.Color = clWhite
  Font.Height = -11
  Font.Name = 'Arial'
  Font.Style = [fsBold]
  ParentFont = False
  Transparent = True
  CountName = 'St. Marys'
  LookupFieldName = 'DisplaySpace'
end
object TGarageTableText
  Left = 93
  Top = 37
  Width = 3
  Height = 14
  Alignment = taRightJustify
  Font.Charset = DEFAULT_CHARSET
  Font.Color = clWhite
  Font.Height = -11
  Font.Name = 'Arial'
  Font.Style = [fsBold]
  ParentFont = False
  Transparent = True
  CountName = 'GoldenGate'
  LookupFieldName = 'DisplaySpace'
```

```
end
```

The properties that can be modified for each element provide the needed flexibility to manipulating the appearance and layout of the information screens. The font, font style, color, and position of the elements can be controlled.

Appendix D: The Vehicle Count XML File Specification

Vehicle Count System Interface Description

Revision 1.2, 8/7/2000

Datapark will generate a XML file containing all the necessary information for proper displaying. The file will be located in the C:\DATAPARK folder and named "vehicle_count.XML".

1. File format.

```
<?xml version="1.0"?>
<VehicleCount>
  <GarageName>GarageName</GarageName>
  <FreeSpaces>FreeSpaces</FreeSpaces>
  <Capacity>Capacity</Capacity>
  <DisplayStatus>DisplayStatus</DisplayStatus>
  <DateTime>DateTime</DateTime>
</VehicleCount>
```

2. Fields description.

<GarageName>	holds the garage name
<FreeSpaces>	holds the total available parking spaces
<Capacity>	holds the total garage capacity
<DisplayStatus>	determines what to be displayed. Codes:
DisplayStatus=FULL	the garage is full, display a full message for this garage
DisplayStatus=PARK	there are spaces available, display the number of FreeSpaces available
DisplayStatus=NULL	do not display the status for this garage. The sign is available for displaying an advertising information.
<DateTime>	holds the current date/time in the following format: mm/dd/yyyy hh:mm:ss

3. Sample XML file:

```
<?xml version="1.0"?>
<VehicleCount>
  <GarageName>Ellis O'Farrell Garage</GarageName>
  <FreeSpaces>250</FreeSpaces>
  <Capacity>1700</Capacity>
  <DisplayStatus>NULL</DisplayStatus>
  <DateTime>07/31/2001 17:50:34</DateTime>
</VehicleCount>
```

For the above sample file the status for this garage should not be displayed. The display is available for advertising messages.

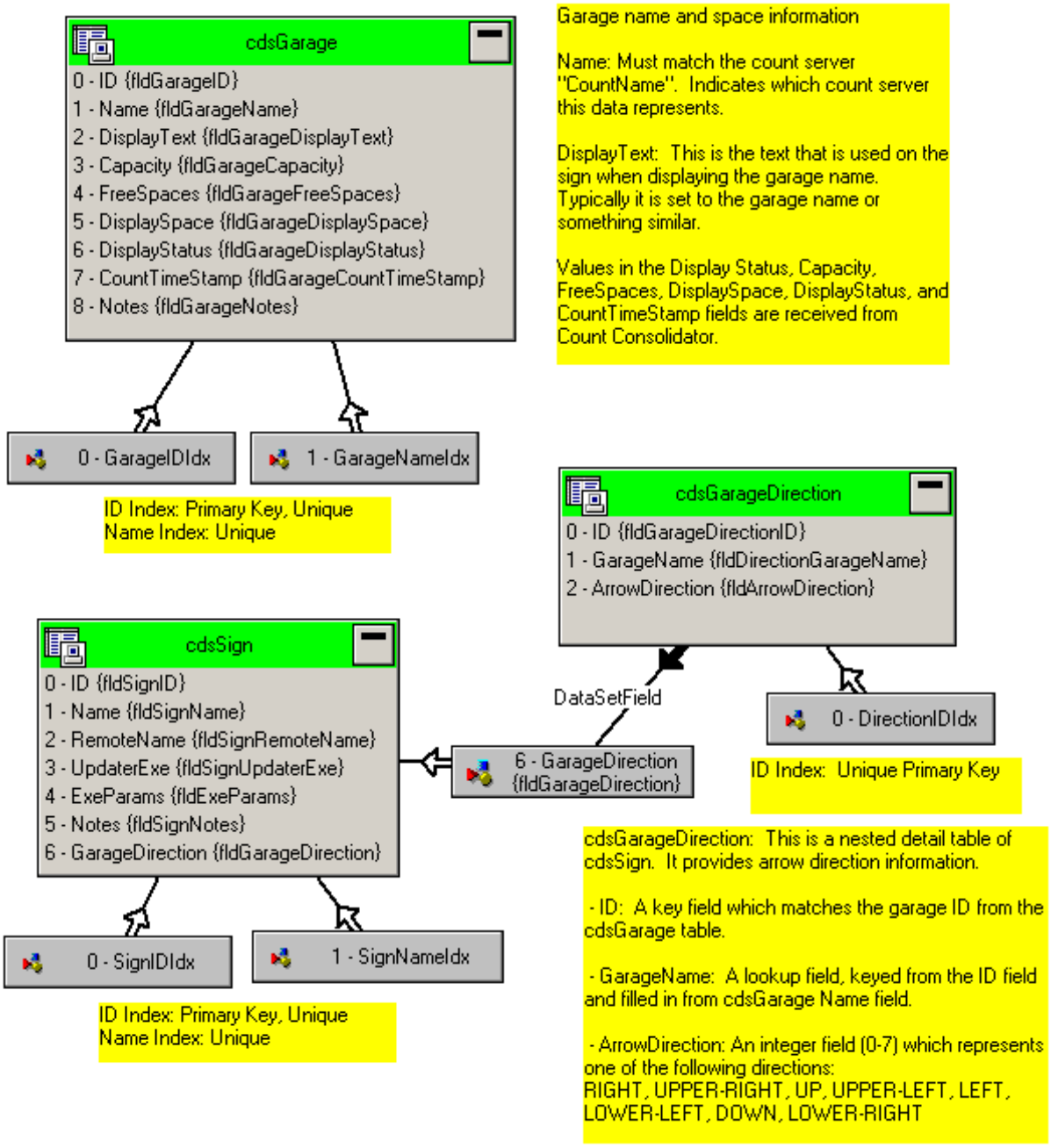
4. XML file generating and processing.

The XML file will be updated in a configurable period of time. If the file is accessed by the counting service Datapark will wait one second and try to update the file again. If the retry fails this scheduled file update will be skipped.

Appendix E: PIDS Config Table Structure

PIDS Config is used to configure garage information and sign information. Main configuration information is stored in three database tables. The database tables are stored in a file named "GarageSignDB.cds". This file must be present in the Display Generators directories for them to work properly with the PIDS system.

The table structures are defined as follows:



Appendix F: Display Generator Picture Settings

A Brief Technical Note

DisplayGen.PictureSettings is used to control the dimming function using the photocell. See included example for some typical values. When used with non-current control modules, only the following parameters are pertinent:

```
UseNewCurrentControl =     False

object BrightEnvParams: TMDLCtrlParams
       PhotoCellPercent =  0.95 //Photocell value peak value for daytime (95%)
       TSMax =             0.95 //time slot dimming for daytime (95% bright)
       TSGamma =           2 //gamma for Daytime

object DarkEnvParams: TMDLCtrlParams
       PhotoCellPercent =  0.15 //photocell minimum value for nighttime
       TSMax =             0.5 //time slot dimming for nighttime (50% bright)
       TSGamma =           2.4 //gamma for NightTime
```

Values for PhotoCellPercent, TSMax, and TSGamma above are examples. They can be modified to suit a specific installation.