EFJohnson®

PC Configure™ Programming Guide

Part of Part Number 002-9998-488 13
Draft: June 29, 2006

Information in this manual covers PC Configure versions through 2.1.0.

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PC Configure Software Programming Guide

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SECTION

1

Introduction

PC Configure™ Programming Software for Portable and Mobile Radios (PC Configure) is the application you use to configure EFJohnson's portable and mobile radios.

The following sections describe these aspects of PC Configure:

- Computer requirements
- Programming setup
- Operating and service manuals
- Software installation
- Starting and exiting
- Programming file types
- Help files
- Main screens
- Other screen information
- Programming scanning
- Firmware upgrading restrictions

1.1 Computer Requirements

The computer used to run PC Configure must meet the following minimum requirements:

- Windows® 95/98/NT/2000/XP (You cannot use Windows 3.1.)
- Pentium® processor or equivalent
- At least 16 MB of RAM
- A hard disk drive with at least 4 MB of free space
- A CD-ROM drive

- An available serial port

1.2 Programming Setup

You need the following to program the various radios:

- Windows®-based computer
- PC Configure
- The items listed in Sections 1.2.1 through 1.2.4

Figure 1.1 shows the connections you must make to program a portable radio. Figure 1.2 shows the connections you must make to program a mobile radio.

Figure 1.1 Portable Radio Programming Connections

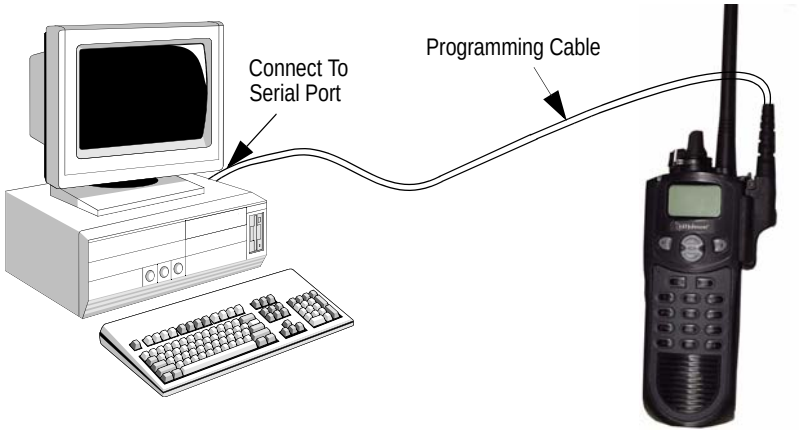
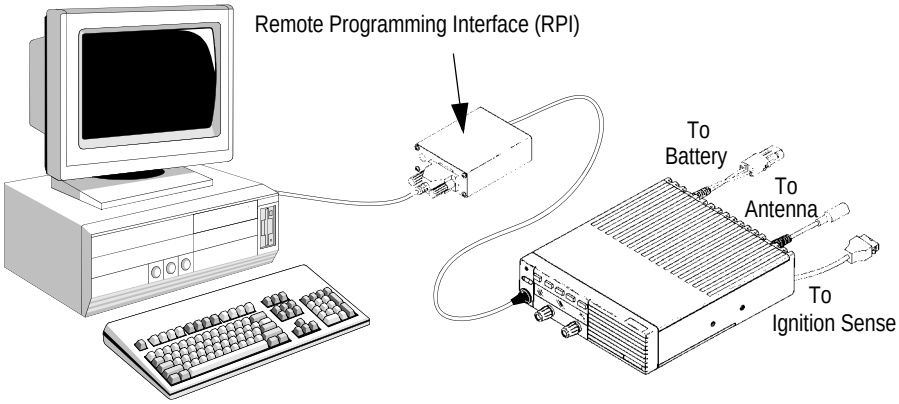


Figure 1.2 Mobile Radio Programming Connections



1.2.1 51xx Portable

Programming cable from computer to radio, Part No. 023-5100-920

Note *This cable, the -488 programming software, and the PDF file for this manual are included in Programming Kit, Part No. 250-5100-003.*

1.2.2 53xx Mobile

- Programming cable from RPI to radio, Part No. 023-5300-005
- Remote Programming Interface (RPI), Part No. 023-5300-000.

Note *The -005 cable, 5300-000 RPI, -488 programming software, and the PDF file for this manual are included in 5300 Programming Kit, Part No. 250-5000-004.*

1.2.3 Connecting Mobile Radios To Computer

With 53xx radios, only RPI, Part No. 023-5300-000, can be used. Other RPIs such as 023-9800-000 and 023-9750-000 are not compatible with this radio.

The Radio Programming Interface (RPI) provides the required logic interface between the computer and radio. The cable from the RPI to computer is not included with the RPI or in the programming kit. The current RPIs have a female DB9 connector, and most computer serial ports have a male DB9 or DB25 connector. Therefore, a male DB9 to female DB9 or DB25 cable is usually required. This is a standard cable available at most computer supply stores or order 6 ft. DB9M to DB9F cable, Part No. 597-5900-002.

Figure 1.3 Radio Programming Interface (RPI) for 5300 Mobile Radios

The cable from the RPI to the radio is not included with the RPI, but it is included with the programming kits or can be ordered separately as previously described.

This cable plugs into the microphone jack of standard front or remote mount radios. With 53xx radios using the Handheld Control Unit (HHC), the connection point is the 10-pin

programming jack on the HHC junction box through a special adapter plug (Part No. 023-5300-140). If the HHC is not equipped with the junction box (Part No.023-5300-130), it is also required for programming.

1.2.4 Connecting Portable Radios To Computer

Note *Although they may look the same, the 5000 portable programming cable cannot be used to program a 5100 portable and vice versa.*

51xx Series - No RPI is required because the radio contains the interface circuitry. The programming cable has a female DB9 connector for connecting to the computer.

Figure 1.4 5000 Portable Programming Cable

As with mobile radios, the cable between the RPI and computer is not included with the RPI. Refer to preceding description for more information.

1.3 Operating and Service Manuals

This manual includes brief descriptions of the various programmable parameters. For detailed radio operating information, refer to the applicable radio operating or service manuals.

1.4 Software Installation

Note *Before you remove an old version of PC Configure, be sure to transfer the files in the Data and Keys folders to those folders of the new version.*

1 Ensure there are no other applications open during this installation procedure. Also, ensure the computer meets the minimum requirements listed in Section 1.1.

2 Insert the PC Configure CD-ROM in the CD drive of your computer.

3 In the lower left corner of the screen, select **Start > Run** and then click the **Browse** button. Select the CD-ROM drive and the file *PCConfigurex_x.exe* (*x_x* is the PC Configure version number). Click the **Open** button and then from the **Run** window, click **OK** and the installation process begins.

4 Follow the on-screen instructions. The default directory for the program is *\Program Files\EF Johnson\PCConfigure* During installation, you can specify a different directory to install the program in if you wish to do so.

1.5 Starting And Exiting

1.5.1 Starting PC Configure

To start the PC Configure program from Windows, select **Start** > **Programs** > **EF Johnson** > **PCConfigure 1.2x.xx**.

You can also start PC Configure from an MS-DOS command prompt (C:\). To display the PC Configure options that can be selected from the command prompt line, enter **PCConfigure /?**. The following information then displays.

```
Usage: PCConfig.exe     /?                                -Help
                        /o FileName                       -Open file
                        /v /sp PortNumber /t RadioType    -Show Version Info
                        /ip /sp PortNumber /t RadioType   -Show IP Address
                        /d FileName /sp PortNumber /b BaudRate /l Times -Download
d file

The options must be in the order as shown.
The /l option is not required to be used in combination with the /d option.

RadioType = [5100 | 5300]
PortNumber = an available serial port number
BaudRate =  [9600 | 19200]

For file download, this window will close upon finishing.
Batch programs can use the return code to determine the download status:

        0 - Success     1 - Failure.


Press <ENTER> to close._
```

1.5.2 Exiting PC Configure

Select **File > Exit** or press the <Alt> and <F4> keys.

1.6 Programming File Types

Programming data is stored in a disk file that can be saved, read, copied, and deleted. Refer to Section 3.1. This file automatically receives the extension *.rcf* .

1.7 Help Files

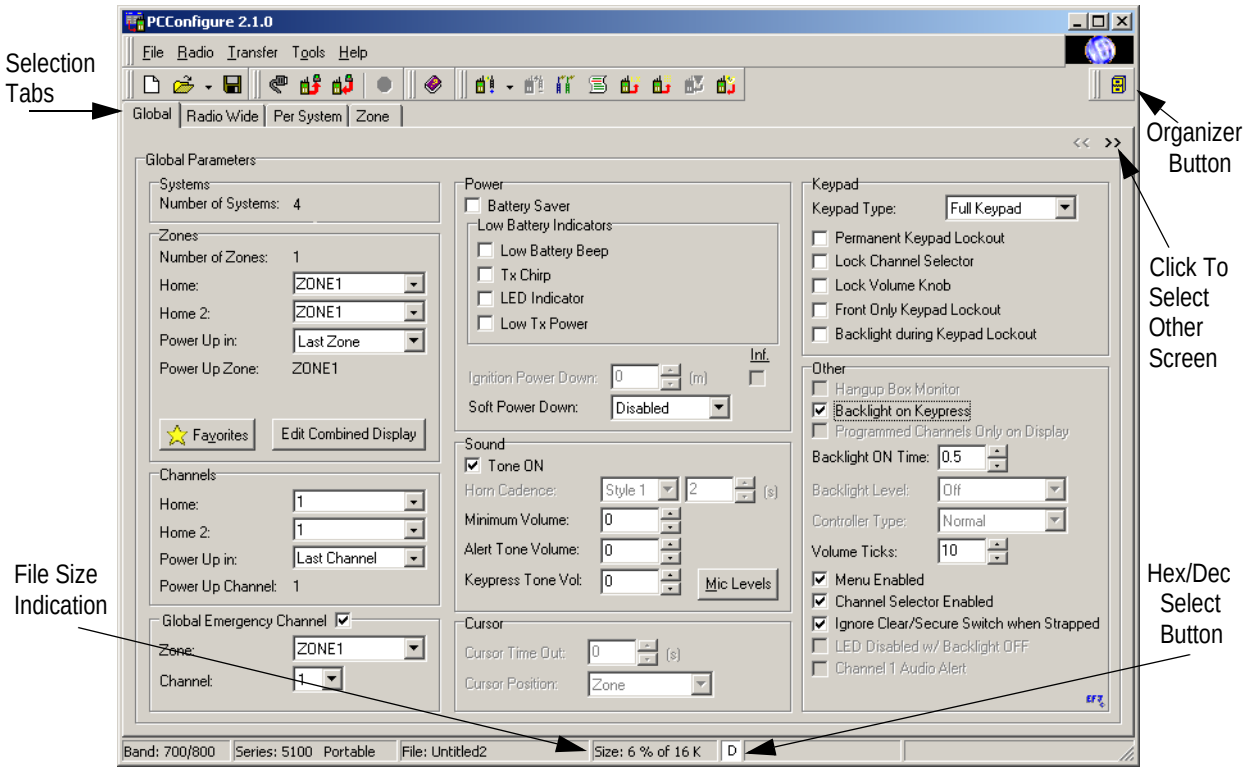
To display help information on the current screen, click **Help** in the menu bar.

Note *For a list of changes made with the various releases of this software, refer to the ReleaseNotes.txt file in the PC Configure program files folder.*

1.8 Main Screens

You can select four different screens by clicking the tabs at the top as shown in Figure 1.5.

Figure 1.5 Main Screen (Global screen shown)



The functions of these screens are as follows:

Global - Figure 1.5 shows this screen. It programs parameters that are the same for all Conventional, Project 25 Trunked, SMARTNET™, and SmartZone® systems. Refer to Section 4 for more information on parameters in this screen.

Radio Wide - This screen programs the parameters that are the same for all programmed Conventional (Project 25 and analog), Project 25 trunked, and SMARTNET/SmartZone systems (a different screen is displayed for each). The screen system type is selected in the system specific box. Refer to Section 5 for more information on parameters in this screen.

Per System - This screen programs the parameters that are unique to each programmed system. Select the system you want to edit by clicking it in the **Systems** box. Refer to Sections 7, 8.1, and 9.1 for more information on parameters in this screen.

Zone - This screen programs the channels and zones. Unique channel parameters include system number and type, frequency, and talk group. Refer to Section 6 for more information on parameters in this screen.

1.9 Other Screen Information

This section describes the following items that appear on the PC Configure main screen:

- Programmable title and logo
- Organizer
- File size indication
- Decimal/Hexadecimal select

1.9.1 Programmable Title and Logo

You can program the title that is displayed after “Radio Configuration” at the top of the screen. Refer to Figure 1.5. You use the **Tools > Organization** Identity menu item to program it. You can use this, for example, to display a company name on the top line. In addition, you can customize the logo that is displayed on the right end of the menu bar. Refer to Section 3.4 for more information.

1.9.2 Organizer

Clicking the organizer button  on the right end of the toolbar displays a screen is used to organize the various programming files into groups and subgroups. This can make it easier to administer the programming files of a large organization. Refer to Section 3.8 for more information.

1.9.3 File Size Indication

The maximum number of channels that you can program may be limited by the available memory space in the radio. Figure 1.5 shows the **Size:** box in the status bar on the bottom of the screen that displays a running indication of the amount of memory used by the current data if it was downloaded to the radio. The **Size:** box displays this as a percentage. When this percentage reaches 100%, the available memory is full and some you may have to delete some channels if more information remains to be programmed.

1.9.4 Decimal/Hexadecimal Select

On some screens, such as the **SMARTNET Talk Group**, you can enter numbers using either a decimal or hexadecimal format. The format is selected globally. This means that when a you select a format, you must use that format to enter all applicable numbers on all screens.

The currently selected format is indicated in the status bar on the bottom of the screen in the box next to the file size indication. Refer to Figure 1.5. A “D” indicates the decimal format is selected, and an “H” indicates the hexadecimal format is selected. The background color indicates the number type. The color is ivory for hexadecimal numbers, and white for decimal and other entries.

To toggle between the decimal and hexadecimal formats, right click the **H/D** box and click “Yes” in the confirmation box that appears. This mode can also be toggled using the **Tools > Preferences** screen described in Section 3.4.

1.10 Creating Systems

Note *To view the current and added systems, select the **Per System** tab and all programmed systems appear in the **Systems** pane on the left side.*

A system as used with these radios is a collection of channels or talk groups typically assigned to the same repeater site. The **Per System** screen shows unique system parameters, including the scan list, various timers, and talk groups. You can create up to sixteen systems of any type.

To create a new Conventional, SMARTNET, SmartZone, or Project 25 Trunked system, select **Radio > Add Systems** in the menu bar and then select the desired system type. Refer to Section 3.2.

Another way to create a system is to click  in the toolbar and select the desired system type from the drop down list. To delete a system, select it in the **Systems** box and then select the **Radio > Delete System** in the menu bar or  in the toolbar.

1.11 Programming Scanning

The two types of scanning that can be programmed are Radio Wide and Priority (Standard):

Radio Wide Scan - Use this type when two or more types of channels must be scanned at the same time such as conventional and Project 25 trunked. If this is not a requirement, use the more efficient Priority Scan which follows because there is less chance of missed calls.

Priority (Standard) Scan - Use this type to monitor only channels that are the same type as the selected channel. For example, if a conventional channel is selected, only conventional channels can be scanned. Trunked channels must also belong to the system of the selected channel.

1.11.1 Programming the Radio Wide Scan Mode

1 On the **Radio Wide** screen, program the Radio Wide Scan List and Scan Hold time as described in Section 5.1. You must set up the channels that you want to include in the scan list as described in Section 6.

2 Program the **Radio Wide Scan** option button by clicking the **Assign Buttons** button on the **Radio Wide** screen as described in Section 5.3. With 51xx portables, a Radio Wide Scan menu parameter can also be programmed as described in Section 5.2.

1.11.2 Programming the Priority Scan Mode

You set up Priority scan on the **Per System** screen because it is unique for each system type. Proceed as follows:

1 On the **Per System** screen, select the desired system in the left pane.

2 In the System Lists drop down list near the bottom of the screen, select **Priority Scan List**. Then click the **Edit List** button and program the scan list as described in Section 7.2, 8.2, and 9.2. You must set up the channels that you want to include in the scan list as described in Section 6.

3 With conventional channels, program the per system scan list settings on the **Per System** screen. There is also the option to link a particular scan list to a zone. Refer to Section 6.1 for more information.

4 Repeat the preceding steps for each system that will have Priority Scan function.

5 With trunked channels (SMARTNET/SmartZone/Project 25), you may need to program each channel to select a scan list and auto scan. Select the **Zone** screen and program this information for each channel if required (Sections 8.3 and 9.3).

6 Program the Scan option button by clicking the **Assign Buttons** button on the **Radio Wide** screen as described in Section 5.3. With 51xx portables, a **Scan** menu parameter can also be programmed as described in Section 5.2.

1.12 Firmware Upgrading Restrictions

Note *Version 1.24 or later PC Configure software can only upgrade radios with later firmware versions. Refer to the following for more information.*

Beginning in approximately June 2004, all 51xx and 53xx radios began shipping with a new version of firmware that uses a different memory configuration for storing the radio

operating program. One effect of this change is that you must use a new firmware upgrade utility to program radios with this firmware. PC Configure includes the firmware upgrade utility. You select it by the **Transfer > Write Application Code To Radio** menu described in Section 3.3. The following information describes which firmware versions can be upgraded with this version of PC Configure.

1.12.1 Compatibility

You must use PC Configure Version 1.24.0 or later to upgrade radios with the following firmware versions:

51xx Series

Non-SEM - Version 1.14.0 or later

SEM - Version 2.04.0 or later

UCM - Version 3.04.0 or later

53xx Series

SEM - Version 2.04.0 or later

UCM - Version 3.04.0 or later

ARM - Version 1.27.0 or later

To summarize these restrictions:

- To upgrade radios to the above firmware versions or later, you must use PC Configure, Version 1.24.0 or later.
- To upgrade radios to earlier versions than those shown above, you must use PC Configure, Version 1.22.0 or earlier.
- If you try to upgrade firmware with the wrong version of PC Configure, the procedure halts and an error message is displayed.
- The boot loader code must also be upgraded when upgrading firmware versions earlier than the preceding. You must do this before you update the application code. Two passwords are provided by EFJohnson with new firmware. One selects the boot loader utility and the other the application code utility.
- This limitation does not apply to standard programming of radio personality parameters. PC Configure is backward compatible. You can use it to program radios with earlier versions of firmware. However, some parameters may be available only with certain versions of firmware.

Some parameters described in this guide apply only to certain revision levels. Index numbers in superscript appear next to the names of such features (for example, "**Example Feature**[9]"). Table 1.1 shows the relationship between these numbers and the revision levels they represent.

Table 1.1 Key to Feature Indexes and Revision Levels

This number next to a feature name...	...means that you need this revision level.
1	51xx models with Flash code 1.9.0 or later and (if applicable) 53xx models with ARM code 1.22.0 or later.
2	Firmware Version 1.16/2.6/3.6/4.2 or later. Earlier versions may be different.
3	51xx models with Flash code Version 1.11.0 or later and 53xx models with ARM code 1.24 or later.
4	51xx models with Flash code Version 1.9.0 or later and 53xx models with ARM code 1.23 or later.
5	Code Version 1.24.1/2.2.1/3.2.1 or later.
6	51xx models with Flash code Version 1.11.0 or later and 53xx models with ARM code 1.19.0 or later.
7	51xx models with firmware Version 1.16/2.6/3.6/4.2 or later.
8	PC Configure software version 1.27.1.0 or later.
9	5300i SEM or 5300i UCM model with software from the Q3 2004 or later
10	51xx Firmware Versions 1.16/2.6/3.6/4.2 and (53xx) 1.28/2.6/3.6/4.2 or later
11	51xx models with code 1.12.1/2.2.1/3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.
12	51xx Version 1.14.0/2.4.0/3.4.0 or later and 53xx Version 1.26.0/ 2.4.0/3.4.0 or later.
13	51xx models with Flash code Version 1.8.0 or later and 53xx models with code 1.21.0/2.x/3.x or later.

1.12.2 Safeguards to Prevent Downloading Wrong Code Version

Note *The following applies only to downloading application code (firmware), not to downloading standard personality information.*

PC Configure software, Version 1.25 or later includes safeguards to prevent downloading an incorrect firmware version. For example, it prevents you from downloading 5100 SEM code (Version 2.x) to a 5100 UCM radio (Version 3.x). If this did happen, no damage occurs. The radio simply would not operate. You could solve this problem by simply downloading the correct version.

To determine the radio version, check the radio boot code version, as Section 1.12.2.1 describes. To determine the firmware version, check the file name of the firmware being downloaded, as Section 1.12.2.2 describes.

1.12.2.1 Radio Version Detection

Since the boot loader code version number is unique for each radio type, it can be used to determine the radio type. However, the version numbers used by mobiles and portables are similar, so it does not indicate if the radio is a mobile or portable. This is determined by detecting the serial port type (RS-485 = mobile, RS-232 = portable).

Version 1.25 or later PC Configure software can only upgrade firmware in radios that have boot code with the built-in ability to identify its version. With portables, code versions with this ability are 1.10/2.1/3.1/4.0 or later. With mobiles it is 2.0/3.0/4.0 or later. If radio with an earlier version needs to be upgraded, either the boot code must be upgraded first or an earlier version of PC Configure must be used.

ARM 53xx radios (code Version 1.x) do not have the ability to report the boot code version. Therefore, if no response is received to a boot loader code version inquiry, the PC Configure software assumes it is an ARM radio. The file must then be named accordingly for an ARM radio (Section 1.12.2.2).

1.12.2.2 Code Version Detection

When you download 51xx and 53xx firmware files, you must name the files according to the naming conventions specified in Table 1.2 and Table 1.3. If a file name does not conform to these naming conventions, an error occurs and it is not downloaded. To download older files that do not conform to these conventions, rename them so that the file names conform.

Table 1.2 51xx Portable File Naming Convention

Boot Version	File Naming Convention
1.x (NonSEM/UCM)	5100NonSEM_Ver_01_yy_zz
2.x (SEM)	5100SEM_Ver_02_yy_zz
3.x (UCM)	5100UCM_Ver_03_yy_zz
4.x (new SEM)	5100x_Ver_04_yy_zz

Table 1.3 53xx Mobile File Naming Convention

Boot Version	File Naming Convention
1.x (ARM)	5300ARM_Ver_01_yy_zz
2.x (SEM)	5100iSEM_Ver_02_yy_zz
3.x (UCM)	5100iUCM_Ver_03_yy_zz
4.x (new SEM)	5100x_Ver_04_yy_zz

SECTION

2

Programming Procedure

This section describes the general procedure that you follow to program a radio. This section describes the following PC Configure procedures:

- Getting started
- Creating systems
- Entering global parameters
- Entering radio wide parameters
- Setting up zones and channels
- Entering conventional system and channel parameters
- Entering SMARTNET/SmartZone system and channel parameters
- Entering Project 25 trunked system and channel parameters
- Programming the radio (writing the file)

2.1 Getting Started

1 Select a programming file as follows:

Create a New File - To start with a new file containing default parameters, select **File > New** . When the dialog box appears, select the frequency band of the radio:

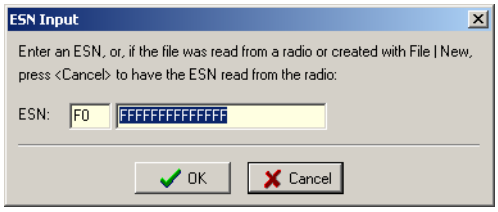
VHF
UHF 380 (380-470 MHz)
UHF Low (403-470 MHz)
UHF High (450-512 MHz)
700/800 MHz (762-870 MHz)
800 MHz (806-870 MHz)
900 MHz (896-940)

Open An Existing File - To open an existing file stored on disk, select **File > Ope**n and then the name of the file that you want to open.

Read a File From a Radio - To transfer a file from a radio to the computer for editing or use as a basis to program another radio, connect the radio to the computer as described in Section 1.2. Then turn the radio on and select **Transfer > Read Parameters From Radio** in the menu bar. For security reasons you cannot upload encryption parameters. Refer to Section 3.3 for more information.

When setting up a new file, the following ESN Input screen is displayed.

Figure 2.1 ESN Input



Press Cancel to read the file from the unit.

2 Be sure the correct radio type (such as the 53xx mobile or 51xx portable) is selected by the **Radio > Series** menu. Refer to Section 3.2.

3 With trunked operation, you must select the correct system key on the **Per System** screen. Refer to Section 13 for more information.

Note *Some operating protocols and options may not be available with your radio. To display the options that have been factory-enabled for your radio, select **Transfer > Read Options From Radio**. Refer to Section 3.3.*

2.2 Creating Systems

When you create a new programming file, PC Configure automatically sets up a conventional system. Create the desired number and type of Conventional, SMARTNET, SmartZone, and/or Project 25 Trunked systems by selecting **Radio > Add System** or  in the toolbar. Refer to Section 1.10 for more information.

Note *The **Per System** screen must be selected to view the current systems.*

2.3 Entering Global Parameters

1 Display the **Global** Parameter screen by clicking the **Global** tab at the top of the screen.

2 Program the applicable parameters in this screen as described in Section 4. Parameters that do not apply to the selected radio series are grayed out.

2.4 Entering Radio Wide Parameters

1 Display the **Radio Wide** screen by clicking the **Radio Wide** tab at the top of the screen.

2 Program the applicable parameters for all Conventional, SMARTNET/SmartZone, and/or Project 25 Trunked systems as described in Section 5.

Note *You cannot program the Radio Wide Scan List until the channels are set up as described in the next section.*

2.5 Setting Up Zones and Channels

1 Display the **Zone** screen by clicking the **Zone** tab at the top of the screen.

2 Set up Zones and Channels as described in Section 6. Zones can include up to 16 channels of any type from any system.

2.6 Entering Conventional System and Channel Parameters

Note *If no conventional channels are programmed, proceed to Section 2.7.*

1 Display the system programming screen by clicking the **Per System** tab at the top of the screen.

2 Select the system in the left pane and program the applicable parameters for each Conventional system as described in Section 6.3.1.

Note *You may have to define the channels further as described in the next steps before programming the standard scan lists.*

3 Display the **Zone** screen by clicking the **Zone** tab at the top of the screen. Program the individual channel information of each Conventional channel in each zone as described in Sections 6.3.1 and/or 6.3.2.

4 If necessary, program the priority scan lists in each system (preceding Step 2). After you have programmed all channel information, program the Radio Wide scan list in the **Radio Wide** screen. Refer to Section 2.4.

2.7 Entering SMARTNET/SmartZone System and Channel Parameters

Note *If no SMARTNET or SmartZone channels are programmed, proceed to Section 2.8.*

1 Display the system programming screen by clicking the **Per System** tab at the top of the screen. Make sure the correct System Key is selected as described in Section 13.

2 Select the system in the left pane and program the applicable parameters for each SMARTNET and SmartZone system as described in Section 8.1.

Note *You may have to define the channels further as described in the next steps before programming the various system lists.*

3 Display the **Zone** screen by clicking the **Zone** tab at the top of the screen. Program the individual channel information of each SMARTNET and SmartZone channel in each zone as described in Section 6.4.

4 If necessary, program the system lists (preceding Step 2). After you have programmed all channel information, program the Radio Wide scan list in the **Radio Wide** screen. Refer to Section 2.4.

2.8 Entering Project 25 Trunked System and Channel Parameters

Note *If no Project 25 Trunked channels are programmed, proceed to Section 2.9.*

1 Display the system programming screen by clicking the **Per System** tab at the top of the screen. Make sure the correct system key is selected as described in Section 13.

2 Select the system in the left pane and program the applicable parameters for each Project 25 Trunked system as described in Section 9.1.

Note *You may have to define the channels further as described in the next steps before programming the priority scan lists.*

3 Display the **Zone** screen by clicking the **Zone** tab at the top of the screen. Program the individual channel information of each Project 25 Trunked channel in each zone as described in Section 9.3.

4 If necessary, program the priority scan lists in each system (preceding Step 2). After all channel information is programmed, program the Radio Wide scan list in the **Radio Wide** screen. Refer to Section 2.4.

2.9 Programming the Radio (Writing the File)

After you have entered all the required programming information in the various programming screens, you can write the information into the radio; this step is also called “downloading”. When writing a file, ensure that you have done the following:

- Secured all connections between the computer and radio
- Turned the radio on
- Selected the proper serial port is selected (Refer to Section 3.3.)

Then proceed as follows:

1 Select **Transfer > Write Parameters To Radio** from the menu bar.

2 If no file is currently loaded, a dialog box appears to select the desired file. Otherwise, the current file is transferred to the radio.

SECTION

3

Menus and Tools

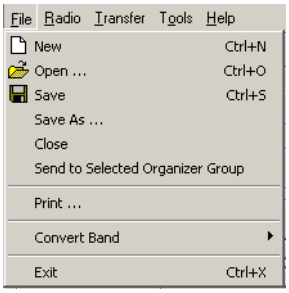
This section describes the controls you find in the following PC Configure navigation tools:

- File menu
- Radio menu
- Transfer menu
- Tools menu
- Help menu
- Toolbar
- Status bar
- Organizer

3.1 File Menu

Figure 3.1 shows the **File** menu.

Figure 3.1 File Menu



New - Creates a new programming file named *untitled.rcf* containing default parameters. Also displays a dialog box for selecting the frequency range.

Open - Opens a programming file that was previously saved to disk. If a modified file is open, PC Configure asks you if you want to save that file before the new file is opened.

Save - Saves the current file to disk using the current file name. If it is the first time a new file is being saved, the following **Save As** screen displays to specify the file name and destination.

Note *You cannot save any type of new programming file to disk without a radio connected. Refer to Section 15.2.1 for more information.*

Save As - Saves the current file to disk and displays a screen for selecting a file name and destination if desired. The default file name is the Project 25 Unit ID in the format *UnitID_xx*

Close - Closes the current file without exiting the program so you can open or create another file. If you modified the current file but did not save your changes, PC Configure asks you if you want to save your changes before closing.

Send to Selected Organizer Group - Adds the current file to the group that you select in the organizer. Refer to Section 3.8 for more information.

Print - Prints the information in the current file. A screen displays to select if **Global**, **Radio Wide**, **Per System**, or **Zone** information is printed.

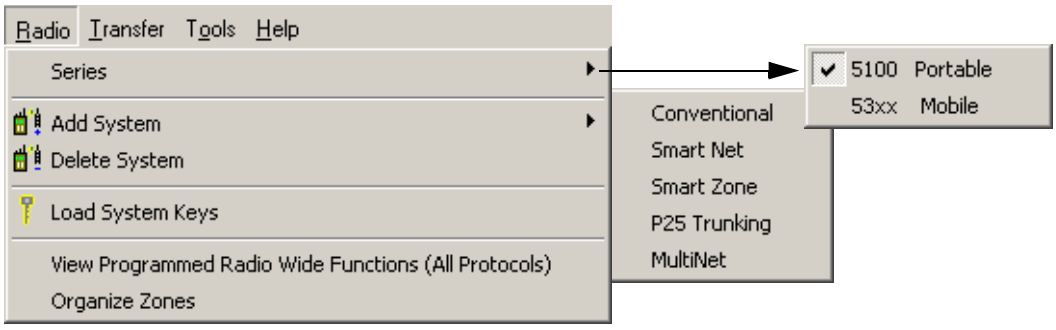
Convert Band - If the current file type is UHF 380 (selected when you create it by **File > New**), you can use this to change it to UHF LO type and *vice versa*. Also, you can use this command to convert an 800 MHz file to 700/800 MHz and *vice versa*.

Exit - Closes the PC Configure program. If you modified the current file but did not save your changes, PC Configure asks you if you want to save your changes before closing.

3.2 Radio Menu

Figure 3.2 shows the **Radio** menu.

Figure 3.2 Radio Menu



Series - Selects the specific type of radio to program. You can then select only parameters that apply to that radio. Other parameters are grayed-out.

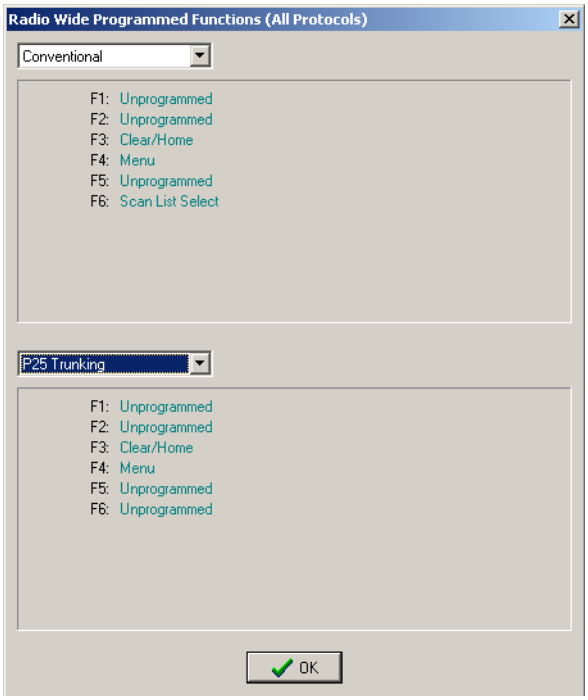
Add System - Adds a new Conventional, SMARTNET, SmartZone, or Project 25 Trunking system as described in Section 1.10. “Multi-Net” is available with Ascend radio models only.

Delete System - When you set-up two or more systems, this function deletes the system selected in the **Per System** screen.

Load System Keys - Allows the system keys to be loaded from a folder other than the default *Keys* folder. A dialog box displays to let you select the desired folder. Refer to Section 13 and “Preferences” in Section 3.4 for more information. After you have loaded the key from the Keys folder, proceed to the Per System tab and select the desired system. In the IDs System pull-down box, select the *.key* file. (Please refer to the Per System Initial screen in Sections 8 and 9.)

View Programmed Radio Wide Functions (All Protocols) - Displays the screen shown below that indicates the functions you assigned to the programmable option buttons on the **Radio Wide** screen. Refer to Section 5.3. You can program these buttons for a different function in each mode (conventional, SMARTNET, SmartZone, Project 25 Trunked). The screen displays a maximum of two modes selected by the pull-down lists.

Figure 3.3 Radio Wide Programmed Functions screen

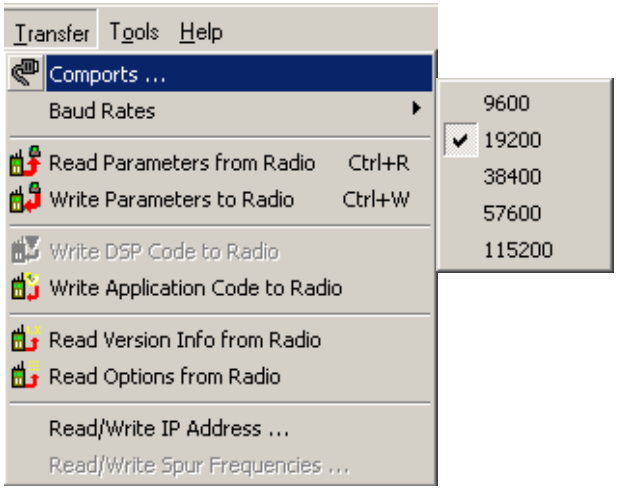


Organize Zones - Zones are programmed by protocols.

3.3 Transfer Menu

Figure 3.4 shows the **Transfer** menu.

Figure 3.4 Transfer Menu



Note *To stop a data transfer in progress, click*  *in the toolbar. Refer to Section 3.6.*

Comports ... - Displays a dialog box in which you can select the serial port used to program the radio. Refer to Section 1.2. The default is COM1. PC Configure saves the last selected port, then automatically selects it again whenever someone starts the program. You can select Ports 1-12. Refer to “Preferences” in Section 3.4 for more information.

Baud Rates - Select the following baud rates for the following radio models. You can perform DSP and ARM code download functions at the higher baud rates. Refer to “Preferences” in Section 3.4 for more information.

Radio Model	Baud Rate [baud]
5300 mobiles with the Rev 4 logic board	9600
5100 portables 5300 mobiles with Rev 6 or later logic boards	19200 (default)

Read Parameters from Radio - Transfers the information programmed in a radio into a new programming file. If you have not saved the current file when you select this function, PC Configure displays a dialog box that asks whether you want to save it. You can view, edit, or save the transferred data to a disk file. You many have to enter an upload password Refer to Section 10 for more information.

Write Parameters to Radio - Programs the radio connected to the computer with the data in the current programming file. You many have to enter an upload password Refer to Section 10 for more information.

Note *Later 51xx and 53xx models have safeguards to prevent unauthorized cloning. Refer to Section 15 for more information.*

Write DSP Code To Radio - Reprograms early 5300 radios. Refer to Section 16.

Write Application Code to Radio - Programs all 53xx and 51xx radios with updated firmware (operating software). With "F" and earlier 5300 radios, this code is referred to as ARM code.

Note *You can only use PC Configure to upgrade radios to the latest radio firmware release. Refer to Section 1.12.*

Proceed as follows:

1 Obtain from EFJohnson a special computer file containing the operating code. The application code has a *.hex* extension, and the 5300 DSP code (if applicable) has an *.out* extension. With all 51xx models, copy the *.hex* file to the *PPC\5100* folder of the PC Configure program. With later 53xx models, copy it to the *PPC\5300_i* folder. With early 53xx ARM models, copy the *.hex* file to the *ARM\5300* folder, and the *.out* file to the *DSP\5300* folder. You can also use other file locations if you wish.

2 Put the radio in the firmware programming mode as follows.

53xx - Turn power on with the special Flash Mode Select Plug, Part No. 023-5300-010, plugged into the microphone jack. Another way to do this is to short Pin 3 to Pin 7. With the HHC, plug it into the programming adapter plug that is plugged into the junction box programming connector.

51xx - Turn power on with the option button above the PTT switch pressed.

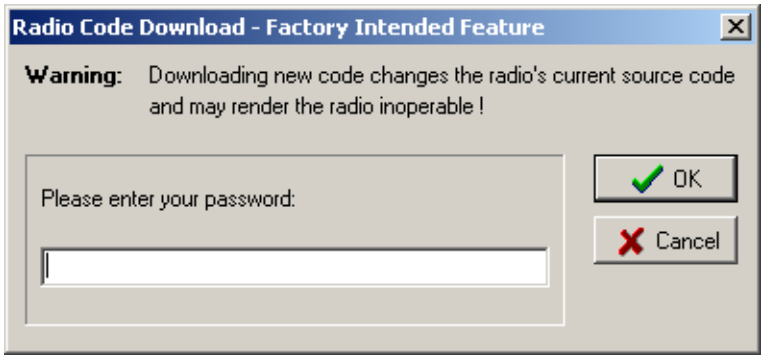
3 For 51xx radios, select the 115,200 baud rate. For 53xx radios, select the 57,600 baud rate.

4 If applicable, make sure the radio is connected to the computer, then select this function. Enter the password (obtained from EFJohnson) in the screen that displays and click the **OK** button.

Note *You may need to update the boot loader code as well as the application code. Update the boot code first. You select the Boot Loader utility by one password and the application utility by another. Refer to Section 1.12.*

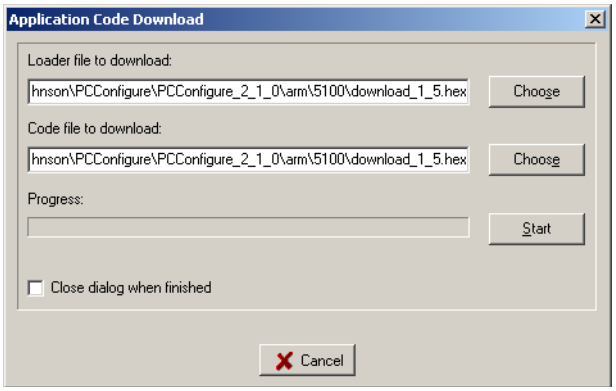
5 The Radio Code Download screen is displayed. Enter your password and press OK.

Figure 3.5 Radio Code Download screen



5 The following screen displays. Select the loader and code files if required by clicking the **Change** button. The PC Configure software includes the loader file. If you need an updated loader file, select the updated file instead of the included loader file. The application code file should be in the folder you selected in Step 1.

Figure 3.6 Code Download screen

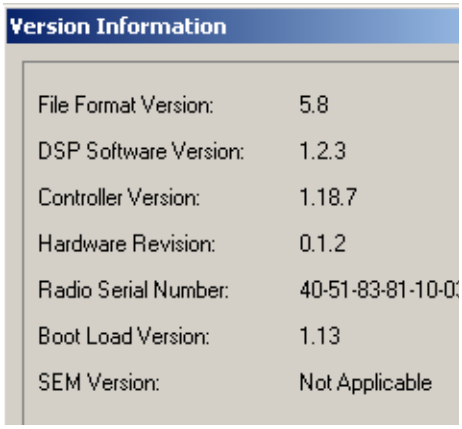


6 Click the **Start** button to begin code downloading. Click **Start** again if a failure occurs. Writing may require 20 minutes or more. With the early 53xx, repeat for DSP code if applicable.

Note *After downloading is complete, perform **Read Parameters from Radio** and then **Write Parameters to Radio** to ensure the file format is correct.*

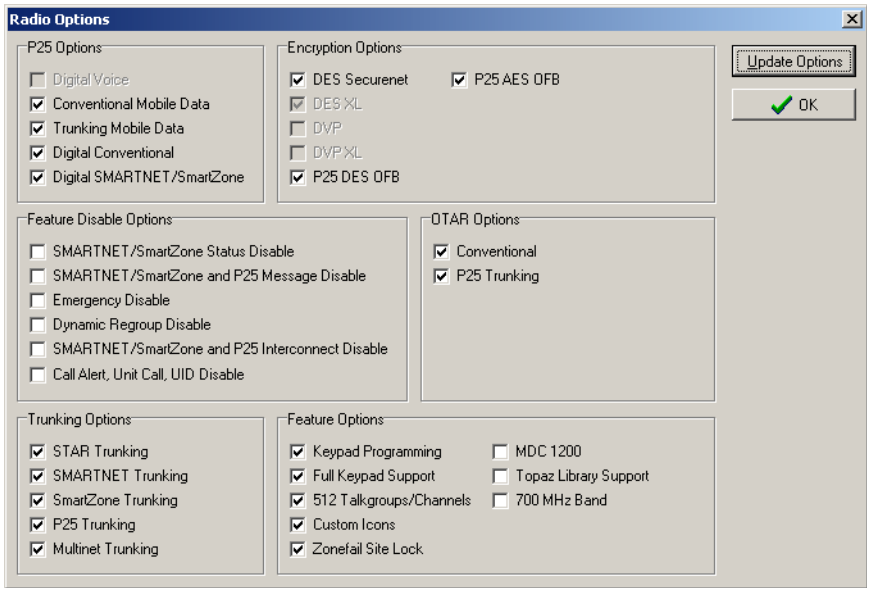
Read Version Info from Radio - Transfers version information on the software the radio contains and then displays it as shown below.

Figure 3.7 Version Information screen



Read Options from Radio - Displays information about the options enabled in the radio as shown in Figure 3.8. The check boxes indicate which options are enabled. They are for informational purposes only and cannot be edited.

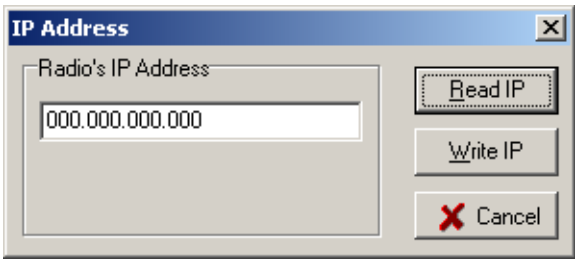
Figure 3.8 Transfer > Read Options Screen (5300 Shown)



Use the **Update Options** button to add additional options that were purchased for the radio. An encrypted data file keyed to the radio serial number unlocks these options. This file has an *.opt* extension. When you click this button, PC Configure displays a screen that lets you select and download this data file.

Read/Write IP Address - (5300) This function is not used because an Ethernet link to the radio is currently not supported. It displays the preceding “IP Address” screen which reads/edits the IP address stored in the radio.

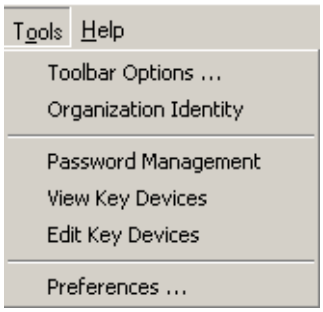
Figure 3.9 IP Address screen



3.4 Tools Menu

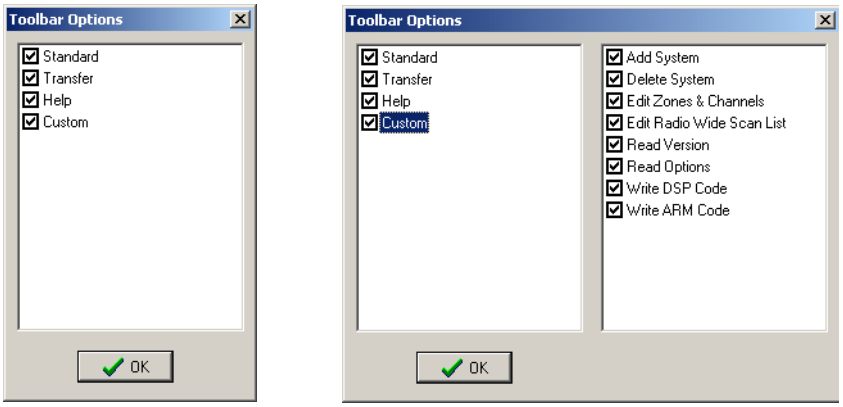
Figure 3.10 shows the **Tools** menu.

Figure 3.10 Tools Menu



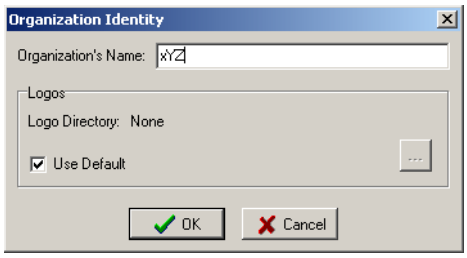
Toolbar Options - Displays the following dialog box from which you select the icons that the toolbar displays. Refer to Section 3.6. When you check and highlight the **Custom** box, the additional window is displayed to allow you to select which icons to display. PC Configure saves the last selected configuration, then automatically reselects that configuration when you restart the program.

Figure 3.11 Toolbar options screen



Organization Identity - Displays the following screen in which you can designate a unique company title and logo to display on the programmer screen.

Figure 3.12 Organization Identity screen



To display a unique company name, enter the desired name in the **Organization's Name** box in this screen. It then displays after **Radio Configuration -** at the top of the screen. Refer to Figure 1.5.

A logo displays on the right end of the toolbar. When the radio performs a read or write operation, this logo changes. To display the default logo, check the **Use Default** box. To display a custom logo, create a bitmap file of the desired graphic that meets the following requirements. You can use a photo editing program to create the bitmap.

- 53 W x 22 H pixels
- .bmp file format
- 256 colors or higher recommended
- You can create a maximum of 30 files. You can name them Logo1.bmp, Logo2. bmp, and so on up to Logo30.bmp. These graphics are then displayed in rapid succession during a radio read or write operation.

Password Management - Displays the following screen in which you can enable, disable, and change radio passwords. You must connect a radio to the computer to display this screen. Actual passwords never display in this screen. PC Configure always represents passwords as eight asterisks (********), no matter how long the passwords really are.

Figure 3.13 Radio Password Management screen

Note *This is a new feature available only with later 51xx and 53xx radios with updated firmware. The power-up password previously programmable on the **Global** screen with*

earlier models can be programmed in those models only with PC Configure, Version 1.21.6 or earlier. Refer to Section 10 for more password information.

User - This drop down list selects the particular password that you want to change as follows:

User 1, User 2, User 3, User 4 - You can program up to four different power-on passwords. The same user features are available with each.

Upload, Download - The radio user must enter these passwords to Upload (read) or Download (write) programming parameters. The radio user does not need a **User** passwordto upload or download parameters.

Master - This password overrides all the other passwords. A system administrator can use it if any of the preceding passwords are lost.

Selected User - This box indicates status of the selected password (Enabled or Disabled). The **Password** box always indicates eight asterisks, and you cannot edit it.

Proceed as follows to set up or change a password. Passwords must be 1-8 characters long and consist of numbers 0-9. Zeros are valid characters in any location, even as leading characters.

Changing a Password

Note *To enter a password, click the first asterisk or select all eight asterisks. If you enter an incorrect password, a red "!" exclamation point displays to the right of the box, as shown in the preceding screen. You must then reenter the password.*

1 Select the password in the pull-down menu.

2 If the password was previously set up, enter the current password in the **Original/ Master Password** box. If this is the first time the password is used, it initially consists of null (deleted) characters. In this case, do not enter anything in this box.

3 If you are enabling or disabling the password, click the appropriate **Enable** or **Disable** button. Proceed to Step 6.

4 If you are changing or initially setting-up the password, enter the new password in the **New Password** box, then reenter it in the **Re-enter New Password** box to confirm it. Click the **Change** button.

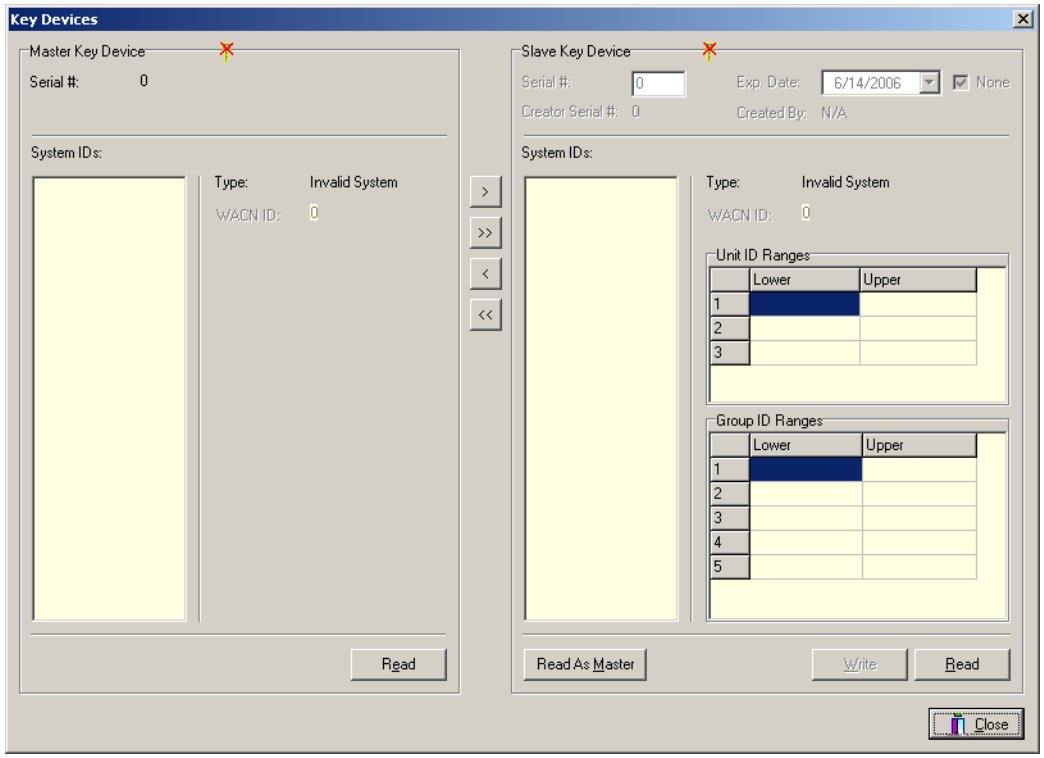
5 Repeat for other passwords as required.

6 To exit without sending the change to the radio, click the **Cancel** button. To exit and send the change to the radio, click the **OK** button.

View Key Device - This field is used to view the system key (dongle) file. (For 5100x and 5300x radios only.) Refer to Figure 3.14

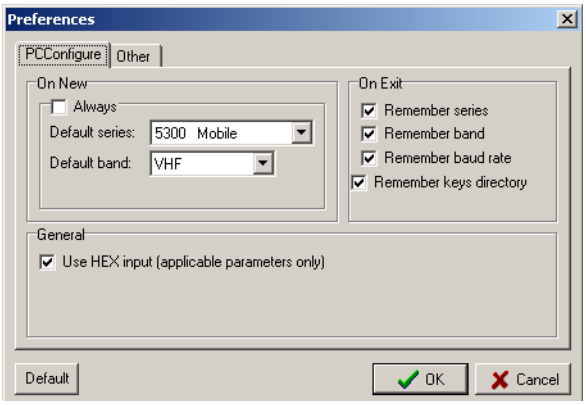
Edit Key Device - This field is used to edit the system key (dongle) file. (For 5100x and 5300x radios only.)

Figure 3.14 Key Device screen



Preferences - Displays the following screens from which you can set several program preferences.

Figure 3.15 Preferences: PC Configure screen



On New - When you check **Always**, PC Configure automatically creates a programming file with the radio series and band selected by the pull-down menus. This happens when you select **File > New** or click the button. However, the you cannot change the band of the file, so you can only create files with the selected band. If you do not check this, you select the band in a separate step before you create the file as described below.

On Exit - When you check one of the parameters in this box, PC Configure restores that parameter to the current condition when you restart the program. Otherwise, the

default is selected. Note that if you check **On New > Always**, it overrides the first two parameters.

Remember series - When you create a new file by selecting **File > New** or clicking the button, PC Configure automatically selects the current radio series. If you do not select this, “5300” is the default.

Remember band - When you create a new file by selecting **File > New** or clicking the button, PC Configure highlights the current frequency band when the band select screen displays. You can also change the frequency band if you wish. If you do not select this, “VHF” is the default.

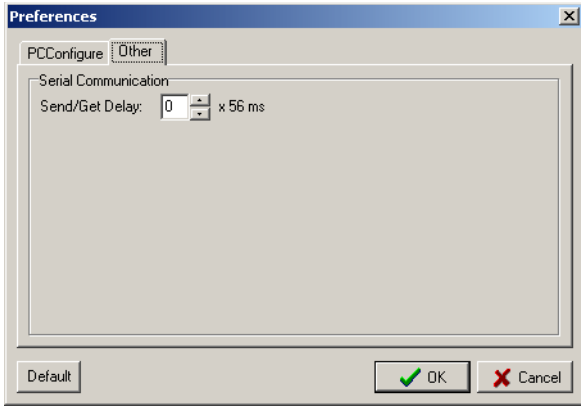
Remember baud rate - PC Configure automatically reselects the current baud rate. Refer to Section 3.3. If you do not select this, “19200” is the default.

Remember keys directory - PC Configure automatically reselects the current key directory. If you do not select this, the “Keys” folder is the default. Refer to “Load System Keys” in Section 3.2.

General

Use Hex input (applicable parameters only) - When selected, you must enter all applicable numbers in hexadecimal format instead of decimal format. All hexadecimal numbers are indicated by an ivory-colored background. Refer to Section 1.9.4 for more information.

Figure 3.16 Preferences: Other Screen



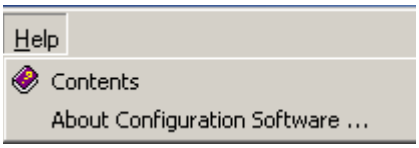
Serial Communication

Send/Get Delay - Allows you to program a serial port delay of 0-18 (x 56 ms). You may need to program this delay may need if you use computers that are slow to respond to serial port signals. If the software times-out during read/write operations, try increasing this delay. Usually, select the default level of “0” (no delay).

3.5 Help Menu

Section 3.17 shows the **Help** menu.

Figure 3.17 Help Menu



Contents - Displays the help system table of contents.

About Configuration Software - Displays the PC Configure version number and company information.

3.6 Toolbar

The tools in the toolbar provide quick access to many menu functions. To display the tools, select the **Tools > Toolbar Options** menu described in Section 3.4. You can use this menu to turn on and turn off the **Standard**, **Transfer**, **Help**, and **Custom** tools.

3.6.1 Standard Tools

Refer to Section 3.1 for more information on these functions.

New - Opens a new programming file containing default parameters.

Open - Loads a file from disk. Clicking the down arrow displays a drop-down list of recently loaded files.

Save - Saves the current file to disk.

3.6.2 Transfer Tools

Refer to Section 3.3 for more information on these functions.

COM Port - Selects the serial port used to connect the radio to the computer.

Read Parameters From Radio - Transfers data from the radio to a new programming file.

Write Parameters To Radio - Programs the radio with the data in the current programming file.

Stop Data Transfer - Cancels the data transfer in progress.

3.6.3 Help Tools

Help - Displays help information.

Manual - Reserved for future use.

Status Bar

3.6.4 Custom Tools

Add System - Adds a new system. Clicking the down arrow displays a drop-down list of the system types that can be added.

Delete System - When the **Per System** screen displays, clicking this button deletes the selected system.

Edit Zones and Channels - Displays the **Edit Zones and Channels** screen.

Edit Radio Wide Scan List - Displays the **Radio Wide Scan List** edit screen.

Read Version From Radio - Reads version information from the radio for the software it contains and then displays that information.

Read Options From Radio - Reads option information from the radio and then displays it.

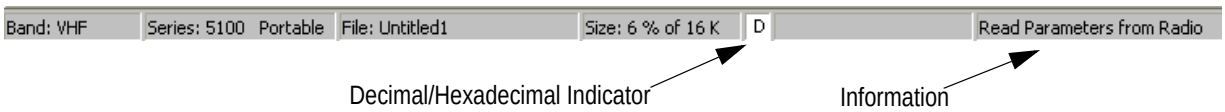
Write DSP Code To Radio - Programs early 53xx models with new DSP software.

Write Application Code To Radio - Programs the radio with new Application/ ARM software.

3.7 Status Bar

Section 3.18 shows the status bar.

Figure 3.18 Status Bar



Band - The frequency band of the file. You select this when you create a new file with the **File > New** function.

Series - The radio series of the file selected by the **Radio > Series** function.

File - The file name of the current programming file. You specify this name the first time you save the file with the **File > Save** function, or you can change it with the **File > Save As** function.

Size - Indicates the percent of the available memory that would use if you programmed the radio with the current file. Refer to Section 1.9.3.

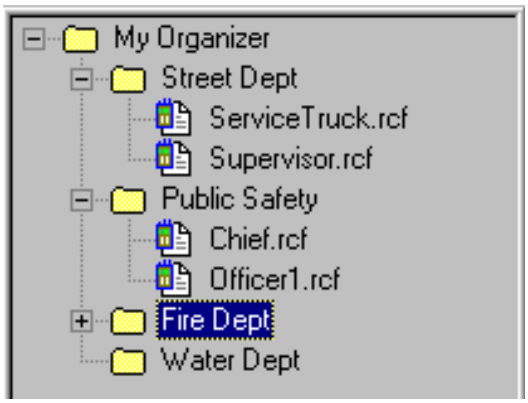
D/H Box - Indicates whether the decimal or hexadecimal number format is selected. Refer to Section 1.9.4.

Information - Displays a short description of tools in the toolbar when they are selected by the cursor.

3.8 Organizer

Figure 3.19 shows an example of the organizer screen.

Figure 3.19 Organizer Screen Example



Clicking the organizer button  on the right end of the toolbar toggles the preceding screen that you can use to organize many programming files into groups and subgroups. This should make it easier for you to organize files if you administer a large organization.

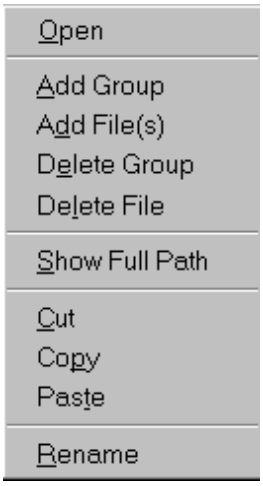
Note *This organizer does not add, delete, or move programming files on the hard drive. It simply organizes those files into logical folders and subfolders.*

The folder symbol  represents groups. The  symbol represents programming files. A  symbol next to an item indicates that the branch is expanded, and clicking it collapses the branch. Likewise, a  symbol indicates that the branch is collapsed, and clicking it expands the branch. If a file in the organizer was deleted from the hard drive, it is indicated by a red “X” through the icon  .

1 To add the current programming file to the Organizer, select the desired group in the organizer and then select the **File > Send to Selected Organizer Group** menu item. Refer to Section 3.1. To add other files, see Step 3.

2 To open a file listed in the organizer, simply double click it, drag it to the main programmer screen, or select **Open** as described in the next step.

3 To add, edit, delete, or move a group or file, right click the applicable group or file. The following window is displayed.



Open - Opens the selected file. If you have not saved the current file, PC Configure asks you if you would like to save it first.

Add Group - Adds a new group below the selected location.

Add File(s) - Displays a screen that you can use to select a file on the hard drive to add to the selected location.

Delete Group - Deletes the selected group from the organizer only. If you select **Delete Group**, it does not delete the actual files on the hard drive.

Delete File - Deletes the selected file from the organizer only. If you select **Delete File**, it does not delete the actual files on the hard drive.

Show Full Path - Displays the entire path name of the file on the hard drive.

Cut - Moves the selected group or file to the clipboard.

Copy - Copies the selected group or file to the clipboard.

Paste - Copies the current clipboard file to the selected location

Rename - Renames the selected group.

Note *You cannot rename files from the organizer.*

SECTION

4

Global Screen

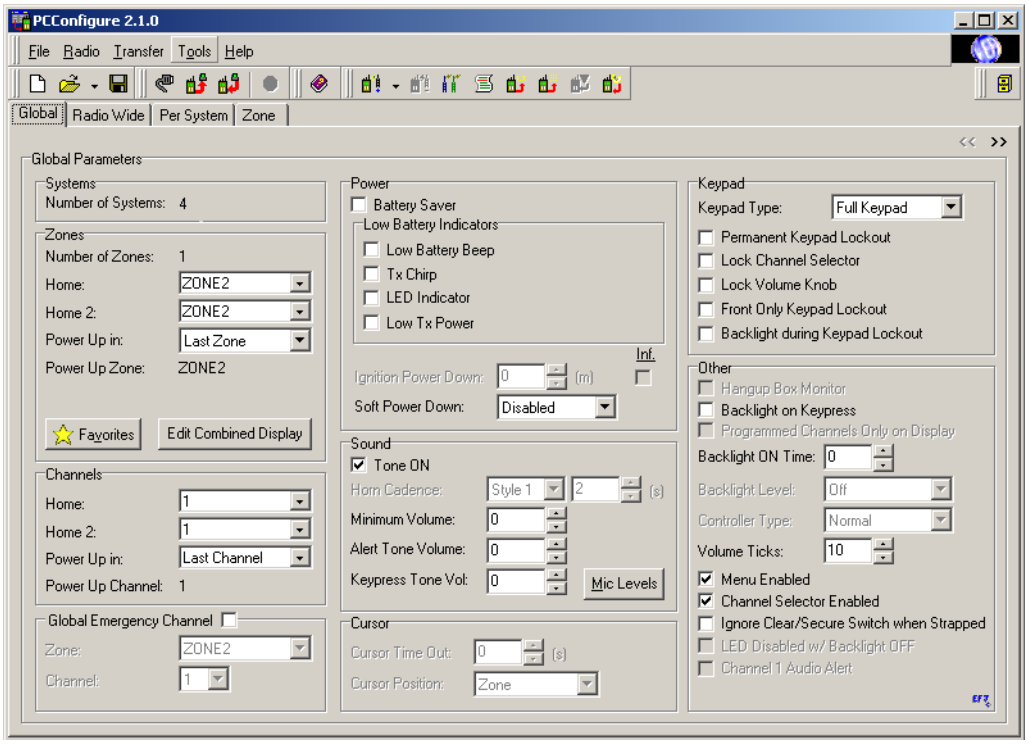
PC Configure global parameters are the parameters that are the same for all systems, channels, and zones. Two screens contain the interface at which you program these parameters. This section contains descriptions of the parameters that you find on these screens.

Some parameters described in this section apply only to certain revision levels. Index numbers in superscript appear next to the names of such features (for example, "**Example Feature**[9]"). Table 1.1 shows the relationship between these numbers and the revision levels they represent.

4.1 Global Parameters: Initial Screen

Figure 4.1 shows the initial **Global** parameters programming screen. The screen displays as active parameters only those parameters that apply to the selected radio series. The other parameters are grayed out.

Figure 4.1 Initial Global Parameter Programming screen (5100)



The parameters in this screen are as follows:

Systems - Displays the number of systems that have been created as described in Section 1.10.

Zones - A zone is a programmed collection of up 16 channels of any type.

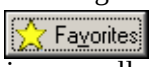
Number of Zones - The total number of zones currently set up. The maximum number allowed is 16. Zones are created in the **Zone > Edit Zones** screen by clicking the + button. Refer to Section 6.1.1.

Home Zone - Selects the zone set for the **Home Zone** option function button (if programmed).

Home 2 - Selects the secondary Home Zone function button.

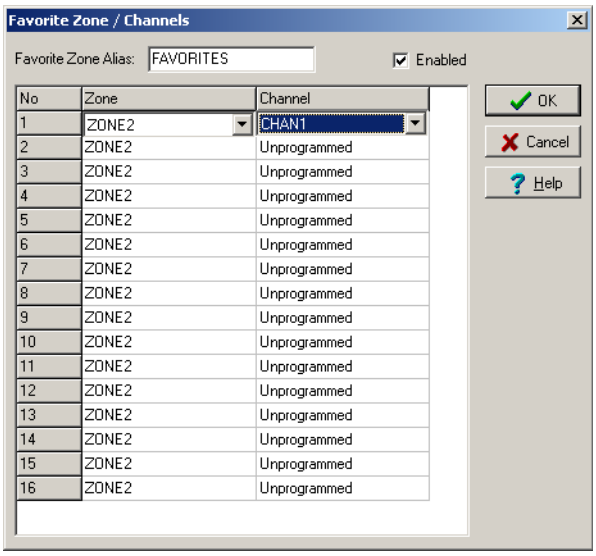
Power Up In - Selects whether the radio powers up on the Home or Last Selected zone.

Power Up Zone - When data is uploaded from a radio, this number indicates the power-up zone in the radio. It does not change until the current data is downloaded and then uploaded again.

Favorites 

- Provides users the ability to setup their “Favorite Channels” in one dynamic zone, allowing the user to change channels at will, without impacting any of the zones / channels that are already programmed. When the Favorites button is selected, the following screen is displayed.

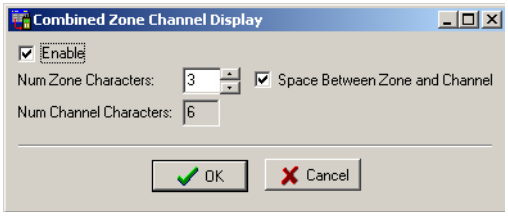
Figure 4.2 Favorite screen



Once enabled, you can change the name of the Favorites Zone and the channel assignments. The default name is set to “FAVORITES”. You may set the 16 Favorite channels via drop down menus that show all of the zones and channels programmed in the radio (Refer to Section 2.5). If no Zone/Channels are selected, the channel is unprogrammed.

Combined Zone/Channel Display - Can combine channel amd zone alias on radio display. May enter up to nine characters to identify the channel and zone.

Figure 4.3 Combined Zone/Channel screen



Channels

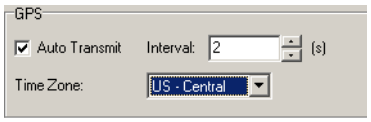
Home - Selects the channel set for the **Home Zone** function button (if programmed) when the radio powers up on the Home zone. With the 51xx, the radio user can select this only if the channel selector switch is disabled. Refer to “Channel Selector Enabled” parameter on Page 4-7.

Home 2 - Selects the channel set for a secondary **Home Zone** function button (if programmed) when the radio powers up on the Home zone.

Power Up In[1] **-** Selects if the Home or Last Selected channel is selected on power up. With the “Last Zone”/“Home Channel” power-up configuration, you select the programmed home channel number of the last active zone. If that channel number is not programmed in the active zone, “Unprogrammd” displays. With the 51xx or Ascend portable, only “Home Channel” is available if the channel selector switch is enabled.

Power Up Channel - Indicates the power-up channel in the radio similar to **Zones > Power Up Zone**.

Global Emergency Channel - Selects the zone and channel on which you transmit all emergency calls and alarms, regardless of the channel type currently selected. For example, if the global emergency channel is a conventional channel and a trunked channel is selected when the emergency is initiated, it transmits on the conventional global emergency channel.



Power

Battery Saver (portables only) **-** If this is checked, 51xx and Ascend automatically switch to the low transmit power mode when the RSSI signal indicates the site is probably nearby. This occurs only when the radio operates in the SMARTNET/ SmartZone or Project 25 trunked modes.

Low Battery Indicators (portables only)

Low Battery Beep - When checked, a short tone sounds periodically in the standby mode while the radio detects a low battery condition.

Tx Chirp - When checked, a chirp sounds each time the radio user presses the PTT switch while the radio detects a low battery condition.

LED Indicator - When checked, the LED on the top panel indicates a low battery condition. For example, the 51xx indicator flashes red in the receive mode.

Low TX Power - When checked, the radio operates on low transmit power when it detects a low battery condition.

Ignition Power Down (mobiles only) **-** When the ignition switch controls radio power, this sets the delay that occurs between when the radio user turns the ignition switch off and when the radio power actually turns off. You can select times of 0-254 minutes or an infinite time (no turn-off).

Soft Power Down (51xx and Ascend portable only) **-** The soft power down feature prevents the radio user from turning off the radio power accidentally turning the top panel on-off/volume control. You can program any side option button for this function (in addition to the button's normal function). Then, to turn the power off, the radio user must press the programmed option button during or just after power is turned off by the on-off/volume control.

Sound

Tone ON - If you check this, all supervisory tones sound. If you do not check this, no tones sound.

Horn Cadence (53xx and Ascend mobiles only) **-** Programs the following styles when the horn alert option switch enables the horn alert. Repeating does not occur with either style.

Style 1 - The horn is on for 1 second and off for 0.5 second for three cycles.

Style 2 - The horn sounds continuously for the programmed time (2-255 seconds).

Minimum Volume (mobiles, 51xx, and Ascend portable) - Sets the minimum volume level the volume control can select. You can use this to prevent missed messages caused

by unintentionally turning the volume down too far. Relative levels of 0-255 can be set in steps of 1 (“0” sets the lowest minimum volume).

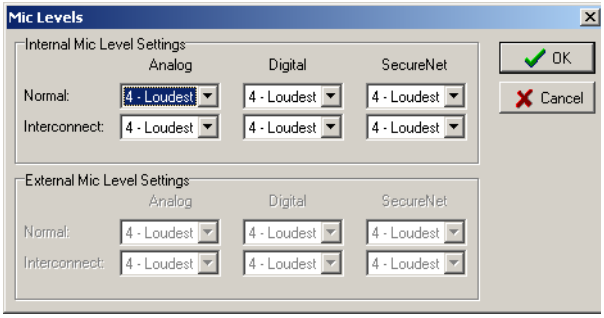
Alert Tone Volume - This adjusts the alert tone volume level relative to the volume control setting. The radio user can also do this by a **Tone Volume Edit** option button if one is programmed. Changes made by this button permanently override this setting. You can set relative levels of –170 to +170 in steps of 1. “0” is the standard default setting.

Keypad Tone Volume - Adjusts keypad button press tone levels.

Mic Levels 

- Displays the following screen which sets the microphone sensitivity for various types of calls. You can set relative levels of 0 (least sensitive) to 4 (most sensitive) for analog, digital, and SecureNet® (encrypted) calls, with “4” the default. You can only set this with 51xx models that have Version 1.6.0 or later Flash code, and 53xx models that have Version 1.38.0 or higher DSP code (or any 2.x/3.x code with both models).

Figure 4.4 MIC Levels screen



Cursor (53xx and Ascend mobile only)

Cursor Time-Out - Programs the time delay that occurs before the cursor (zone or channel select indicator) returns to the default position programmed in the next parameter. You can program times of 0-255 seconds. “0” selects no return.

Cursor Position - Selects whether the Zone or Channel select mode is enabled when the radio user turns the power on and after the preceding time-out period expires.

Keypad (Portables Only)

Keypad Type - Selects if the portable radio has a full DTMF Keypad or a limited keypad (without the 0-9, *, # DTMF keys).

Permanent Keypad Lockout[2] **-** If you check this, you permanently disable the front and side panel keys. You cannot enable them again. If you select the **Front Only Keypad Lockout** parameter that follows, you permanently disable only the front panel keys. The radio user can still use the side panel keys.

Lock Channel Selector[2] **-** When checked, the **Keypad Lockout** function also temporarily locks the top panel channel selector switch. When not checked, it remains

functional when the keypad is locked. To totally disable this control, do not select **Channel Selector Enabled** which follows.

Lock Volume Knob[2] **-** When checked, the top panel volume control function (but not on-off) is also temporarily locked by the Keypad Lockout function. When not selected, it remains functional when the keypad is locked. To totally disable this control, program an Up/Down volume button. Refer to the following section on the **Volume Ticks** parameter.

Front Only Keypad Lockout[2] **-** This controls the keys that are disabled by the preceding **Permanent Keypad Lockout** function and the **Keypad Lockout** option button if programmed. If neither of these functions is used, checking this parameter has no effect. If this box is checked, the front panel keys are disabled but the side panel keys remain active. If this box is not checked, both the front and side panel keys are disabled.

Backlight During Keypad Lockout[2] **-** If you check this box, the backlight turns on normally when the user presses a key with the keypad locked (if **Backlight on Keypress** which follows is enabled). If you do not check this box, the backlight is also disabled when the keypad is disabled.

Other

Hangup Box Monitor (mobiles only) **-** When checked, enables microphone off-hook detection. Taking the microphone off-hook then enables the monitor mode (conventional only) and disables scanning. When not checked, taking the microphone off-hook has no effect on these functions.

Backlight on Key Press (portables only) - If checked, the backlight turns on for the **Backlight ON Time** whenever the radio user presses a key.

Programmed Channels Only on Display (53xx only) **-** If you check this box, the radio user can select only programmed channels. If you do not check this box, the radio displays all channels. When the radio user selects an unprogrammed channel, “UNPROGRAMD” displays and a tone sounds.

Backlight ON Time (portables only) **-** Programs the period of time in seconds the backlight stays on after it is enabled by pressing a key. Refer to the preceding section on **Backlight on Key Press**. You can program times of 0-7.5 seconds in 0.5-second steps. When the radio user turns on the backlight by the option switch or menu parameter, the backlight stays on.

Backlight Level (mobiles only) **-** Selects the backlight brightness as “Off,” “Mid,” or “High” whenever power is on. The backlight option switch can override this setting if that switch is programmed.

Controller Type (53xx only) - Selects the type of control head being used. Select “Normal” for the standard front or remote mount control head. Select “Handheld” for the Handheld Control Unit.

Volume Ticks (51xx only)[3] - When you program a Volume Up/Down button on the **Radio Wide** screen for a particular system type, the volume control is disabled when the radio user selects a channel programmed for that system type. This then selects the number of button presses (“ticks”) required to change from minimum to maximum volume. You can program from 1 to 50 steps. Refer to the preceding section on the **Lock Volume Knob** parameter**.**

Menu Enabled (51xx only) **-** Enables the menu mode with 51xx portables. The <F1> and <F2> keys then become menu exit and select keys instead of programmable option

keys. If you do not select this parameter, the menu mode is not available and <F1> and <F2> remain as programmable option keys.

Channel Selector Enabled (51xx only) **-** Enables the channel select knob in the top panel. If you do not check this, you permanently disable the channel select knob and the radio user can only select channels by the **Channel Select** option button or menu parameter. Refer to the preceding section on the **Lock Channel Selector** parameter.

Ignore Clear/Secure Switch when Strapped[4] **-** When you select this, the mode selected by the switch (or menu parameter with the 51xx) is ignored and the transmission always occurs in the strapped mode. In addition, the error tone and "Sec Only" or "Clear Only" do not display when the switch selects a different mode than the one that is strapped.

Note *If all channels and talk groups are strapped **Clear** or **Secure** and no **Clear** or **Secure** option switch or menu parameter is used, you must always select this parameter. Refer to the following.*

Without the **Clear/Secure** switch or menu parameter, the radio is always in the last known state (usually Clear) and there is no way to change it. For example, if the last known state is Clear and you do not select this parameter, the radio user can never transmit a Secure message on a channel strapped Secure. When the user tries to do this, the following occurs:

- Transmitting is disabled
- An error tone sounds
- "Sec Only" displays

LED Disabled w/ Backlight OFF (5300 Only)[5] **-** When you select this, the front panel transmit indicator is disabled whenever the display backlight is off. If you do not select it, this indicator operates normally regardless of the backlight state (except when you select the surveillance mode).

Channel 1 Audio Alert (5300 Only) - When rolling from channel 16 to channel one, an audio tone sounds to alert the user that you have rolled over to the beginning of the zone.

4.2 Global Parameters: Second Screen

You open and close a second **Global** screen when you click the << >> buttons in the upper right corner of the screen. Figure 4.6 shows this second screen

Figure 4.5 Second Global Parameter Programming Screen (for 5100 series)

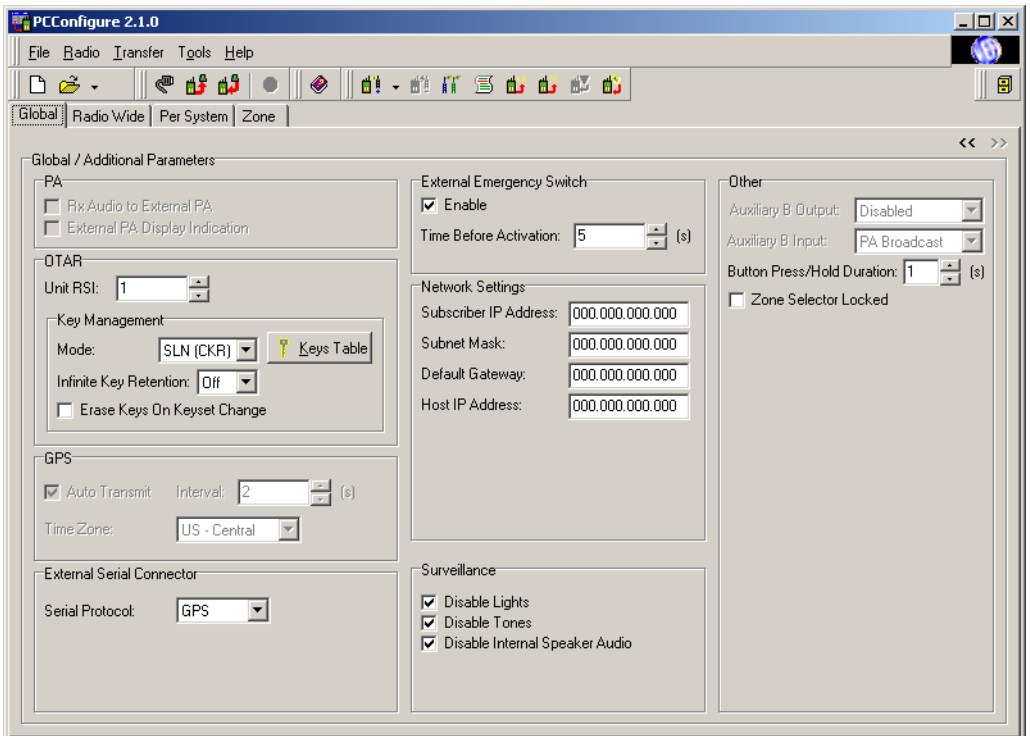
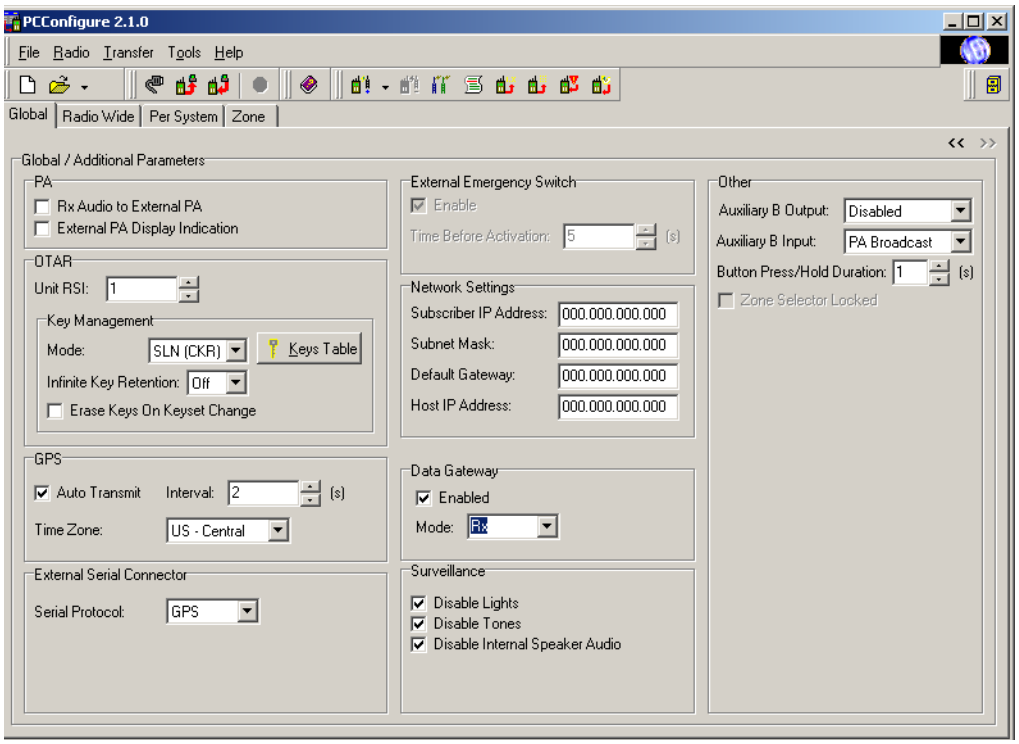


Figure 4.6 Second Global Parameter Programming Screen (for 5300 series)



The second **Global** screen displays the following parameters:

PA (5300 only)

Rx Audio to External PA - Microphone audio always connects to the Ext PA line of the accessory cable. If you select this parameter, the receive audio signal also connects to this line.

External PA Display Indication - If you select this, “Ext PA On” displays continuously when the **Ext PA** option button enables the external PA function. If you do not select it, “Ext PA On/Off” flashes in the display when the radio user presses a button.

OTAR (Over-the-Air Rekeying)

Unit RSI - This sets the individual Radio Set Identifier of the OTAR radio. You typically set this number to the Digital Unit ID, but you can also program other numbers if you wish to do so. The allowed range is 1 - 9,999,999.

Key Management - Your key management mode determines the method you use to load and manage encryption keys. The Motorola keyloader has ASN and Astro 25 modes. You can use the ASN mode to load analog channel keys (DES or DES-XL) only. You can use the Astro 25 mode to load both analog and digital (DES-OFB or AES) channel keys.

Mode - Select the PID/ASN or SLN/CKR mode as follows. The keyloader function of the EFJohnson Subscriber Management Assistant (SMA) supports the SLN mode only. The Motorola keyloader operates only in the ASN mode when you select “PID/ASN”, and in either the ASN or Astro 25 mode when the you select “SLN/CKR”.

PID/ASN Mode - Select this mode to load analog channel keys directly into a Key PID (Physical ID) from 0-15. The following restrictions are true of this mode:

- You can load digital channel keys in this mode
- OTAR is not available
- You cannot use the keys table

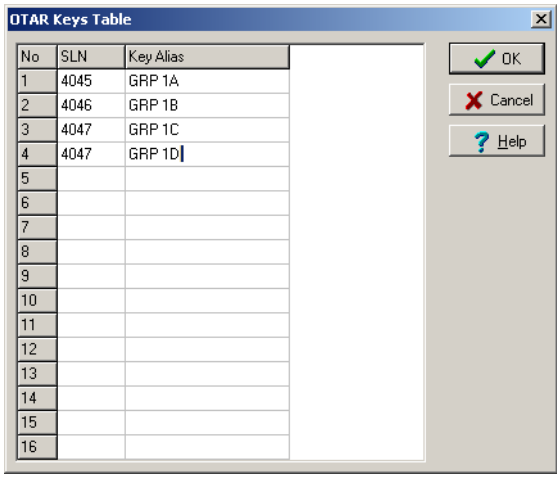
SLN/CKR Mode - Select this mode to load keys into an SLN/CKR location from 1-4095 instead of a Key PID location from 1-16.

Note *You must select this mode to program the radio for OTAR.*

You can specify a maximum of 16 SLNs. The following key (alias) table links each SLN to a Key PID. Storage Location Number (SLN) and Common Key Reference (CKR) are equivalent terms.

- Clicking this button displays the OTAR keys table screen shown in Figure 4.7. In this screen, you associate Key PIDs 1-16 with the SLN/CKRs from 1-4095 specified when you load the key. You must program this table if you selected the SLN/CKR mode described above. The SLN/CKR number points to a specific key slot (of both keysets is using OTAR). The radio briefly displays the 10-character key alias when transmitting, changing channels, and switching between the clear and secure modes.

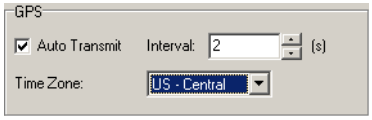
Figure 4.7 OTAR Keys Table Screen



Infinite Key Retention[6] **-** If you select “On”, the radio stores keys in its memory and does not lose them when power is removed. If you select “Off”, the radio maintains the keys with power removed only until the storage capacitance discharges (approximately eight hours with a 53xx mobile and 30 seconds with a 51xx portable).

Erase Keys on Keyset Change (OTAR only) - If this is selected, the keys in the original keyset are erased when the OTAR Changeover command or the Keyset option switch are used to select the other keyset. If this not selected, the keys in the original keyset are not erased when this occurs.

GPS (5300 Only) -The GPS feature can be used with other equipment to determine the geographical location of the subscriber unit.



Auto Transmit - Check if you wish the location of the unit to be transmitted.

Interval - If Auto Transmit selected, enter the time intervals for transmittal in one-second intervals.

Time Zone - Select your time zone or Greenwich time.

External Serial Connector - Select GPS if using external device and Other if using P25 data over IP applications.

External Emergency Switch (5100 Only)[7] - Selects the emergency mode if the radio remains in a horizontal position for the programmed time. The emergency mode selected by this feature functions the same as if the radio user pressed the emergency button. To use this feature, you must select it from the screen. You must also attach a man-down device to the accessory port of the radio. You can program the timer for 0-63 seconds. The feature resets if the radio user moves the radio back to a horizontal position. The radio user can cancel the emergency mode by pressing the emergency button.

Network Settings - The radio IP address may be set one of two ways: Using the Transfer > Read/Write IP address or setting the network settings on this screen. This is used for 5300 gateway for OTARing to other manufacturings infrastructure and it also makes use of the P25 data over IP, which you can send text or files via OTA using the P25 data over the air protocol using the application P25dataOverIP. Set static IP addresses for the following.

Subscriber IP Address

Subnet Mask

Default Gateway

Host IP Address

Data Gateway - Enables two 5300 radios to be networked for OTAR operations.

Mode - Set accordingly if radio can transmit or Receive OTAR operations.

Surveillance - Disables the transmit/receive LED indicator, display and keypad backlight, and all alert tones. This provides a quick way to disable these functions in all operating modes. It overrides any other programming of these functions such as a Tone or Backlight option switch. A transmit icon in the display indicates the transmit mode when the LED indicator is disabled by this mode (51xx, code version 1.16/2.6/3.6/4.2 or later only). This icon displays only in the Surveillance mode.

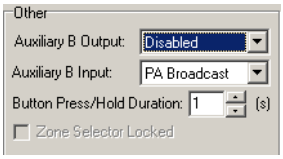
Program surveillance mode on the **Radio Wide** screen to allow the following to take effect.

Disable Lights - Check this box if you want the lights to be disabled.

Disable Tones - Check this box if you want the tones to be disabled.

Disable Internal Speaker Audio - Check this box if you want the audio to be disabled.

Other (53xx Only)



Auxiliary B Output - Determines the function controlled by Pin 4 output of the accessory connector:

Backlight - When you program the Siren option, the control head backlight also controls the Siren Controller backlight.

Horn - Controls an external horn alert.

Site Trunking - Controls an external site trunking indication of some type with SmartZone and Project 25 trunked operation. This feature is available only with code Version 1.26.0/2.4.0/3.4.0 or later.

Disabled - The output is nonfunctional.

Auxiliary B Input - Determines the function controlled by Pin 8 input of the accessory connector:

PA Broadcast - Selected with the Transit Bus PA option only to allow the radio user to select the public address function using an external switch.

Ext Emergency - Selected if the radio user can use an external emergency switch, such as a foot-activated type, to activate an emergency condition (later model firmware only).

Disabled - The input is nonfunctional.

Button Press/Hold Duration - Programs how long you need to press the button to enable it. This is so the user does not accidently push a button, but has to press it for the duration programmed to activation for use.

Zone Selector Locked (5100 only) - When the radio is turned on, the zone that comes up is the only one that can be used. Checking this box disables the user from changing zones and the radio stays in the Home Zone selected on the Primary Global page.

SECTION

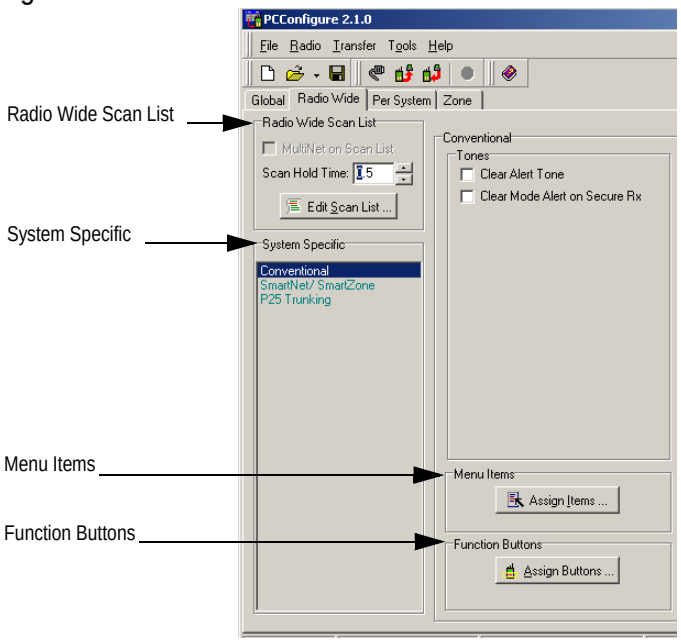
5

Radio Wide Screen

The Radio Wide screen programs parameters that are the same for all Conventional, Project 25 Trunked, and SMARTNET/SmartZone systems. A different screen displays for each system type. Figure 5.5 shows the Conventional screen, Figure 5.6 shows the SMARTNET/SmartZone screen, and Figure 5.7 shows the Project 25 Trunked screen.

The **Radio Wide** screen contains four areas that appear regardless of which type of system you program.

Figure 5.1 Radio Wide Screen Common fields



When you click any of the buttons, PC Configure opens a screen that enables you to program a corresponding set of parameters. This section contains the instructions to program these parameters.

In the System Specific area, select the system that you wish to program. This section also contains the instructions to program the separate parameters that are unique to the Conventional, Project 25 Trunked, and SMARTNET/SmartZone systems.

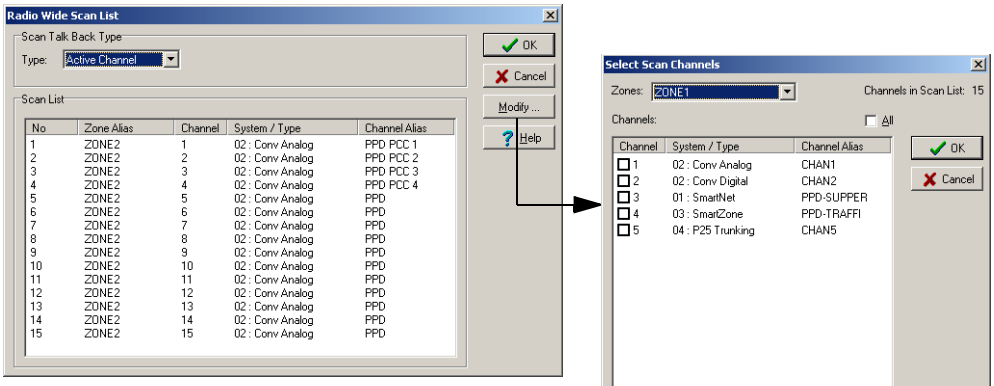
5.1 Radio Wide Scan List Programming

Note *For more information on how to set up radio wide and priority (standard) scanning, refer to Section 1.11.*

Scan Hold Time - When the radio performs Radio Wide scanning, this programs the delay that occurs after the radio stops receiving and transmitting messages. You can program times of 0 - 7.5 seconds.

You cannot program the radio wide scan list until you have set up all channels to be included in it in the Zone screens, as described in Section 6.2. The **Radio Wide Scan List** is the same for all system types and can include up to sixteen channels from any system. You program this scan list by clicking the Edit Scan List ... button on this screen or in the toolbar. When you click either of these buttons, PC Configure displays the screens shown in Figure 5.2. To select the channels that are in the radio wide scan list, click the Modify ... button to display the **Select Scan Channels** screen. Select the desired zones from the drop-down list and then check the channels that you want to include from each zone in the list.

Figure 5.2 Radio Wide Scan List screens



Radio Wide Scan List screen

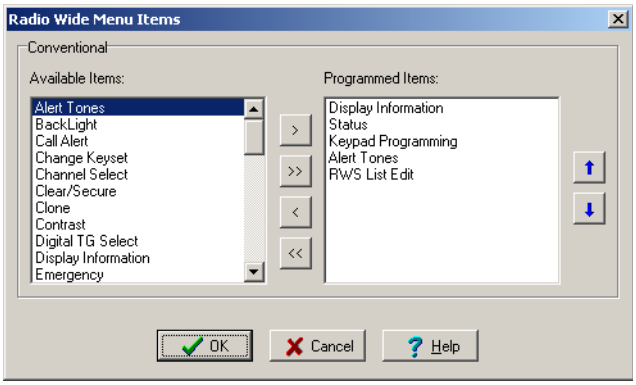
Select Scan Channels screen

5.2 Menu Items Programming (51xx Only)

You can only assign menu items when you program 5100 portable radios. To allow the radio user to use the menu mode, you must select the **Menu Enabled** box on the **Global** screen. Clicking the Assign Items ... button on the Radio Wide screen displays the Radio Wide Menu Items shown in Figure 5.3. In this screen, you choose the functions the radio

user can select in the menu mode. To move any item from the **Available Items:** list to the **Programmed Items:** list--or *vice versa*--double-click the item or select it and click one of the single arrow buttons. Clicking a double arrow button moves all items in one list to the other list.

Figure 5.3 Radio Wide Menu Items screen

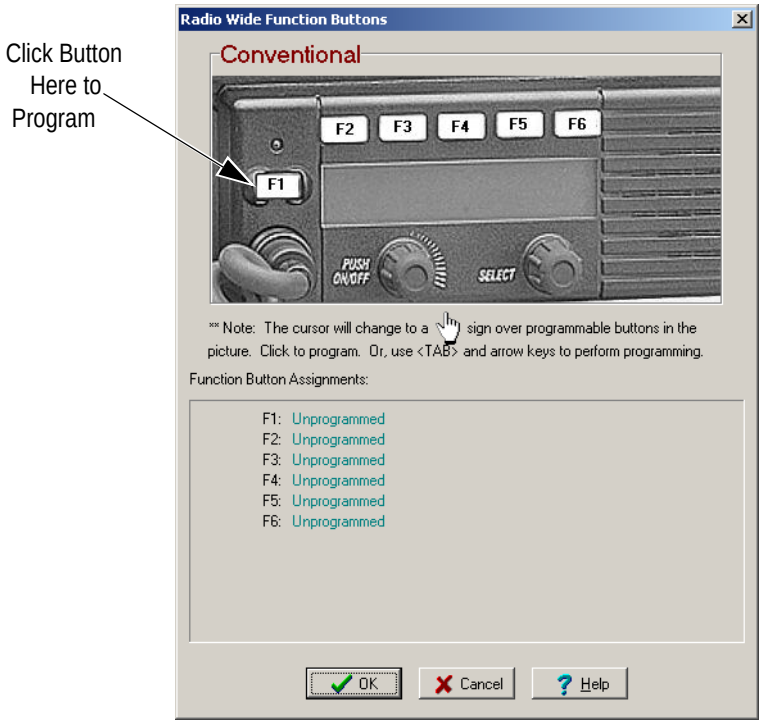


You can program a separate set of menu parameters for each system type using a process similar to the one described for function buttons in Section 5.3. Select the system type that you want to program in the **Radio Wide** screen's **System Specific** box. The radio user can control functions by both the menu and a function button. Table 5.1 shows the available 51xx menu functions.

5.3 Function Button Programming

Clicking Assign Buttons... in the **Radio Wide** screen displays a screen similar to the one shown in Figure 5.4. This is the screen in which you program the function buttons for the radio series you chose in **Radio > Series**.

Figure 5.4 Radio Wide Function Buttons Screen (5300 Series shown)



You can program each button with a maximum of four different functions. You can program one function for Conventional mode, a second for SMARTNET/SmartZone mode, a third for Project 25 Trunked mode, and a fourth for Multi-Net mode. You select the system type in the **Radio Wide** screen's **System Specific** box. Table 5.1 shows the available 5100 and 5300 option button functions.

Note *To view the functions programmed for each button in the various modes, select **Radio** > **View Programmed Radio Wide Functions**. Refer to Section 3.2.*

Table 5.1 51xx/53xx Programmable Option Button and 51xx Menu Mode Functions

Function	X = Available in Mode:				5100 Menu Display
	Conventional	Project 25 Trk	SMARTNET	SmartZone	
Alert tones On-Off	X	X	X	X	Tones
Backlight On-Off (51xx), Hi/Med/Off (53xx)	X	X	X	X	Backlight
Call Alert Select (Paging)	X	X	X	X	Call Alert
Call Response Select		X	X	X	Call Rsp
Cancel Dynamic Regroup		X	X	X	Cancel DR
Change Keyset (OTAR)	X	X	X	X	Chg Keyset
Channel Select	X	X	X	X	Chan Selct
Clear/Secure Encryption Select	X	X	X	X	Security
Clone Programming Select (51xx menu only)	X	X	X	X	Clone
Configure (51xx menu only, not curr used)	X	X	X	X	Config
Digital (Project 25) Talk Group Select	X				Select TG
Display GPS (53xx only)	X				-
Display Information Select (frequency or channel display)	X				Display
Emergency Mode Select	X	X	X	X	Emergency
Erase Keys, OTAR (menu only with 51xx)	X	X	X	X	Erase Keys
External Public Address (53xx only)	X	X	X	X	-
High/Low Power Select	X	X	X	X	Tx Power
Home Zone Select	X	X	X	X	Home Zone
Home 2	X	X	X	X	
Horn Honk Select (53xx only)	X	X	X	X	-
Key Select, OTAR	X	X			Key Select
Keypad Lock Select (51xx only)	X	X	X	X	(Opt sw only)
Keypad Programming Select	X				Keypad Prg
Messaging Select	X		X	X	Message
Monitor Mode Select	X				Monitor
Mute/Unmute	X	X	X	X	
Normal/Selective Squelch Select	X				Squelch
P25 Packet Data	X	X			Data Modes
Phone Call Select	X	X	X	X	Phone
Priority Channel Select	X				Priority
Private Call Select			X	X	Priv Call
Radio Wide Scan Select	X	X	X	X	RW Scan
Rekey Request	X	X			Rekey Request

Table 5.1 51xx/53xx Programmable Option Button and 51xx Menu Mode Functions (continued)

Function	X = Available in Mode:				5100 Menu Display
	Conventional	Project 25 Trk	SMARTNET	SmartZone	
Remote Access (Pyramid Repeater) (53xx only)	X	X	X	X	-
Repeater Talk-Around Select	X				Talk Arnd
Request to Talk	X				
RWS List Edit	X	X	X	X	RWS Edit
Scan Mode Select	X	X	X	X	Scan
Scan List Edit Select	X	X	X	X	Scan Edit
Scan List Select	X (5100 only)	X	X	X	Scan Selct
Set User Password	X	X	X	X	Set Paswd
Squelch (Code) Select List	X				Sqlch Code
Single Tone Encoder (51xx only)	X				Tone Encdr
Site Lock Select		X		X	Site Lock
Site Search Select		X		X	Site Srch
Status Select	X	X	X	X	Status
Surveillance Mode Select	X	X	X	X	Surv Mode
Tone Volume Edit - Alert	X	X	X	X	numbers that can be adjusted
Tone Volume Edit - Keypad	X	X	X	X	numbers that can be adjusted
Unit Call Select	X	X			Unit Call
Unprogrammed (Note *The button is not used.*)	X	X	X	X	-
Volume Down (51xx only)	X	X	X	X	(Opt sw only)
Volume Up (51xx only)	X	X	X	X	(Opt sw only)
Zone Select	X	X	X	X	
					Tones

Program the function buttons as follows:

1 Click the white <Fx> button that you want to program in the photo. A pull-down menu displays that shows the functions you can assign.

Tip *You can program almost all the 51xx portable's buttons.*

2 To select a function, double click it in the drop-down list. The functions assigned to each button appear in the bottom part of the screen.

3 Repeat Steps 1 and 2 for all function buttons that you want to program. Next, click OK to exit and save the changes or Cancel to exit without saving the changes.

4 You may want the function buttons to perform different functions when the radio operates in other modes. To accomplish this, do the following:

a Select one of the other modes in the **Radio Wide > System Specific** box.

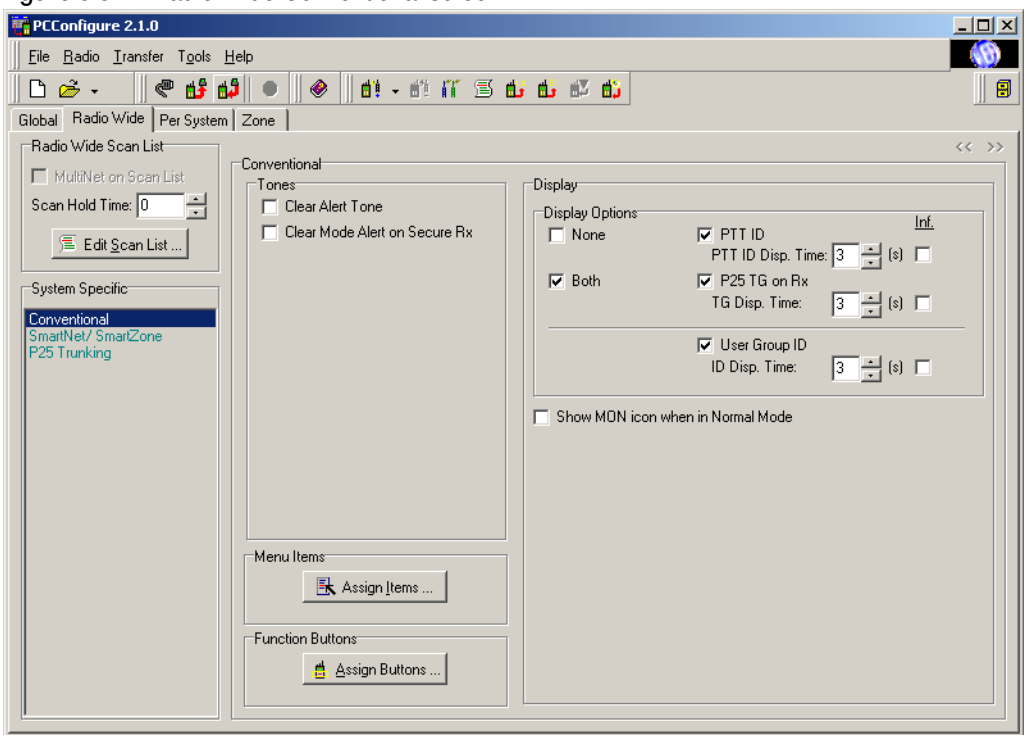
b Click Assign Buttons ... in the **Radio Wide** screen to display a screen similar to the one shown in Figure 5.4.

c Repeat Steps 1 through 3 for each mode that you want to assign unique function buttons to.

5.4 Radio Wide Conventional Parameters

Select “Conventional” in the **System Specific** box to display the screen shown in Figure 5.5. This screen programs the functions for Conventional systems.

Figure 5.5 Radio Wide Conventional screen



Clear Alert Tone - If checked, a short beep sounds to indicate that the radio user selected the clear (non-encrypted) mode. This tone sounds with SecureNet and digital OFB encryption only.

Clear Mode Alert on Secure Rx - If radio is in secure mode, a tone is sounded if user receives clear call.

Display Options - Select whether anything displays alternately with the selected channel alias or frequency when the radio receives Project 25 group calls.

None - Only the selected channel alias or frequency is displayed.

Both - Both of the following are displayed:

PTT ID - The ID of the mobile placing the call displays. You can program this ID to display for 0.5-7.0 seconds or “infinite”. When you select “infinite”, this ID displays

for the entire call and none of the other parameters display. *Available only in 5100 models with Flash code Version 1.9.0 or later and 5300 models with ARM code 1.22.0 or later.*

P25 TG on Rx - The radio displays the alias of the talk group on which the call is being received. You can program this to display for 0.5-7.0 seconds* or "infinite" as just described. *Available only in 5100 models with Flash code Version 1.9.0 or later and 5300 models with ARM code 1.22.0 or later.*

User Group ID - If the ID of the call being received is included in a User Group ID list as described in Page 7-16, the alias of that group displays. You can program this to display for 0.5-7.0 seconds or "infinite" as just described. *Available only in 5100 models with code 1.12.1/2.2.1/3.2.1 or later and 5300 models with code 1.24.1/2.2.1/ 3.2.1 or later.*

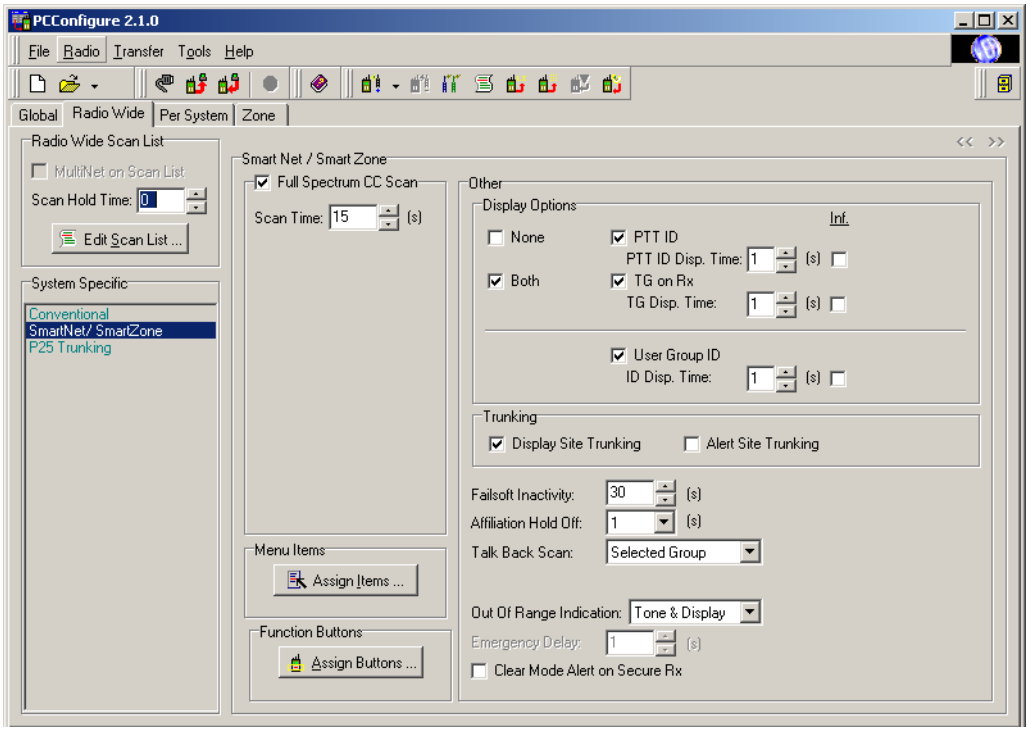
Show MON Icon When in Normal Mode* - If checked, the monitor indication in the display ([with 51xx, MON with 53xx) turns on when you select the "Normal" mode by the Normal/Selective option button or menu parameter (51xx only). If you do not check this, there is no continuous indication when the radio user selects this mode. *Available only with 51xx firmware 1.14.0/2.4.0/3.4.0 or later and 53xx firmware 1.26.0/2.4.0/3.4.0 or later.*

Clear Mode Alert on Secure Rx ** -** When you select this, a beep sounds whenever the radio receives a Secure (encrypted) call in the Clear mode on a conventional channel. If you do not select this, no beep sounds when this occurs. *Available only with 51xx firmware 1.16/2.6/3.6/4.2 or later and 53xx firmware 1.28/2.6/3.6/4.2 or later.*

5.5 Radio Wide SMARTNET/SmartZone Parameters

Select "SMARTNET/SmartZone" in the **System Specific** box to display the screen shown in Figure 5.6. This screen programs the functions that are the same for all SMARTNET and SmartZone systems.

Figure 5.6 Radio Wide SMARTNET/SmartZone Screen



Full Spectrum CC Scan - After the radio searches all potential control channel frequencies, the radio enters a channel-by-channel search across the full spectrum the radio covers. The timer sets the period of time the radio performs this scan before checking the expected frequencies again. After the radio checks these frequencies, full spectrum scanning resumes. This cycle repeats until the radio finds a control channel. Checking the box enables full spectrum scan.

Scan Time - Sets the time that full spectrum scanning occurs as just described. The selectable range is 5-31 seconds. The default is five seconds.

Display Options - Select whether anything displays alternately with the selected channel alias or frequency when the radio receives Project 25 group calls.

None - Only the selected channel alias or frequency is displayed.

Both - Both of the following are displayed:

PTT ID - The ID of the mobile placing the call displays. You can program this ID to display for 0.5-7.0 seconds or “infinite”. When you select “infinite”, this ID displays for the entire call and none of the other parameters display. *Available only in 5100 models with Flash code Version 1.9.0 or later and 5300 models with ARM code 1.22.0 or later.*

P25 TG on Rx - The radio displays the alias of the talk group on which the call is being received. You can program this to display for 0.5-7.0 seconds* or “infinite” as just described. *Available only in 5100 models with Flash code Version 1.9.0 or later and 5300 models with ARM code 1.22.0 or later.*

User Group ID - If the ID of the call being received is included in a User Group ID list as described in Page 7-16, the alias of that group displays. You can program this to

display for 0.5-7.0 seconds or “infinite” as just described. *Available only in 5100 models with code 1.12.1/2.2.1/3.2.1 or later and 5300 models with code 1.24.1/2.2.1/ 3.2.1 or later.*

Trunking

Display Site Trunking - If you select this, “Site Trunking” displays if the affiliated site loses communication with the zone controller and operates in the site trunking mode. This message displays until the zone controller returns to normal operation.

Alert Site Trunking - If you select this, an alert tone sounds when entering the site trunking mode previously described.

Failsoft Inactivity - Programs failsoft operation. If the radio remains inactive (no receive or transmit activity on the channel) while it operates in the failsoft mode for the programmed time, the radio momentarily leaves the failsoft mode and attempts to find a control channel. If you program “0”, the radio does not leave the failsoft mode.

Affiliation Hold Off - With SmartZone operation, this is the delay time that occurs after acquiring the control channel before it sends an affiliation inbound signaling word (ISW). This prevents all radios on the system from sending affiliation ISWs at the same time.

Talkback Scan - When the radio receives a call while it is scanning, this setting determines the talk group of the radio’s response. You can program the radio to respond on the Selected talk group or the received talk group (Active) group if they are not the same. You program **Scan Hold Time** on the **Per System** screen.

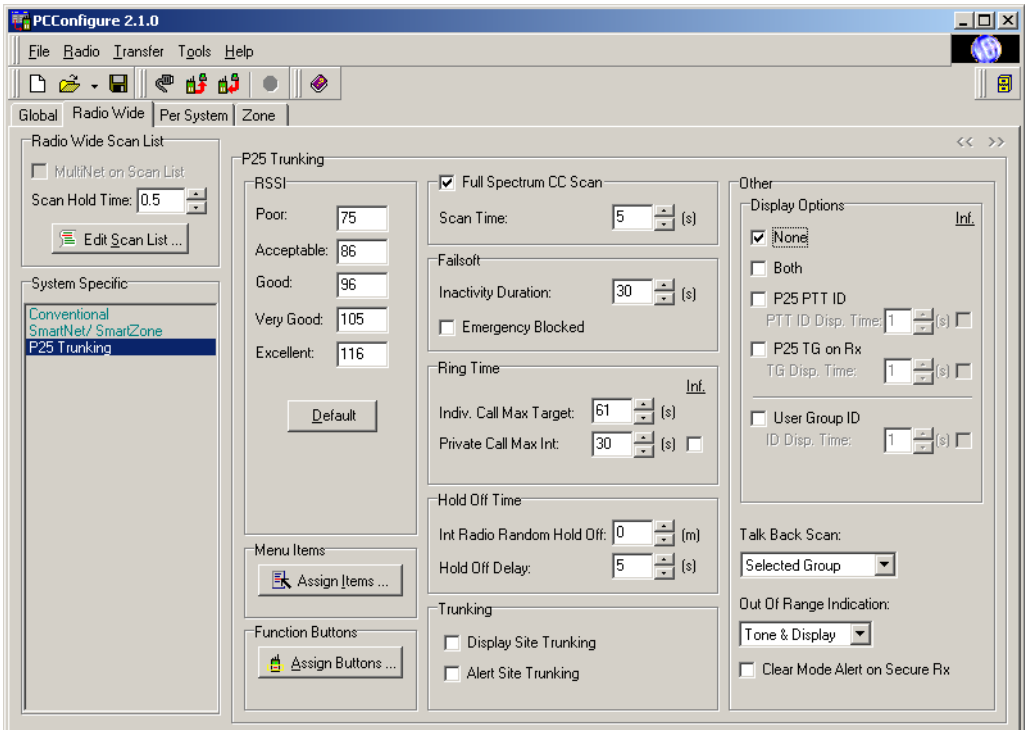
Out-of-Range Indication - Selects if the periodic tone sounds, “Out of Rng” (or “NO SYS”) displays, or if both or neither of these indications occur when an out-of-range condition exists.

Clear Mode Alert on Secure Rx - When you select this, a beep sounds when the radio receives a Secure (encrypted) call in the Clear mode on a SMARTNET/SmartZone channel. If you do not select it, no beep sounds when this occurs. *Available only with 5100 firmware 1.16/2.6/3.6/4.2 or later and 5300 firmware 1.28/2.6/3.6/4.2 or later.*

5.6 Radio Wide Project 25 Trunked System Parameters

Select “Project 25 Trunked” in the **System Specific** box to display the screen shown in Figure 5.7. This screen programs the functions that are the same for all Project 25 trunked systems.

Figure 5.7 Radio Wide Project 25 Trunking Screen



RSSI - This sets the Receive Signal Strength Indicator (RSSI) levels that determine when the radio tries to search for and switch to another site. Click the **Default** button to restore these levels to the default settings. If you check the **Hex** box, the RSSI levels display in as hexadecimal numbers instead of decimal numbers.

Note *Do not change the default RSSI levels unless you know how these levels affect radio operation.*

Full Spectrum CC Scan - Checking the box enables full spectrum scan.After the radio searches all potential control channel frequencies, it enters a channel-by-channel search across the full spectrum the radio covers. The timer sets the period of time the radio performs this scan before it checks the expected frequencies again. After it checks these frequencies, full spectrum scanning resumes. This cycle repeats until the radio finds a control channel.

Scan Time - Sets the time that full spectrum scanning occurs. You can select time periods between 5 and 31 seconds. The default is 5 seconds.

Failsoft - These parameters program failsoft operation that occurs when there is a controller or other major system failure.

Inactivity Duration - Sets the time the radio must remain inactive (no receive or transmit activity on channel) in the failsoft mode before it tries to leave the failsoft mode and attempt to find a control channel. If you program “0”, the radio does not leave the failsoft mode.

Emergency Blocked - If you check this, the radio user cannot make emergency calls when the radio is in the failsoft mode.

Ring Time

Individual Call Maximum Target Ring - Sets the maximum ring time of the target radio when it receives phone and unit-to-unit calls. When this time expires, the call automatically discontinues. You can program time periods between 61 and 120 seconds. The default is 61 seconds.

Private Call Max Int - Sets the maximum time the initiating radio rings when it places a unit call. This does not include phone calls. Ringing stops if the target radio answers before this timer expires. You can program time periods between 1 and 255 seconds. The default is 30 seconds. If you program “infinite”, ringing continues until the target mobile answers.

Hold Off Time

Int Radio Random Hold Off - When a failure occurs on a site, this sets the delay that occurs before a radio leaves that site and registers on another. It also sets the delay that occurs before a radio returns to a site that has returned to normal operation. A random time is calculated between 0 and the selected time. This timer starts only when the following **Hold Off Delay** expires. You can program time periods between 0 and 60 minutes. The default is ten minutes.

Hold Off Delay - Sets the delay in registration or affiliation that occurs before starting the preceding random hold off time. During this delay, the radio monitors for over-the-air packets. You can program time periods between 5 and 60 seconds. The default is 5 seconds.

Trunking

Display Site Trunking - If you select this, “Site Trunking” displays if the affiliated site loses communication with the zone controller and begins to operate in the site trunking mode. This message displays until the zone controller returns to normal operation.

Alert Site Trunking - If you select this, an alert tone sounds when the radio enters the site trunking mode just described.

Other

Display Options - Select whether anything displays alternately with the selected channel alias or frequency when the radio receives Project 25 group calls.

None - Only the selected channel alias or frequency is displayed.

Both - Both of the following are displayed:

PTT ID - The ID of the mobile placing the call displays. You can program this ID to display for 0.5-7.0 seconds or “infinite”. When you select “infinite”, this ID displays for the entire call and none of the other parameters display. *Available only in 5100 models with Flash code Version 1.9.0 or later and 5300 models with ARM code 1.22.0 or later.*

P25 TG on Rx - The radio displays the alias of the talk group on which the call is being received. You can program this to display for 0.5-7.0 seconds* or “infinite” as just described. *Available only in 5100 models with Flash code Version 1.9.0 or later and 5300 models with ARM code 1.22.0 or later.*

User Group ID - If the ID of the call being received is included in a User Group ID list as described in Page 7-16, the alias of that group displays. You can program this to

display for 0.5-7.0 seconds or “infinite” as just described. *Available only in 5100 models with code 1.12.1/2.2.1/3.2.1 or later and 5300 models with code 1.24.1/2.2.1/ 3.2.1 or later.*

Talkback Scan - When the radio receives a call while it is scanning, this setting determines the talk group of the radio’s response. You can program the radio to respond on the Selected talk group or the received talk group (Active) group if they are not the same. You program **Scan Hold Time** on the **Per System** screen.

Out Of Range Indication - Selects which of the following occur when an out-of-range condition exists:

1. The periodic tone sounds.
2. “Out of Rng” (or “NO SYS”) displays.
3. Both A and B above.
4. Neither A nor B above.

Clear Mode Alert on Secure Rx [2] - When you select this, a beep sounds when the radio receives a Secure (encrypted) call in the Clear mode on a Project 25 trunked channel. If you do not select it, no beep sounds when this occurs.

SECTION

6

Setting-Up Zones and Channels

This section describes how to set-up zones and assign channels to each zone. A zone can include up to 16 channels of any type (conventional analog, Project 25 conventional, SMARTNET/SmartZone, or Project 25 Trunked).

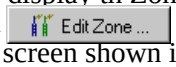
With the 51xx portable/53xx mobile, you can program a maximum of 32 zones for up to 512 channels if you enable the “512 Talkgroups/Channels” option. Refer to Page 3-7. Otherwise, you can program a maximum of 16 zones.

6.1 Setting-Up Zones

This section contains the following information about setting-up zones:

- Setup procedure
- Linking conventional scan lists to zones

6.1.1 Setup Procedure

1 Select the **Zone** tab to display th Zone screen (This screen varies according to the type of system.) Then click 

in the upper left corner of the screen to display the **Zones and Channels** screen shown in Figure 6.1. Another way to do this is to click  in the toolbar.

Figure 6.1 Zones and Channels Screen

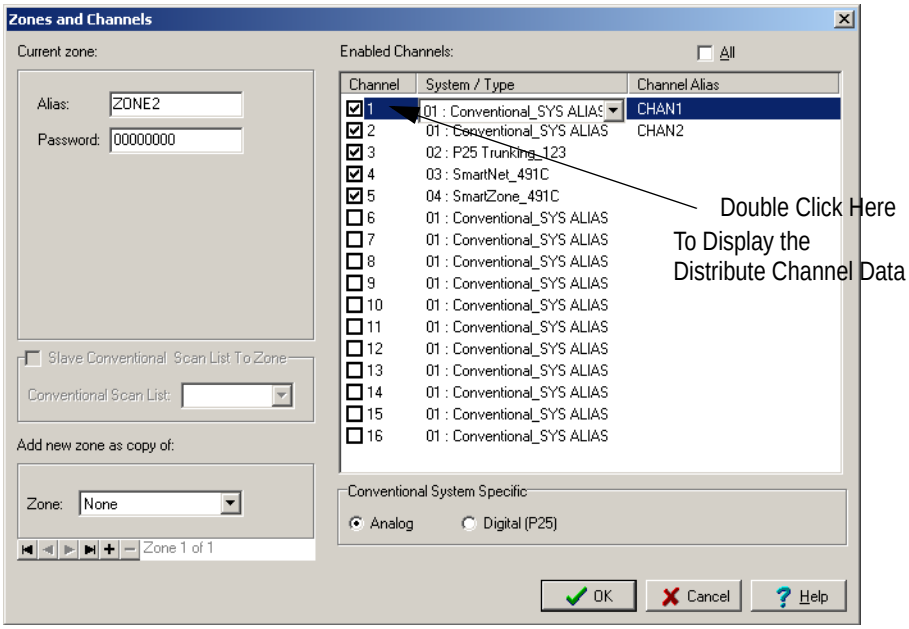
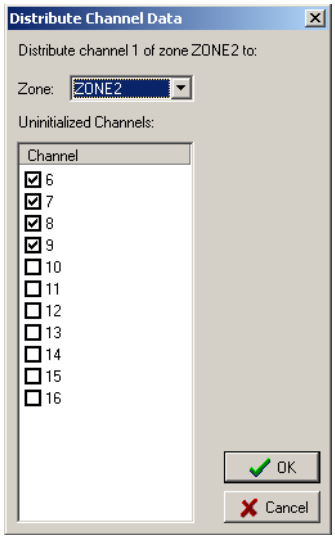


Figure 6.2 Distribute Channel Data



2 To add a new blank zone, select “None” in the Zone drop-down list and then click the + button. To make a copy of a current zone, select the desired zone in the Zone drop-down list instead. To delete the current zone, click the − button.

3 To display the first zone, click ⏮, the last zone ⏭; the previous zone ◀; and the next zone, ▶.

4 Program the alias (identification) that is displays briefly when you select the zone. To do this, enter a maximum of 10 characters in the **Alias** box.

5 You can program a zone password that you must enter to perform keypad programming of the zone. Refer to Section 11. To program this password, enter any eight numbers

from 0-9. If you do not wish to program this password for the zone, simply leave this field all zeros.

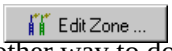
6.1.2 Linking Conventional Scan Lists to Zones

You program conventional systems on the **Per System** screen with a default scan list that all channels in a given system can normally select. Refer to Section 7.1. However, you can select this parameter to link a particular conventional scan list to the zone. This then becomes the default list for all conventional channels in that zone. It overrides the system default list programming. This feature is available only with radio firmware Versions 1.16/2.6/3.6/4.2 (51xx) and 1.28/2.6/3.6/4.2 (53xx) or later.

6.2 Setting Up Channels

Note *When you assign a channel to a zone, the you also select the system of the channel. Therefore, before assigning you assign a channel to a zone, set up all necessary systems as described in Section 1.10.*

Set up channels by assigning them to a zone in the **Zones and Channels** screen shown in Figure 6.1. Proceed as follows to set up any type of channel (Conventional Analog, Conventional Digital, Project 25 Trunked, SMARTNET/SmartZone).

1 Select the **Zone** screen (see Figure 6.3) and then click 

to display the **Zones and Channels** screen shown in Figure 6.1. Another way to do this is to click  in the toolbar.

2 Select the desired zone as described in the preceding section.

3 To add a channel to the displayed zone, check the applicable box in the **Channel** column. To select or deselect all channels in the box, check or uncheck the **All** box.

4 To assign the channel to a system (if applicable), select the drop-down list in the **System/Type** column and select the desired system.

5 For Conventional channels, also select the channel type of each channel by clicking **Analog** or **Digital (Project 25)** in the **Conventional System Specific** box.

6 To copy an enabled channel to unprogrammed channels of the current zone or other zones, double click the shaded area of the channel as shown in Figure 6.1. The **Distribute Channel Data** screen then appears.Select the desired channels from this screen.

7 Repeat the preceding steps until the you have set up desired channels in each zone.

8 To program individual system and channel information, refer to Section 7 (Conventional), Section 8 (SMARTNET/SmartZone), or Section 9 (Project 25 Trunked).

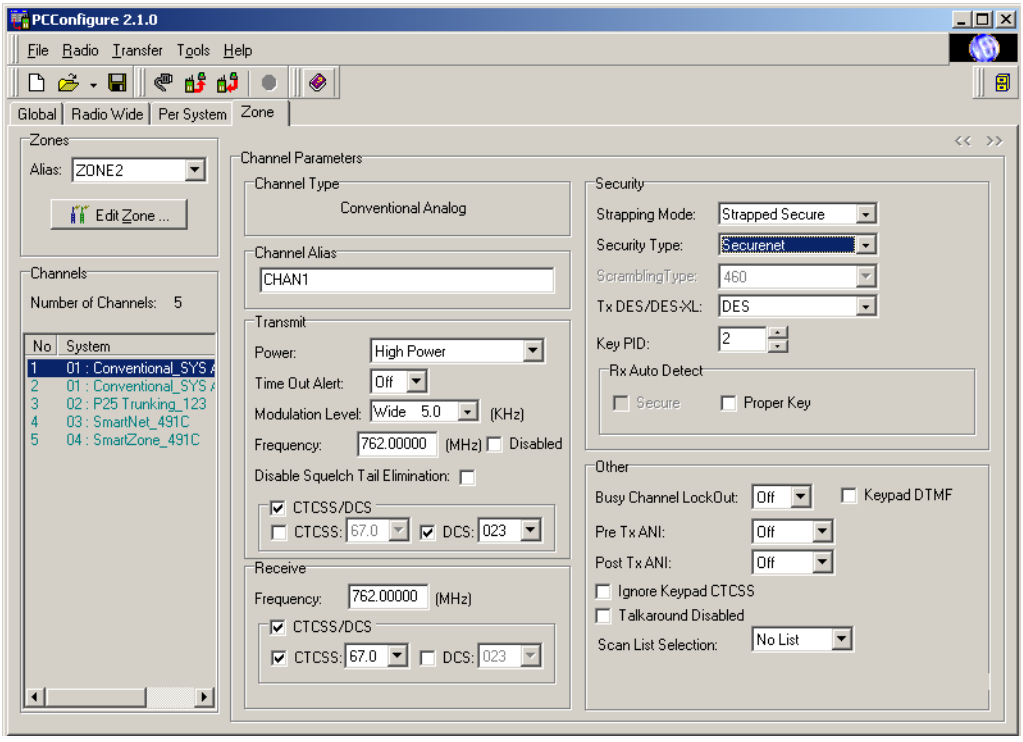
6.3 Conventional Channel Parameters

After the desired channels have been set up as described in Section 6.2, you can program individual channel parameters. Select the **Zone** screen shown in Figure 6.3 and then select the desired Zone using the drop-down list in the “Zones” box. Screens which program individual channel parameters are selected by clicking the channel in the “Channels” box. See Figure 6.3 to set parameters for a Conventional Analog channel and Figure 6.4 to set parameters for a Conventional Digital channel.

6.3.1 Conventional Analog Channel Parameters

The following screen is used to set channel parameters for a Conventional Analog system.

Figure 6.3 Conventional Analog Channel Screen



The parameters displayed when a Conventional Analog channel is selected are as follows. Refer to Section 6.3.2 for information on Conventional Digital (Project 25) channels. SMARTNET/SmartZone and Project 25 Trunked channels are described in Sections 8 and 9.

Channel Type - Indicates the type of channel (Conventional Analog or Conventional Digital) that is currently selected in the “Channels” box.

Channel Alias - Programs the alias (identification) that is displayed when the channel is selected.

Transmit

Power - Fixes the transmit power on the channel for the high or low level or makes it selectable (the high/low power option switch is then required).

Time Out - Enables or disables the transmit time-out timer on the channel. The time-out timer time is programmed on the **Per System** programming screen (see Section 7.1).

Modulation Level - This selects if the channel modulation is wideband (5 kHz), narrowband (2.5 kHz), or NPSPAC (4 kHz). NPSPAC (public safety) modulation applies to 800 MHz models only.

Frequency - Programs the transmit frequency of the channel.

Disabled - Checking this box disables transmitting on the channel so that it is receive only.

CTCSS/DCS - Checking this box enables Call Guard (CTCSS/DCS) squelch control transmission on the channel. If this box is not checked, no code is transmitted and squelch is carrier controlled.

CTCSS - If this box is checked, tone Call Guard (CTCSS) squelch control is used and the desired tone is selected by the drop-down list. NOTE: A CTCSS/DCS code table is shown on Page 17-1.

DCS - If this box is checked, digital Call Guard (DCS) squelch control is used and the desired code is selected by the drop-down list.

Receive

Frequency - Programs the receive frequency of the channel.

CTCSS/DCS - Checking this box enables Call Guard (CTCSS/DCS) squelch control on the channel. If this box is not checked, no squelch control coding is used, and squelch is carrier controlled.

CTCSS - If this box is checked, tone Call Guard (CTCSS) squelch control is used and the desired tone is selected by the drop-down list.

DCS - If this box is checked, digital Call Guard (DCS) squelch control is used and the desired code is selected by the drop-down list.

Security

Note *Voice encryption is an optional feature that requires factory programming and possibly special hardware.*

Strapping Mode

Strapped Clear - All transmissions on the channel occur in the clear (unscrambled) mode.

Strapped Secure - All transmissions occur in the secure (scrambled) mode selected by Security Type.

Switched - The clear or secure status of the channel is selected by the Clear/Secure function switch.

Security Type

Securenet - Selects Motorola SecureNet™ DES type secure communication when either the Strapped Secure or Switched strapping modes are selected.

Scrambling - Selects Transcrypt 460 scrambling when either the Strapped Secure or Switched strapping modes are selected (not available with 5100 and later 5300 models).

Scrambling Type - When the Transcrypt 460 scrambling type is selected, 460 scrambling is always enabled.

Tx DES/DES-XL - When the Motorola SecureNet secure communication is selected, enables either the DES or DES-XL type (with the 51xx, DES-XL is available only in later models equipped with the UCM module).

Key PID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure calls on the channel if applicable.

Rx Auto Detect

With the SecureNet protocol, select “Secure” to enable automatic detection of encrypted receive signals (not available with 5100 models). This may increase the response time of the radio to an incoming signal. Select “Proper Key” to cause the radio to search the available SecureNet keys until it finds a match for the current transmission.

Other

Busy Channel Lockout

Off - Disables this feature.

Noise - Transmitting is disabled if a carrier is detected.

Tone - Transmitting is disabled if an incorrect Call Guard (CTCSS/DCS) tone or code is detected (one not programmed for current channel).

Keypad DTMF - If this box is checked, manual dialing of numbers using the DTMF keypad is allowed.

Pre TX ANI - If “Pre Tx” is selected, a DTMF-coded ID is sent at the beginning of each transmission.

Post TX ANI - If “Post Tx” is selected, a DTMF coded ID is sent at the end of each transmission.

Ignore Keypad CTCSS - Ignore Keypad CTCSS - If this is checked and a CTCSS/DCS code has been selected from the preprogrammed CTCSS/DCS table by the Selective Squelch Code Select feature, it is ignored and the programmed code for the channel is selected instead.

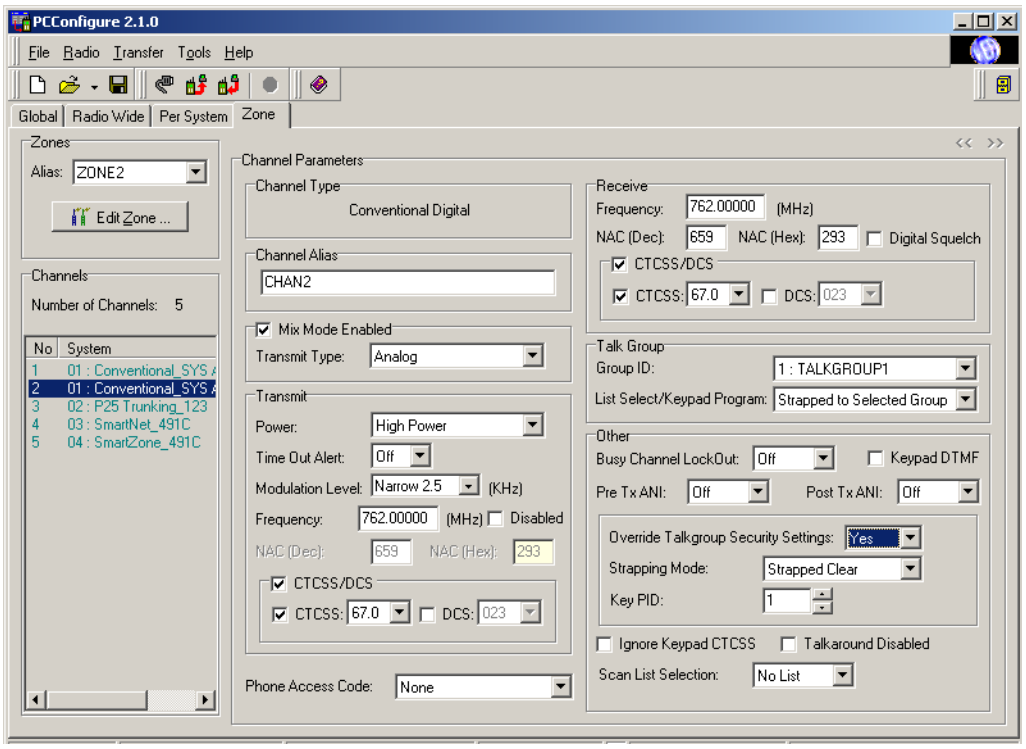
Talkaround Disabled - Set on a per-channel basis: the user has to use the infrastructure if disabled.

6.3.2 Conventional Digital (Project 25) Channel Parameters

After the desired channels have been set up as described in Section 6.2, individual channel parameters can be programmed. Select the **Zone** screen shown in Figure 6.4 and then select the desired Zone using the drop-down list in the “Zones” box. Screens which

program individual channel parameters are selected by clicking the channel in the “Channels” box.

Figure 6.4 Conventional Digital (Project 25) Channel Screen



The parameters displayed when a Conventional Digital channel is selected are as follows. Refer to Section 6.3.1 for information on Conventional Analog channels. SMARTNET/ SmartZone and Project 25 Trunked channels are described in Sections 8 and 9.

Channel Type - Indicates the type of channel (Conventional Analog or Conventional Digital) that is currently selected in the “Channels” box.

Channel Alias - Programs the alias (identification) that is displayed when the channel is selected. Up to ten characters can be programmed.

Mixed Mode Enable - Checking this box selects both analog and digital operation on the current channel.

Mixed analog and digital (Project 25) operation can be programmed on a channel. With mixed mode operation, both types of calls can be received, and the Tx Type determines if NAC or CTCSS/DCS is transmitted. With analog operation, channel modulation, coded squelch, and ANI signaling may require programming similar to that described in Section 6.3.1.

Tx Type - When “Analog” is selected, CTCSS/DCS is transmitted, and when “Digital” is selected, NAC is transmitted.

Transmit

Power - Fixes the transmit power on the channel for the high or low level or makes it selectable (the high/low power function switch is then required).

Time Out - Enables or disables the transmit time-out timer on the channel. The time-out timer time is programmed on the **Per System** programming screen (see Section 7.1).

Modulation Level - If the Mixed Mode and Tx Type = Analog is selected, the modulation level is programmed. This selects if the channel modulation is wideband (5 kHz), narrowband (2.5 kHz), or NPSPAC (4 kHz).

Frequency - Programs the transmit frequency of the channel.

Disabled - Checking this box disables transmitting on the channel so that it is receive only.

NAC - Programs the transmit NAC (Network Access Code). These codes can be 0-4095, and either decimal or hexadecimal numbers can be entered.

CTCSS/DCS - If the Mixed Mode and Tx Type = Analog is selected, the transmit Call Guard (CTCSS/DCS) squelch coding can be programmed (see Section 6.3.1).

CTCSS - Select the desired tone from the drop-down list. NOTE: A CTCSS/DCS code table is shown on Page 17-1.

DCS - Select the desired code from the drop-down list.

Phone Access Code - Selects the Phone Access Code if telephone calls are placed on the channel. The access codes are programmed by the Phone Access Code system list on the **Per System** screen.

Receive

Frequency - Programs the receive frequency of the channel.

NAC - Programs the receive NAC (Network Access Code). These codes can be 0-4095, and either decimal or hexadecimal numbers can be entered. NAC F7E (hex) is interpreted as a standard code.

Digital Squelch - When checked, carrier squelch is enabled which results in all digital traffic, regardless of NAC or talk group ID, being received. This does not program NAC F7E which is used the same as other NAC codes.

CTCSS/DCS - If the Mixed Mode is selected, the receive Call Guard (CTCSS/DCS) squelch coding can be programmed (see Section 6.3.1). Both analog and digital (Project 25) calls can be received in the mixed mode.

CTCSS - Select the desired tone from the drop-down list. NOTE: A CTCSS/DCS code table is shown on Page 17-1.

DCS - Select the desired code from the drop-down list.

Talk Group

Group ID - This selects the Project 25 talk group that is assigned to the channel. The talk group includes the Talk Group ID, talk group alias, secure strapping mode, and encryption key address. Talk Groups are programmed in the **Per System** screen (Section 7.1).

List Select/Keypad Program

Strapped To Selected Group - The talk group on the channel is always the programmed talk group and cannot be changed.

List Selectable - The talk group may be changed using the Digital TG Select function button.

Other

Busy Channel Lockout

Off - Disables this feature.

Noise - Transmitting is disabled if a carrier is detected.

NAC - Transmitting is disabled if an incorrect NAC code is detected (or CTCSS/DCS if mixed mode is enabled). An incorrect code is any code not programmed for the current channel.

Keypad DTMF

If this box is checked, manual dialing of numbers using the DTMF keypad is allowed. This is available in the mixed mode only.

Pre TX ANI - If “Pre Tx” is selected, a DTMF-coded ID is sent at the beginning of each transmission.

Post TX ANI - If “Post Tx” is selected, a DTMF coded ID is sent at the end of each transmission.

Override Talkgroup Security Settings[6] - This allows the encryption strapping mode and key location to be set on a per channel basis instead of just on a per talk group basis. If “Yes” is selected in the drop down menu, the selected strapping mode and key location overrides the talk group programming if applicable (conventional digital channels only).

Strapping Mode

Strapped Clear - All transmissions on the channel occur in the clear (unscrambled) mode.

Strapped Secure - All transmissions occur in the secure (scrambled) mode selected by Security Type.

Switched - The clear or secure status of the channel is selected by the Clear/Secure function switch.

Key PID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure calls on the channel if applicable.

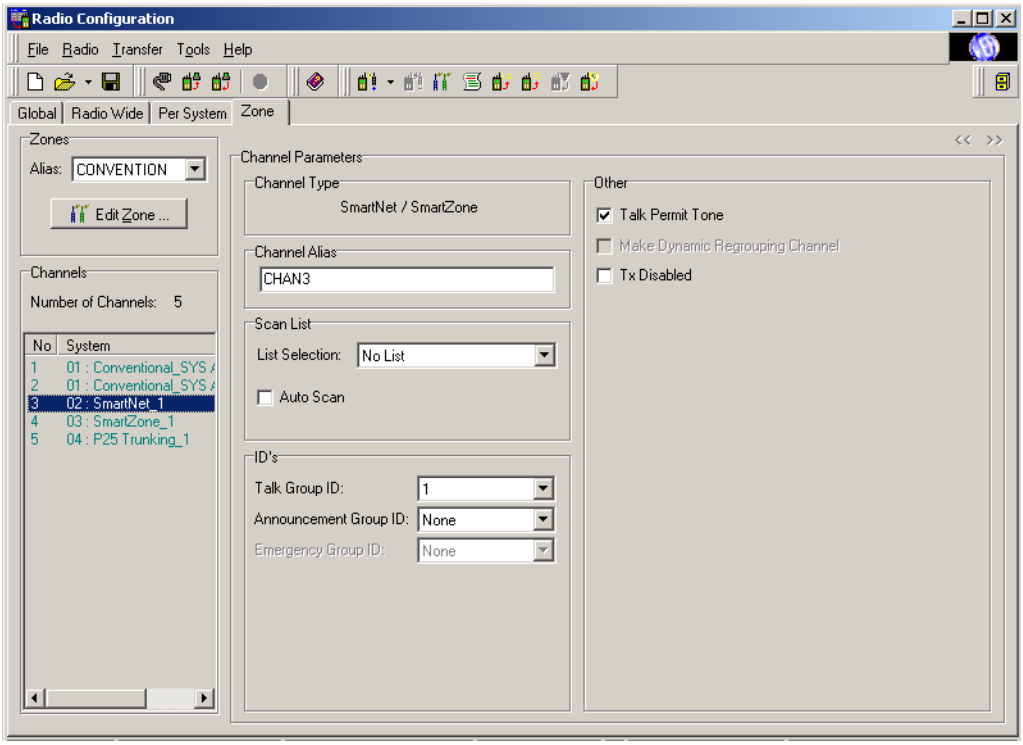
Ignore Keypad CTCSS - If this is checked and a CTCSS/DCS code has been selected from the preprogrammed CTCSS/DCS table by the Selective Squelch Code Select feature, it is ignored and the programmed code for the channel is selected instead.

Talkaround Disabled - Set on a per-channel basis: the user has to use the infrastructure if disabled.

6.4 SMARTNET/SmartZone Channel Parameters

After the desired channels have been set up as described in Section 6.2, you may program individual channel parameters. Select the **Zone** screen shown in Figure 6.5 and then select the desired Zone using the drop-down list in the “Zones” box. Select screens to program individual channel parameters by clicking the channel in the “Channels” box.

Figure 6.5 SMARTNET/SmartZone Zone screen



The parameters displayed when a SMARTNET/SmartZone channel is selected are as follows. Conventional and Project 25 Trunked channels are described in Sections 6.

Channel Type - Indicates the type of channel that is currently selected in the “Channels” box.

Channel Alias - Programs the alias (identification) that is displayed when the channel is selected. Up to ten characters can be programmed.

Scan List - Selects the priority (standard) scan list selected by the channel. If “No List” is selected, scanning is not selectable on that channel.

Auto Scan - When this is checked, the radio automatically begins scanning the scan list associated with the channel whenever the channel is selected. When it is not checked, scanning must be started manually by the Scan option switch.

IDs

Operation with the various combinations of Talk Groups (TGs) and Announcement Groups (AGs) is as follows:

Talk Group Only - Transmit on TG, receive on TG.

Announcement Group ID - Transmit on AG, receive on all TGs in AG.

Talk and Announcement Groups - Transmit on TG and receive on TG plus AG but not the TGs assigned to the AG.

Tip *You can enter these IDs in either decimal or hexadecimal format as described in Section 1.9.4.*

Talk Group ID - Selects the talk group selected by that channel. Program Talk Groups by selecting "Talk Group List" on the **Per System** screen (see Section 8.2.6 or Section 9.3.6).

Announcement Group ID - Selects the receive-only announcement group selected by that channel. Program Announcement Groups by selecting "Announcement Group List" on the **Per System** screen (see Section 8.2.7 or Section 9.3.7).

Emergency Group ID - Selects the talk group used for emergency calls on the channel. If no Emergency Group is selected, the emergency is transmitted on the selected (tactical) talk group.

Other

Talk Permit Tone - When this feature is checked, a short tone sounds after a request for a group call has been approved by the main controller. This indicates that speaking can begin. When not checked, no audio feedback is used to indicate when speaking can begin.

Make Dynamic Regrouping Channel - Checking this box designates the channel as the dynamic regrouping channel. The talk group is then programmed over the air, so the Talk Group ID and Announcement Group ID are not programmable.

Dynamic Regrouping must be enabled on the System screen to program a dynamic regrouping channel. The dynamic talk group does not need to be a programmed group.

A Cancel Dynamic Regrouping[2] option button or menu parameter (51xx only) can now be programmed (see Sections 5.2 and 5.3). This allows the user to reselect the previous talk group if desired.

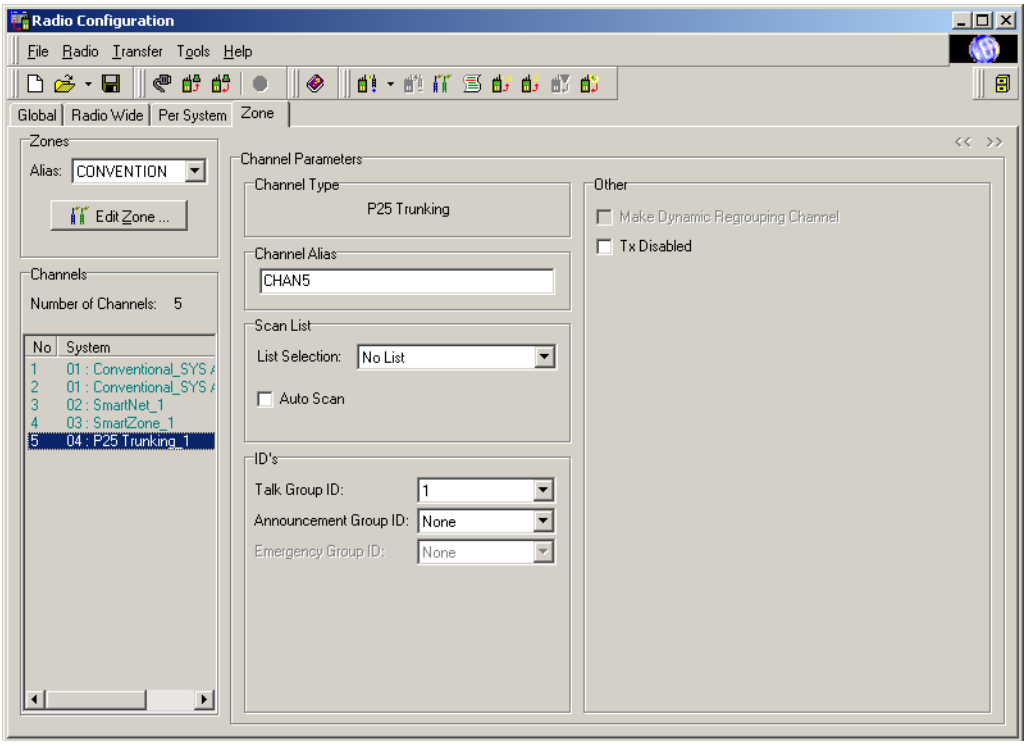
Transmit Disabled[1] - When this feature is checked, transmitting is disabled on the channel, and it can be used for monitoring only.

6.5 Project 25 Trunked Channel Parameters

After you set-up your desired channels as described in Section 6.2, you can program individual channel parameters. Select the **Zone** screen shown in Figure 6.6, then select the

desired zone using the pull-down menu in the **Zones** box. Select screens that program individual channel parameters by clicking the desired channels in the **Channels** box.

Figure 6.6 Project 25 Trunked Channel Zone Screen



The parameters you display when you select a Project 25 Trunking channel are as follows.

Channel Parameters

Channel Type - Indicates the type of channel (Conventional Analog, Conventional Digital, SMARTNET/SmartZone, Project 25 Trunked) that is currently selected in the “Channels” box.

Channel Alias - Programs the alias (identification) that displays when the radio user selects the channel. You can program a maximum of ten characters.

Scan List - Selects the priority (standard) scan list selected by the channel. If you select “No List”, the radio user cannot select scanning on that channel.

> **Auto Scan -** When you check this, the radio automatically begins scanning the scan list associated with the channel whenever the radio user selects the channel. When it you do not check this, the radio user must start scanning manually with the Scan option switch.

ID’s - The possible combinations of Talk Groups (TGs) and Announcement Groups (AGs) provide the following operation:

- **Talk Group Only -** Transmit on TG, receive on TG.
- **Announcement Group Only -** Transmit on AG, receive on all TGs in AG.

- **Talk and Announcement Groups -** Transmit on TG and receive on TG plus AG but not the TGs assigned to the AG.

Note *You can enter these IDs in either the decimal or hexadecimal format as described in Section 1.9.4.*

Talk Group ID - Selects the talk group selected by that channel. Program talk groups selecting “Talk Group List” on the **Per System** screen. Refer to Section 9.3.6.

Announcement Group ID - Selects the announcement group selected by that channel. Program announcement groups by selecting “Announcement Group List” on the **Per System** screen. Refer to Section 9.3.7.

Emergency Group ID - Selects the talk group used for emergency calls on the channel. If you do not select an emergency group, the emergency signal transmits on the selected (tactical) talk group.

Other

Make a Dynamic Regrouping Channel - When you check this box, you designate the channel as the dynamic regrouping channel. The system then programs the talk group over the air, so the talk group ID and announcement group ID are not programmable.

You must enable **Dynamic Regrouping** on the **Per System** screen to program a dynamic regrouping channel. The dynamic talk group does not need to be a programmed group.

Tx Disabled[1] **-** When you check this box, you disable transmitting on the channel. You can then use the channel for monitoring only.

SECTION

7

Conventional Systems

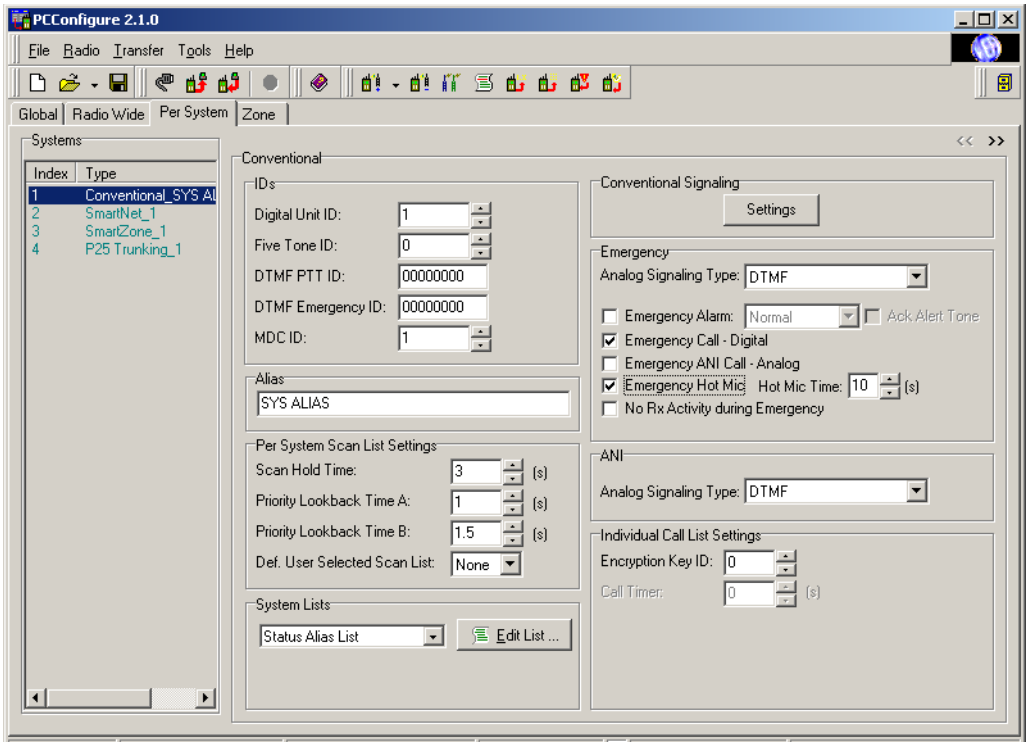
Two screens contain the interface to program conventional system and channel parameters. This section contains descriptions of the parameters found on these screens. Figures 7.1 show the **Per System** tab discussed in this section.

Some parameters described in this section apply only to certain revision levels. In this section, index numbers in superscript appear next to the names of such features (for example, "**Example Feature**[9]"). Table 1.1 shows the relationship between these numbers and the revision levels they represent.

7.1 Individual Conventional System Parameters

You can program Individual system parameters using the **Per System** screen shown in Figure 7.1. These parameters can be programmed after the desired systems have been set up as described in Section 1.10.

Figure 7.1 Conventional System screen



There are also radio wide parameters that are programmed by the **Radio Wide** screen as described in Section 5.4. For information on programming individual SMARTNET/ SmartZone and Project 25 Trunked system parameters, refer to Sections 8.1 and 9.1. The parameters in the individual Conventional System screen are as follows:

IDs

Digital Unit ID - This number identifies the radio when it operates on a Project 25 (digital) channel. Each radio must have a different ID, and it must be between 1 and 16,777,216.

Five Tone ID - Program for a RTT signaling or a pre and post ANI. Consisting of four digits from 0-9. Radio does not decode the five tone ID, only consoles will be able to decode the RTT or ANI signaling.

DTMF PTT ID - Channels programmed for pre- or post-transmit ANI use the PTT ID if the system is programmed for the DTMF analog signaling type. Refer to Section 7.1. This ID consists of eight digits from 0-9. Program the ANI function on the channel screen as described in Sections 7.3 and 7.4.

DTMF Emergency ID - This sets the ANI number that transmits if you selected the “Emergency ANI Call” or “Emergency Alarm” analog emergency features on the conventional **Per System** screen. Refer to Section 7.1.

MDC ID - 51xx portable models that have Version 4.x firmware support the ANI and Emergency Alert features of the Motorola MDC1200 data protocol. This ID, with values from 0 to 65535, transmits if you select the MDC Analog Signal Type on the Conventional **Per System** screen, and if you program ANI or Emergency Alert. You program Emergency Alert and ANI parameters on the **Per System** screen, and you enable ANI on the channel screen.

Alias - Programs the alias that is displayed for the system in the left pane after the system type. This alias is not displayed by the radio.

Per System Scan List Settings - These parameters set various timers that control priority scanning when a channel assigned to the system is selected.

Scan Hold Time - Sets the delay that occurs before scanning resumes after a signal is no longer received. Times of 0 -7.5 seconds can be programmed.

Priority Lookback Time A - This time determines how often the priority channel is checked for activity. Times of 0.25-4.00 seconds in 0.25-second steps can be programmed.

Priority Lookback Time B - This time determines how often the priority channel is checked once an incorrect Call Guard (CTCSS/DCS) or NAC code is detected. Since it takes much longer to detect an incorrect Call Guard signal than a carrier, this time should be relatively long to prevent the interruptions from making a message difficult to understand. Times of 0.5-8.0 seconds can be programmed in 0.5-second steps.

Default User Selected Scan List - Selects the scan list that is normally always selected on power up. A different scan list can be temporarily selected using the Scan List option switch or menu parameter (if applicable). This setting is overridden if a scan list is slaved to a particular zone on the **Zone** setup screen (see Section 6).

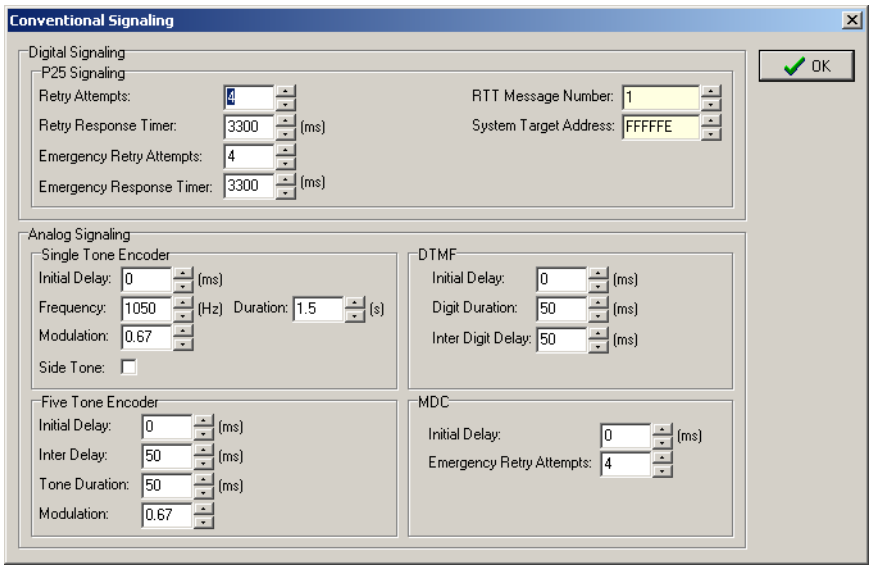
System Lists - Refer to Page 7-10 for information on these lists.

Conventional Signaling

Select the Settings Button 

to display the Conventional Signaling screen, Figure 7.2. This screen provides parameters and settings for Conventional digital (P25) and analog signaling.

Figure 7.2 Conventional Signaling screen



Two parameters (upper right area of the screen may be set. The remainder are for information only.

RTT Message Number - This message identiier will to be selected by the user to represent an RTT which is defineable in the portable and mobile radio as well as the dispatch console system.

System Target Address - This address indicates that the message is not sent to a particular unit, but to the system infrastructure.

The other information provided on this screen includes:

P25

Retry Attempts - In the event that an RTT is not received by the system, the radio shall retransmit the RTT message until a successful ACK_RSP_FNE message is received or the maximum number of retransmisions is reached.

Retry Response Timer - If the radio does not receive the ACK_RSP_FNE message, this is the delay between the retry attempts.

Emergency Retry Attempts - In the event that an emergency alarm is not received by the system, the radio shall retransmit the emergency alarm message until a successful ACK_RSP_FNE message is received or the maximum number of retransmisions is reached.

Emergency Response Timer - If the radio does not receive the emergency alarm message, this is the delay between the retry attempts.

Analog Signaling

Single Tone Encoder

Initial Delay - This the delay before the actual signal is sent.

Frequency - The frequency of the tone being sent.

Duration - The amount of time the frequency is transmitted.

Modulation - An adjustable modulation value. Minimum is .5 and maximum is .8.

Side tone - Enables a side tone when transmitting a single tone encoder.

Five Tone Encoder

Initial Delay - The delay before the actual signal is sent.

Inter Delay - The delay between each of the five tones being sent.

Tone Duration - The transmitted time duration of each tone.

Modulation - An adjustable modulation value. Minimum is .5 and maximum is .8.

DTMF

Initial Delay - The delay before the actual signal is sent.

Digit Duration - The duration of each of the tones being sent

Inter Digit Delay - The delay between each of the tones being sent.

MDC

Initial Delay - The delay before the actual signal is sent.

Emergency Retry Attempts - In the event that an emergency alarm is not received by the system, the radio shall retransmit the emergency alarm message until a successful ACK_RSP_FNE message is received or the maximum number of retransmisions is reached.

Emergency (Conventional)[13]

Analog Signaling Type - Selects the signaling type (DTMF or MDC) used for emergency calls and ANI on analog channels on the system. MDC selects the MDC1200 Motorola signaling protocol. The DTMF and MDC IDs are programmed on the **Radio Wide** Conventional screen (see Section 5.4), emergency and some ANI information is programmed on this screen, and ANI is enabled on the analog channel screen (see Section 6.3.1).

Note *MDC is available only with 51xx portable models that have Version 4.x firmware.*

Emergency Alarm - If this box is checked, emergency alarms are sent by pressing the Emergency option switch. In the Project 25 mode, an emergency alarm is a special Project 25 data transmission. In the analog mode, it is a DTMF or MDC Emergency ID that is sent (see preceding Analog Signaling Type). This ID is programmed on the Conventional **Radio Wide** screen described in Section 5.4.

Normal/Silent - When “Normal” is selected and an emergency alarm is sent, the red transmit indicator lights, an emergency tone sounds, and EMERGNCY flashes in the display. EMERGNCY continues to flash until power is cycled, the channel is changed, or the Emergency switch is pressed and held. If “Silent” is programmed, none of these indications occur.

Acknowledge Alert Tone - If selected, an alert tone sounds when the emergency alarm is acknowledged by the dispatcher (DTMF only).

Emergency Call - Digital - Enables Emergency Calls on conventional Project 25 channels. When the Emergency button and then the PTT switch are pressed, an emergency call is transmitted. To exit the emergency mode, cycle power or press and hold[11] the Emergency switch.

Emergency ANI Call - Analog - Enables Emergency Calls on conventional analog channels. When the Emergency button and then the PTT switch are pressed, the Emergency DTMF code is sent every transmission (in place of the DTMF PTT ID if applicable). To exit the emergency mode, cycle power or press and hold[11] the Emergency switch.

Emergency Hot Mic - When this box is checked and an emergency call is sent by pressing the Emergency switch, automatic transmitting occurs with the microphone audio unmuted (without user intervention) for the time specified by the following Emergency Hot Mic Time. If it is not checked or if an emergency call is not selected, automatic transmissions do not occur. This feature is initiated only by the first press of the Emergency switch. Subsequent presses do not trigger automatic transmissions. To reset this function, power must be cycled.

Emergency Hot Mic Time - Defines the period during which automatic transmissions occur. Times of 10-120 seconds in ten-second steps can be selected.

No Rx Activity During Emergency[12] - When this box is checked, the following receive indications are disabled in the emergency mode: receive audio, receive LED, receive icons.

ANI

Analog Signaling Type - Selects the signaling type (DTMF or MDC) used for emergency calls and ANI on analog channels on the system. MDC selects the MDC1200 Motorola signaling protocol. The DTMF and MDC IDs are programmed on the **Radio Wide** Conventional screen (see Section 5.4), emergency and some ANI information is programmed on this screen, and ANI is enabled on the analog channel screen (see Section 6.3.1).

Note *MDC is available only with 51xx portable models that have Version 4.x firmware.*

Note *The type of ANI (DTMF or MDC) is selected by the preceding Analog Signaling Type. DTMF PTT and MDC IDs are programmed on the **Radio Wide** Conventional screen, and pre and post ANI is enabled on the analog channel screen.*

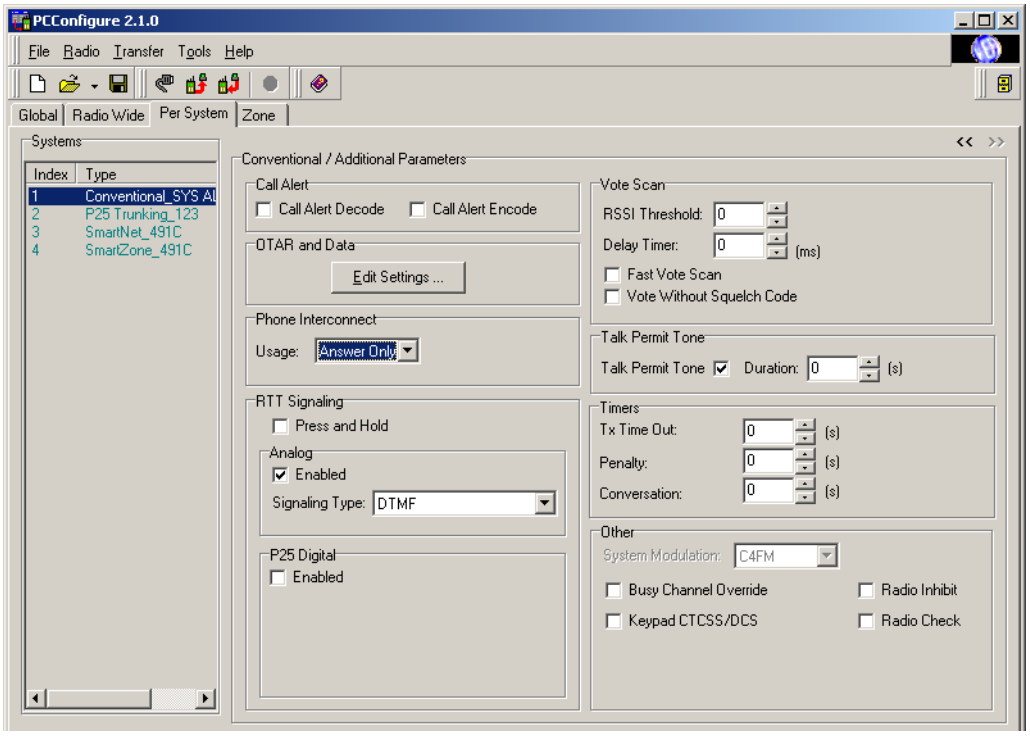
Individual (Unit) Call List Settings (Project 25 Only)

Encryption Key ID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure individual calls on the system if applicable.

Call Timer - Used with 5300, Rev 4, logic board only to set the maximum time the radio remains in the individual call mode after an individual call is received. A response must be made before this timer expires. With Rev 6 and later boards and other radios, the call is ended by pressing the Call button.

An additional conventional system screen is opened/closed by clicking the << >> buttons in the upper right corner of the screen. The following additional parameters are then displayed:

Figure 7.3 Conventional System Page 2 screen description



Call Alert (Project 25 Only)[13]

Call Alert Decode - If selected, enables call alert messages (pages) to be received.

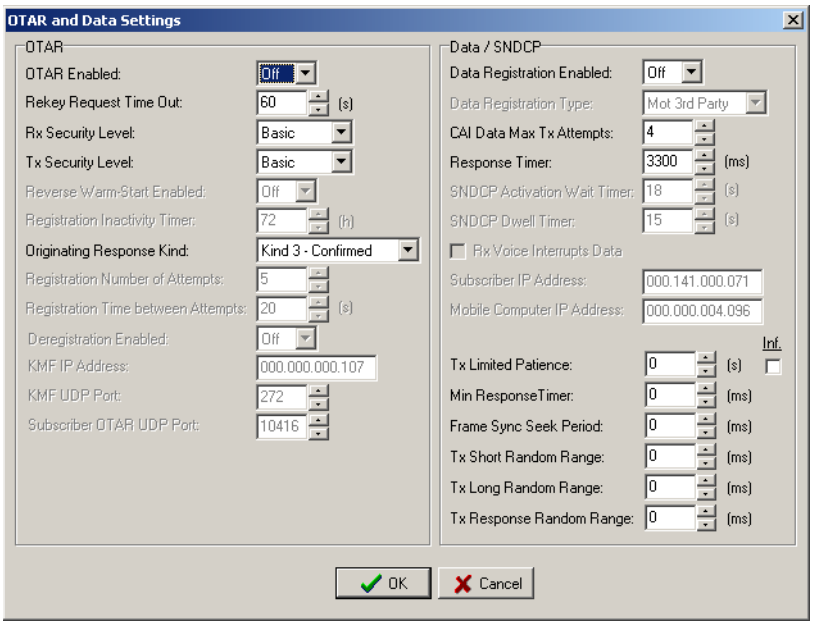
Call Alert Encode - If selected, enables call alert messages (pages) to be sent.

OTAR and Data Settings

Tip *You must select the SLN (CKR) key management mode on Page 2 of the **Global** screen to select the OTAR and Data parameters which follow.*

Clicking the Edit Settings ... button displays the following screen which programs various OTAR and Project 25 data parameters:

Figure 7.4 OTAR and Data Settings screen



OTAR

OTAR Enabled - Select “On” to enable OTAR (Over-the-Air Rekeying) of encryption keys. Select “Off” to disable this feature.

Rekey Request Time Out[11] - When rekeying is initiated by the radio (OTAR Rekey Request message sent), this setting determines how long the radio waits for a response from the Key Management Facility (KMF). Times of 20-180 seconds can be programmed.

Rx Security Level[12] - When Enhanced is selected, only encrypted and authenticated Key Management Messages (KMMs) from the KMF are accepted (except for warm-start, which is authenticated only). If Basic is selected, any KMM is accepted that is in a format allowed by the OTAR standard.

Tx Security Level[12] - When Enhanced is selected, all OTAR procedures originating from the radio are encrypted and authenticated. If they cannot be encrypted and authenticated, the KMM will not be sent. When Basic is selected, the radio always sends KMMs in the clear (if the OTAR standard allows them to be unencrypted and unauthenticated).

Originating Response Kind[12] - Selects if a response is required from the KMF to outgoing messages. If “Kind 1-Unconfirmed” is selected, no response is requested, and if “Kind 3-Confirmed” is selected, and immediate response is requested.

Data/SNDCP (Simple Network Data Control Protocol)

Data Registration Enabled - Select “On” if OTAR is used. The radio then registers with the data system on a channel change (Project 25 channels only)

CAI Data Max Tx Attempts[12] - Selects the maximum number of times the radio attempts to send a Common Air Interface (CAI) data packet transmission. Retrys continue until it receives an acknowledgement confirming the successful receipt of transmission, or until the selected amount of transmit attempts is reached.

Response Timer[12] - Selects the amount of time the radio waits for an acknowledgement that a CAI transmission is successful before resending.

Phone Interconnect (Project 25 Only)[10]

Note *Project 25 phone calling is available on conventional channels only with 5100 portables with firmware 1.16/2.6/3.6/4.2 or later and 5300 mobiles with firmware 1.28/2.6/3.6/4.2 or later.*

Usage

Disabled - Phone calls cannot be placed or received.

Answer Only - Phone calls can be received but not placed.

List Only - Phone calls can be placed and received, and numbers can be recalled from a preprogrammed list only.

Unlimited - Private calls can be placed and received, and numbers can be recalled from a preprogrammed list or dialed using a keypad. With 53xx radios (firmware Version 1.28/2.6/3.6/4.2 or later only), this mode is supported only when the HHC control unit is used. Standard 53xx front and remote models do not support number dialing.

Note *To enter this mode, press the Phone key and hold until a tone sounds.*

RTT Signaling - Request to Talk (RTT) is used to alert the OCC operator that a unit is requesting to speak with the operator. In some cases Automatic Number Identification (ANI) is utilized to permit OCC operator identification of unit calling. Each base, mobile and portable radio transmits an encoded signal which is decoded into a unit identification and is displayed at the operator's console position. Priority capabilities permit a member to signal an emergency condition to the commenter by pushing one button.

Press and Hold - The time it takes to activate RTT Signaling.

Analog

Enabled - Enabled if a conventional analog channel.

Signaling Type - DTMF, MDC 1200, Single Tone Encoder, Five Tone Encoder.

P25 Digital

Enabled - Enabled if a digital channel.

Vote Scan - This option must be purchased.

RSSI Threshold - Sets the Receive Signal Strength Indicator (RSSI) levels that determine when searching for and switching to another site occurs.

Delay Timer - A delay that starts once a valid RF signal is received. After the delay timer has elapsed, an RSSI measurement is made.

Fast Vote Scan - A feature that is selected and if the signal strength level for the current repeater is above the RSSI Threshold setting, no additonal voting will occur and the current repeater will be used.

Vote Without Squelch Code - If enabled, the CTSS/DCS setting will be ignored when determing which repeater to used.

Talk Permit Tone - An audible tone alerting the user that it is OK to talk.

Duration - The amount of time that the tone sounds.

Timers

Tx Time-Out - This timer limits the length of individual transmissions. Times up to 3 minutes, 45 seconds can be programmed in 15-second steps.

Penalty - This timer disables transmitting after the time-out timer disables the transmitter. Times up to 3 minutes, 45 seconds can be programmed in 15-second steps.

Conversation - This timer limits the total length of a conversation. Times up to 7.5 minutes can be programmed in 0.5-minute steps.

Other

System Modulation - Reserved for future use.

Busy Channel Override - If selected, the busy channel lockout feature can be overridden by quickly releasing and then pressing the PTT switch.

Keypad CTCSS/DCS (51xx Only) - If selected, a code for the selected channel can be directly selected from the programmed CTCSS/DCS/NAC list using the keypad. For example, pressing the "3" key selects code number 3 from the table. No other functions can then be assigned to the keys. If this is not selected, these codes can be selected only by the option button or menu parameter for that function.

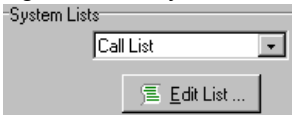
Radio Inhibit (Project 25 only)[13] - If selected, the dispatcher can send a command which disables the radio.

Radio Check (Project 25 only)[13] - If selected, the dispatcher can send a message requesting a response from the radio (to check if it is in operation, for example).

7.2 Conventional System Lists

The various conventional system lists are programmed by selecting them in the System Lists drop-down list on the Conventional **Per System** screen shown Figure 7.1 and then clicking the Edit List button. Descriptions of the various lists and the information they program follow. Figure 7.5 shows the drop-down Systems List

Figure 7.5 System Lists drop-down list



The following system lists may be selected:

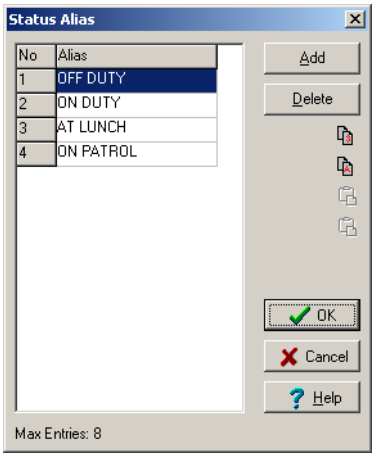
- Status Alias List (Project 25 Only)
- Message Alias List (Project 25 Only)
- Call List (Project 25 Only)
- Talk Group List (Project 25 Only)
- Priority Scan List

- CTCSS/DCS/NAC List
- User Group ID List* (Project 25 Only)
- Phone Access Code List (Project 25 Only)
- Phone List (Project 25 Only)

7.2.1 Status Alias List (Project 25 Only)[13]

The Status Alias List screen which follows programs the alias for each of up to eight status conditions that can be sent. The meaning of each status number is defined by the system manager.

Figure 7.6 Status Alias List screen



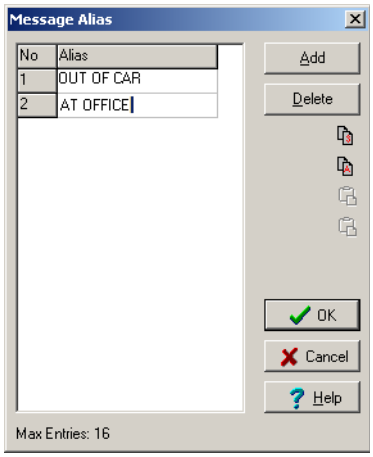
To display this screen, on the Conventional **Per System** screen, select Status Alias List in the drop-down list and then click the Edit List ... button (see Figure 8.1).

To add an alias, click the Add button, and to delete an alias, simply select it and click the Delete button. To edit an alias, select it and change it as desired. Up to ten characters can be entered that identify the status. This identification is displayed when the user selects a status condition.

7.2.2 Message Alias List (Project 25 Only)[13]

The Message Alias List screen shown in Figure 7.7 associates an alias (name) with each message number. The meaning of each message number is defined by the system manager.

Figure 7.7 Message Alias List screen



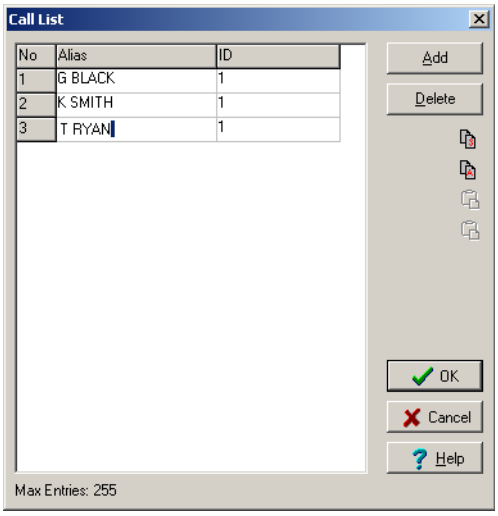
To display this screen, on the Conventional **Per System** screen, select Message Alias List in the drop-down list and then click the Edit List ... button (see Figure 8.1).

To add an alias, click the Add button, and to delete an alias, simply select it and click the Delete button. To edit an alias, select it and change it as desired. Up to ten characters can be entered that identify the status. This identification is displayed when the user selects a message.

7.2.3 Call List (Project 25 Only)

This Call List screen which follows sets up the IDs used to place individual calls on conventional digital (Project 25) channels. This list is not used with conventional analog channels.

Figure 7.8 Call List screen



To display this screen, on the Conventional **Per System** screen, select Call List in the drop-down list and click the Edit List ... button (see Figure 8.1).

To add a call, click the Add button, and to delete an call, simply select it and click the Delete button. To edit an Alias or ID, select it and enter the desired information as follows:

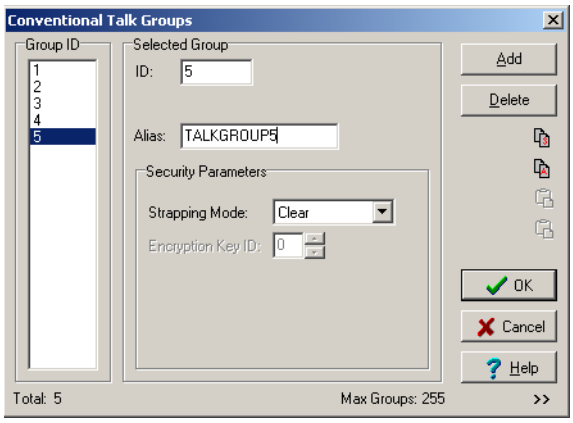
Alias - Up to ten characters can be entered to identify the user being called. This identification and the ID are alternately displayed when the call is selected by the user. Only uppercase letters can be entered, so lowercase letters are automatically converted to uppercase by the program.

ID - This is the ID of the radio being called. Valid entries are 0 - 16,777,216. When receiving a call from a unit with an ID entered on the list, the alias is displayed on the radio instead of the numeric ID.

7.2.4 Talk Group List (Project 25 Only)

The Talk Group screen shown in Figure 7.9sets up the Talk Groups used to place group calls on conventional digital (Project 25) channels. Talk groups are not used with conventional analog channels. Talk groups are assigned to channels on the channel programming screen described in Section 6.5.

Figure 7.9 Talk Group screen



To display this screen, on the Conventional **Per System** screen, select Talk Group List in the drop-down list and then click the Edit List ... button (see Figure 8.1).

To add a talk group, click the Add button, and to delete an talk group, simply select it and click the Delete button. To edit an ID or Alias, select it and enter the desired information as follows:

ID - Group IDs can be any number from 0-65535. Group IDs can be entered as decimal or hexadecimal numbers depending on which mode is selected.

Alias - The alias is the identification that is displayed when the Talk Group is selected, and up to 10 characters can be entered. This drop-down list selects the Talk Group to be edited if applicable.

Security Parameters

Clear - All transmissions on the group occur in the clear (unscrambled) mode.

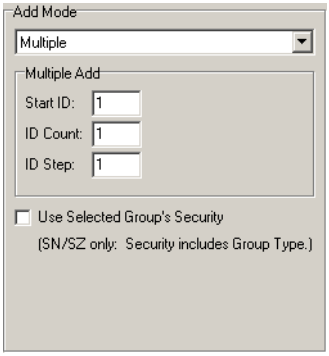
Secure - All transmissions occur in the secure (scrambled) mode.

Switched - The clear or secure status of the group is selected by the Clear/Secure option switch.

Encryption Key ID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure calls on the group if applicable.

Add Mode - To add an entire block of talk group IDs or a specific ID, click the arrow button >> in the lower right corner of the screen and the Talk Group screen is expanded and the following panel is displayed:

Figure 7.10 Add Mode screen



Add Mode Drop Down List - “Single” adds the next available ID similar to the preceding “Add” button. “Multiple” adds a block of IDs as follows. To initiate the selected add operation, click the preceding “Add” button. If the specified ID range results in duplicate IDs, an error message is displayed and no IDs are added.

Start ID - Specifies the starting ID of the block.

ID Count - Specifies the number of IDs to be added.

ID Step - Specifies if consecutive IDs are added or some other step rate is used.

For example, if Start ID =10, ID Count = 5, and ID Step = 10, the IDs added are 10, 20, 30, 40 and 50.

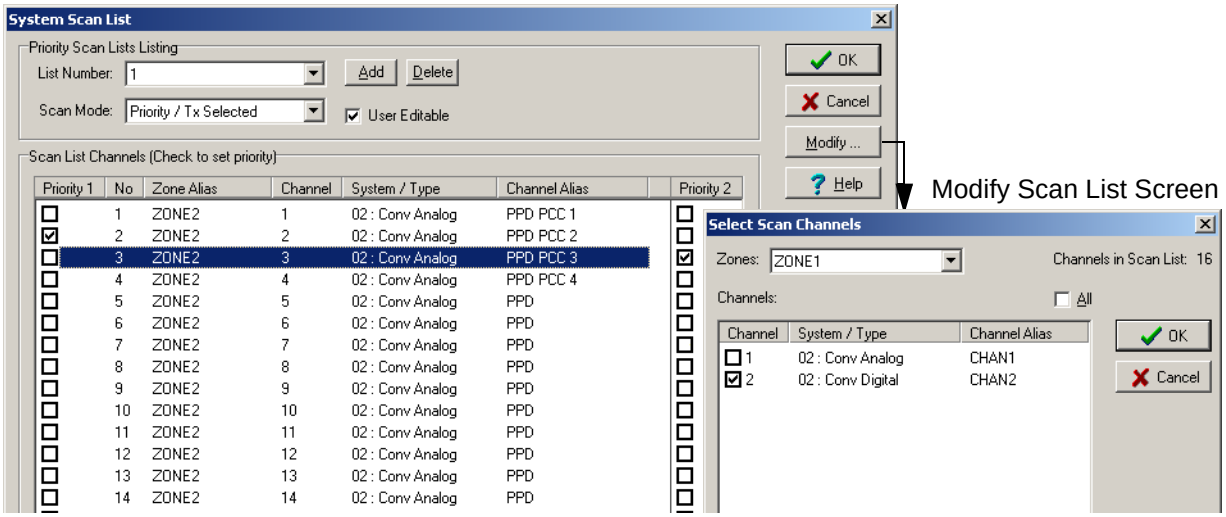
Use Selected Group’s Security - When selected, the added groups are automatically programmed with the Strapping Mode and Encryption Key ID of the selected group.

7.2.5 Priority Scan List

Note *It may be necessary to define specific channel parameters before programming the conventional scan lists as follows (see Section 6.3.1).*

Figure 7.11 Priority (Standard) Scan List Programming Screens

Edit Scan List Screen



This displays the Priority (Standard) Scan List screen shown in Figure 7.11. This screen programs the priority scan lists that are selected on the system.

List Number - This drop-down list selects which of the scan lists to program. Click the "Add" button to add a scan list and "Delete" to delete a scan list.

User Editable - If this box is checked, user editing of the scan list is allowed. The Scan Edit function switch is then required. User editing can be enabled or disabled on each scan list.

Note *With the 51xx and 53xx, Priority 1 and 2 channels can be programmed. The Priority 1 channel is sampled while listening to a call on the Priority 2 channel but not vice versa.*

Scan Mode - Sets the channel on which transmissions occur when the PTT switch is pressed while scanning. A different mode can be programmed for each scan list. In addition, it selects if priority sampling is used and also the type of priority channel. The following modes are available:

No Priority - Priority sampling does not occur (all channels are scanned in sequence). The radio transmits on the selected channel.

Priority/Tx Selected - Priority sampling occurs and the priority channel(s) are those programmed in the selected scan list. The radio transmits on the selected channel.

Priority/Tx Priority (1) - Priority sampling occurs and the priority channel(s) are programmed in the selected scan list. The radio transmits on the priority (1) channel.

Priority (1) on Sel Chan - The priority (1) channel is always the selected channel. The radio transmits on the selected channel.

Talkback - No priority sampling occurs. The radio transmits on the channel of a call while scanning is halted. Then when scanning resumes, it transmits on the selected channel.

If the "Priority/Tx Priority" or "Priority/Tx Selected" mode is programmed, you must choose the priority channel for the scan list. To do this, click the box next to the desired

channel. Select the Priority 1 channel in the Priority 1 column and if a Priority 2 channel is also used, select it in the Priority 2 column.

Modify ... (Modify) - To add or delete channels from a list, click this button to display the Modify Scan List screen shown in the preceding illustration. Select the channels from each zone that are to be included in the selected list (up to 16 channels maximum).

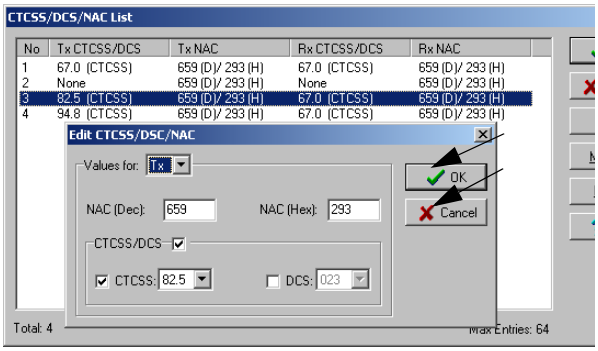
OK - (OK) - Clicking this button closes the screen and saves the changes.

Cancel (Cancel) - Clicking this button closes the screen without saving any changes.

7.2.6 CTCSS/DCS/NAC List

Use Figure 7.12 to program the list of CTCSS/DCS (Call Guard) and NAC (Project 25) codes that can be selected if the Selective Squelch option switch is programmed or the Keypad CTCSS/DCS function which follows is programmed.

Figure 7.12 CTCSS/DCS/NAC List

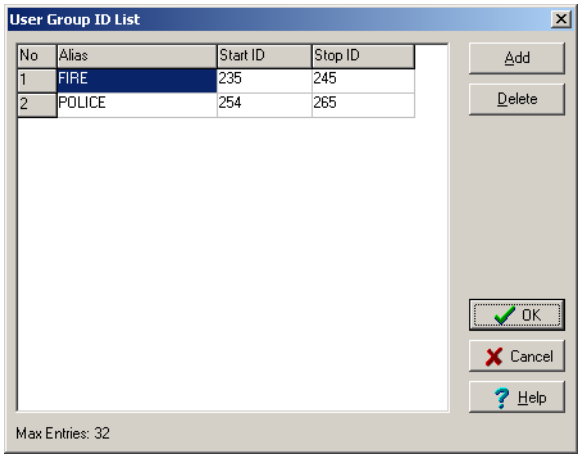


To add a code to the list, click the Add button and an additional screen like the one shown above is displayed. Different codes can be programmed for the transmit and receive modes by selecting the mode in the drop down list. In addition, carrier squelch can be programmed instead of a CTCSS/DCS code by unchecking the CTCSS/DCS box. To change a code, select it and then click the Modify button. Up to 64 different codes can be programmed. A CTCSS/DCS code table is shown on Page 17-1.

7.2.7 User Group ID List[13] (Project 25 Only)

Use the User Group ID List screen shown in Figure 7.13 to program aliases that can be displayed if a call is received on a talk group ID within the programmed block. For example, with the following screen, if a group call is received on group IDs 234-264, the alias “Fire” can be displayed. The display of this alias is controlled by the “User Group ID” parameter on the **Radio Wide** screen.

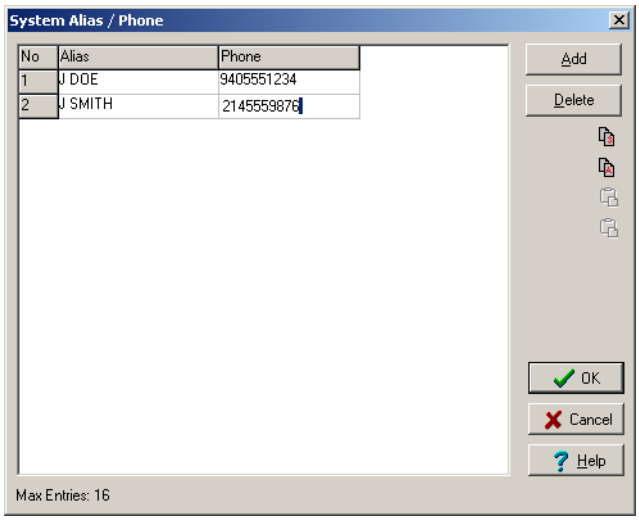
Figure 7.13 User Group ID List screen



7.2.8 Phone Access Code List (Project 25 Only)[10]

Use the Phone Access Code List screen shown in Figure 7.14 to program sets of predefined DTMF access and de-access codes needed to make interconnect telephone calls on Project 25 channels. The code must be entered before the actual telephone number. They can be up to four digits in length, and the default code is *1P#. The access code is selected from this list on the conventional digital channel screen (see Section 6.3.2).

Figure 7.14 Phone Access Code List screen

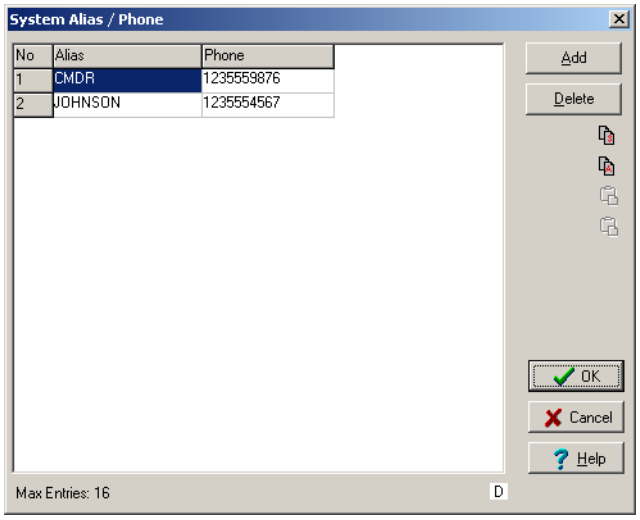


7.2.9 Phone List (Project 25 Only)[10]

Use the Phone List screen shown in Figure 7.15 to program the telephone number list used for placing telephone calls if applicable. A maximum of 16 numbers can be programmed.

To display this screen, on the Conventional **Per System** screen, select Phone List in the drop-down list and then click the Edit List ... button (see Figure 8.1).

Figure 7.15 Phone List screen



To add a number, click the Add button, and to delete a number, simply select it and click the Delete button. To edit an alias or number, select it and enter the desired information as follows:

Alias - Up to ten characters can be entered to identify the number being called. This identification is displayed when the number to be called is selected by the user from the list. Only uppercase letters can be entered, so lowercase letters are automatically converted to uppercase by the program.

ID - This is the telephone number dialed when the location is selected. Numbers up to sixteen digits can be entered. A pause is entered by “p” or “P” and counts as one digit.

SECTION

8

SMARTNET and SmartZone Systems

Two screens contain the interface where you program individual SMARTNET and SmartZone system parameters. This section contains descriptions of the parameters that you find on these screens. You can program these parameters after you set-up the desired systems as described in Section 1.10.

There are also SMARTNET and SmartZone radio wide system parameters that you program at the **Radio Wide** screen described in Section 5.6.

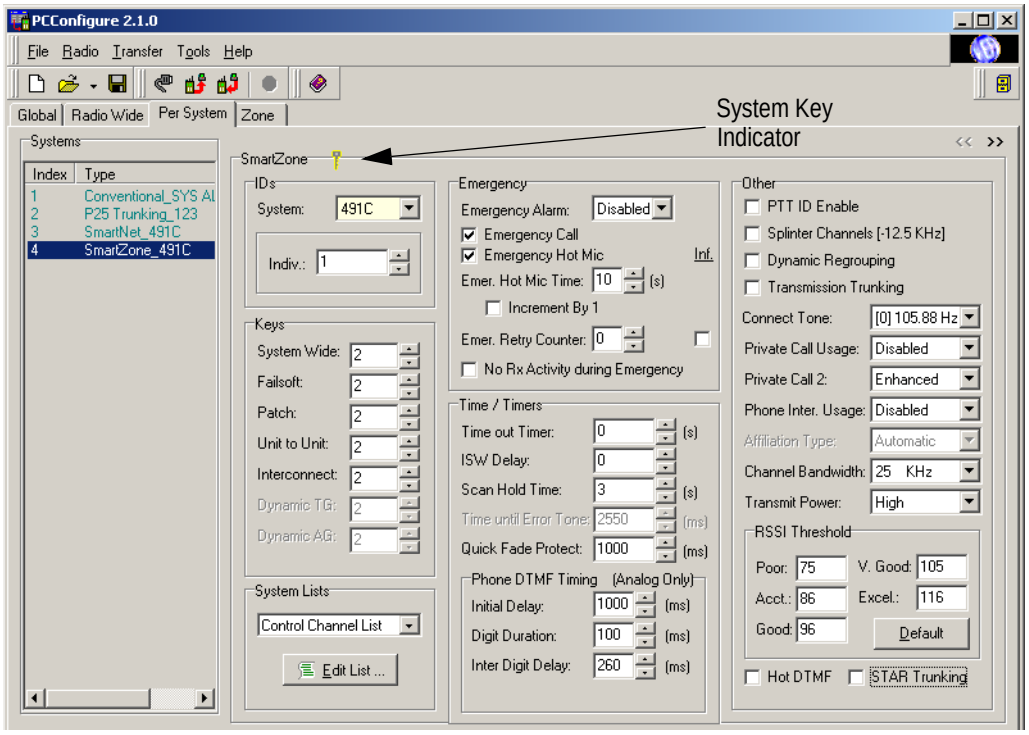
Note *You can edit some SMARTNET and SmartZone parameters only if PC Configure detects the proper system key. PC Configure detects a key if a yellow key icon is indicated as shown in Figure 8.1. If there is a red "X" through this icon, PC Configure does not detect a key. Refer to Section 13 for more information.*

Some parameters described in this section apply only to certain revision levels. In this section, index numbers in superscript appear next to the names of such features (for example, "Example Feature[9]"). Table 1.1 shows the relationship between these numbers and the revision levels they represent.

8.1 SMARTNET and SmartZone System Parameters: Initial Screen

Figure 8.1 shows the initial SMARTNET and SmartZone system programming screen.

Figure 8.1 SMARTNET and SmartZone System Screen



IDs

Note *You can enter these IDs in either decimal or hexadecimal format as described in Section 1.9.4.*

System - After you have loaded the system key from the *Keys* folder, select the key from the pull-down box. (Refer to the related Note at beginning of this section.) System ID numbers can be 1 through 65535 or 0001 through FFFF hex. If PC Configure does not detect a valid system key, you can only select the default ID of "1"

Indiv - Uniquely identifies the radio on a particular system. Each radio must have a different Unit ID. Valid Unit IDs are 1 through 65535. If you checked the Hex box, you can enter Indiv as a hexadecimal number instead of a decimal number.

Keys - Programs the following encryption key ID (hardware location) that is used for all except group calls.

System Wide - Key used for system-wide calls (typically originated by the dispatcher). The dispatcher usually originates these calls.

Failsoft - Key used in failsoft conditions.

Patch - Key used in patch calls.

Unit To Unit - Key used for unit-to-unit (private) calls.

Interconnect - Key used for telephone interconnect calls.

Dynamic TG - The talkgroup used when the radio has been dynamicallly regrouped. Defaulted value.

Dynamic AG - The announcement group used when the radio has been dynamically regrouped. Defaulted value.

System Lists - Refer to Section 8.2 for information on these lists.

Emergency

Emergency Alarm

Disabled - The radio sends no emergency signal when the user presses the Emergency option switch.

Normal - The radio sends an emergency alarm when the user presses the Emergency switch. If you disabled emergency calls, the alarm always occurs on the selected group. If you enabled emergency calls, it occurs—in order of preference—on the emergency group, selected group, and announcement group. When radio sends an emergency signal, the red transmit indicator lights, an emergency tone sounds, and "EMERGNCY" flashes in the display. "EMERGNCY" and the initiating ID continue to flash alternately until power is cycled, the channel is changed, or the radio user presses and holds the Emergency switch.[11]

Silent - Same as **Normal** except none of the preceding audio or visual indications occurs.

Emergency Call

Enable - When you check this box, if the radio user presses the Emergency option switch and then the PTT switch, an emergency group call transmits on the emergency group. The radio user cancels the emergency mode by cycling power or pressing and holding[11] the emergency switch.

Disable - When you do not check this box, no emergency group call is authorized.

Emergency Hot Mic

Enable - When you check this box and the radio user sends an emergency alarm by pressing the Emergency switch, automatic transmitting occurs. The microphone audio is unmuted (without user intervention) for the time specified by the following **Emergency Hot Mic Time**. If you do not check this or if you do not select either emergency call, automatic transmissions do not occur. This feature initiates only by the first press of the Emergency switch. Subsequent presses do not trigger automatic transmissions. This function resets if the radio user changes the channel.

Disable - If you do not check this box, automatic transmissions do not occur.

Emergency Hot Mic Time - Specifies the time period during which transmissions occur. You can select time periods of 10 through 120 seconds in ten-second increments.

Increment by 1 - If the ten-second increment is not desired, check this box to increment by one second.

Emergency Retry Counter - If you check Inf (infinite), the radio system repeats emergency calls until they are acknowledged or canceled. If you do not check it, the radio system repeats these calls only the specified number of times.

No Rx Activity During Emergency[12] - When you check this box, the following radio receive indications do not display in the emergency mode: Receive audio, receive LED, and receive icons.

Time/Timers

Time-Out Timer - This timer determines the maximum time period of a continuous transmission. You can program it for 15 through 225 seconds in 15-second intervals, or you can disable it (0).

ISW Delay Time - Increasing or decreasing this value changes the transmission timing of inbound signaling words (ISWs) relative to the reception of outbound signaling words (OSWs).

Scan Hold Time - Specifies the delay that occurs after the radio no longer receives a message before scanning resumes. You can program times of 2 through 10 seconds. The default is three seconds.

Time until Error Tone - Defaulted value.

Quick Fade Protect - Specifies the time the radio will stay on the control channel when synchronization is lost before resynchronizing. This allows recovery without performing a full resynchronization of the channel.

Phone DTMF Timing (Analog Only)

Initial Delay - Delay from 10 through 500 milliseconds from the time the radio system grants a traffic channel for phone interconnect to the start of the dialing of the phone number.

Digit Duration - Duration from 10 through 500 milliseconds of each phone number digit.

Inter Digit Delay - Delay from 10 through 500 milliseconds between each digit of a phone number.

Other

PTT ID Enable - When selected, the radio can key during the programmed hang time and continue the conversation on the active channel, similar to message trunking. If a user keys during the hang time, reaffiliation with the system occurs before the radio uses the voice channel. The radio then holds the voice channel while this reaffiliation occurs. The call connects to the open voice channel. This results in all traffic being logged, even the traffic of the radios that transmit during the hang time.

If you do not select either PTT ID Enable or Transmission Trunking, operation is similar to that described above. However, reaffiliation does not occur during the hang time. Therefore, radios that key up during the hang time do not affiliate and are not logged. The radio system logs only the call of the radio that initiates the call.

Splinter Channels - When you check this, the receive and transmit frequencies are 12.5 kHz lower than the normal frequencies. Splinter channels are used only as required in the U. S.-Mexico and U. S.-Canada border areas for frequencies between 806 and 820.975 MHz.

Dynamic Regrouping - When you check this, you can program a dynamic regrouping channel. This is a SMARTNET/SmartZone channel that the dispatcher dynamically sets the talk group for. You select it on the channel screen. Refer to Section 6.4.

Transmission Trunking - The radio does not use hang time. The radio affiliates and receives a new channel grant on every PTT. When a radio unkeys, the radio system

makes the channel available for other users immediately, and the system logs all traffic. If you do not check this, refer to the PTT ID Enable description above.

Connect Tone - The tone expected by the controller on the traffic channel to confirm the presence of a subscriber transmission. Set this tone the same as it is in the controller.

Private Call Usage

Disabled - The radio user cannot place private calls or receive them.

Response Only - The radio user can receive private calls but cannot place them.

List Only - The radio user can place private calls and receive them. The user can recall numbers from a programmed list only.

Note *To enter the following mode, the radio user must press the phone key and hold it until a tone sounds.*

Unlimited - The radio user can place private calls and receive them. The user can recall numbers from a programmed list or dial them from the keypad. 53xx radios support this mode only when they use the HHC control unit (firmware Version 1.28/ 2.6/3.6/4.2 or later only). Standard 53xx front and remote models do not support number dialing.

Private Call 2

Standard - Selects the standard Private Conversation mode in which the user does not receive any feedback when the called radio is not active in the system. The radio user receives only a “No Answer” if the called radio does not answer.

Enhanced - Selects the Enhanced Private Conversation™ mode. When the radio users places a call with this mode, the system tells the user if the called radio is currently active in the system and within range. The calling radio displays “No Ack” if the called radio is not active in the system and “No Answer” if it is active but does not answer.

Phone Inter. Usage - Programs operation of telephone calls same as “Private Call Usage” above.

Affiliation Type (SMARNET Only)

Automatic - The radio immediately affiliates with the central controller as soon as the radio operator turns it on. The radio automatically re-affiliates each time the talk group changes.

On PTT - The radio affiliates with the central controller each time the radio user presses the PTT switch, even when pressed during the hang time. Also, when the radio user keys the radio during the hang time, the radio holds the active channel during the re-affiliation. The re-affiliated radio continues traffic on this channel.

Channel Bandwidth - Selects the channel bandwidth as 25, 20, or 12.5 kHz.

25 kHz - Tx Modulation Limiting is 4 kHz for NPSPAC (821 or 806) channels, 5 kHz otherwise.

20 kHz - Tx Modulation Limiting is 4 kHz for all frequencies.

12.5 kHz - Tx Modulation Limiting is 2.5 kHz for all frequencies.

Transmit Power - Fixes the system’s transmit power at the high or low level, or makes it selectable. If it is selectable, the radio must have a high/low power function switch.

RSSI Threshold (SmartZone Only) - Sets the Receive Signal Strength Indicator (RSSI) levels that determine when searching for and switching to another site occurs.

Tip *Do not change the RSSI Threshold default levels unless you know how these settings affect operation.*

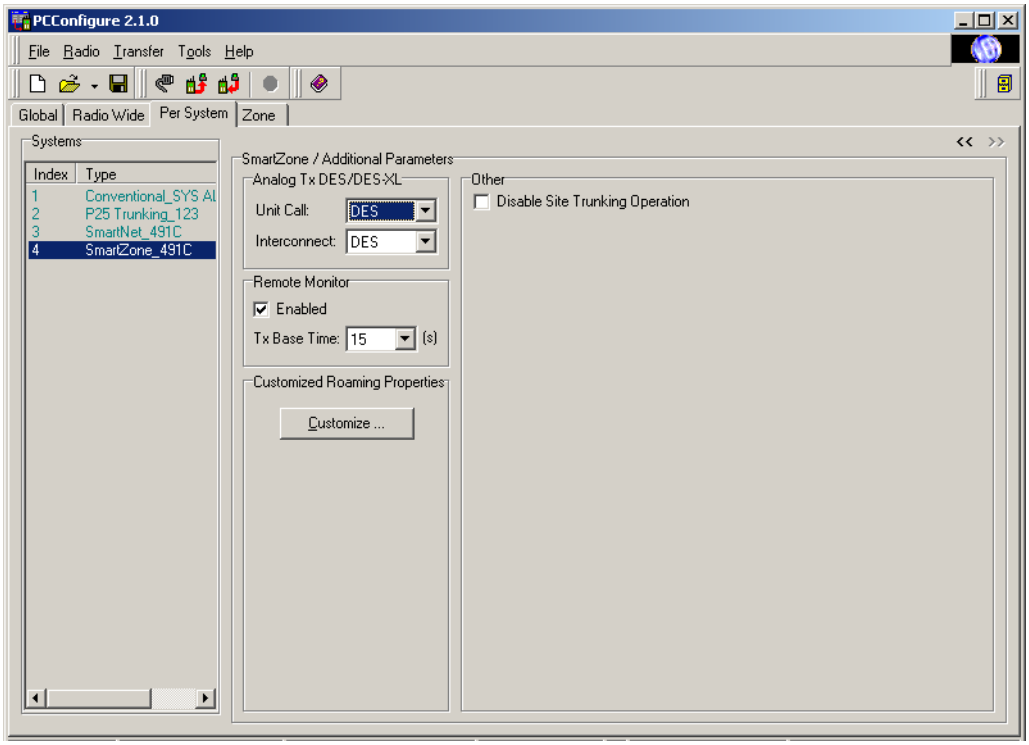
Hot DTMF - When you check this, the radio sends DTMF digits when the radio user presses buttons while transmitting in the SMARTNET/SmartZone analog mode.

STAR Trunking (SmartZone Only) - Selects this feature which is available with SmartZone systems. The system selected in the System: pull-down menu then becomes the “home” system. The radio system then requires no other system information to use this feature. You must enter the talk groups as with non-Omnilink systems. All other programming occurs on the infrastructure side. All required roaming information is received through adjacent site control channel data.

8.1.1 SMARTNET and SmartZone Additional Parameters

You open and close a second SMARTNET and SmartZone system programming screen when you click the << >> buttons in the upper right corner of the screen. The following additional parameters are then displayed. Section 8.2 shows the parameters displayed on this second screen.

Figure 8.2 SMARTNET and SmartZone System Page 2 screen



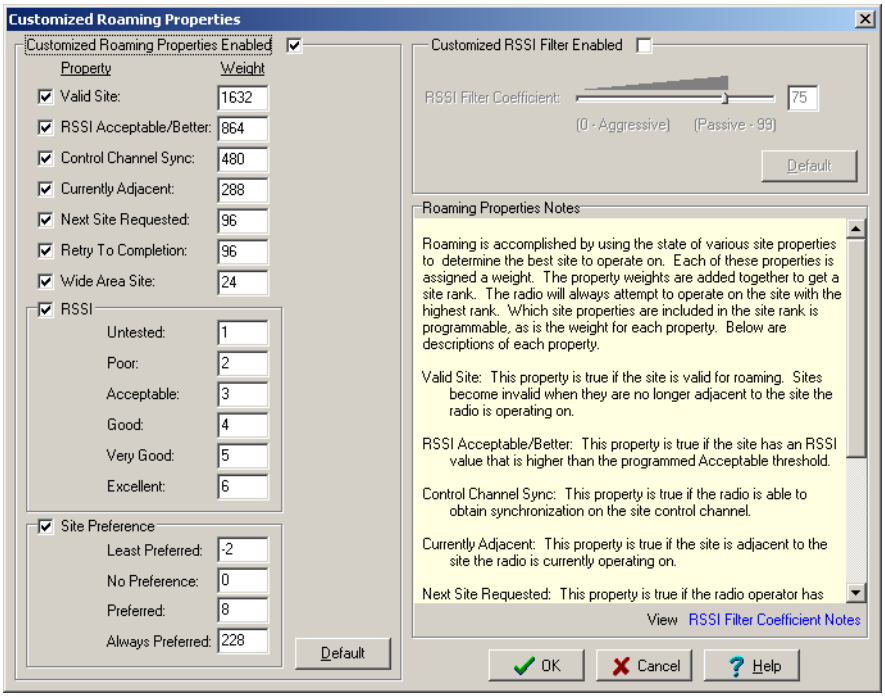
Analog Transmit DES/DES-XL3 - Allows you to specify the type of encryption individually for Unit and Interconnect calls made in the analog mode. You can only use DES-XL if the radio has the Motorola UCM encryption module. Refer to Section 16.

Remote Monitor - Used to remotely key up the radio for emergency situations. System sends a trace talkgroup to the radio. The radio receives the command and performs a hotmic on that talkgroup for period of time programmed (15, 30, 45, 60 seconds).

Transmit Base Time - Time programed for Remote Monitor. From 15 to 60 seconds in 15-second intervals.

Customized Roaming Properties (SmartZone Only) - You can change SmartZone and Project 25 Trunked roaming properties by clicking the Customize ... button. The screen shown in Figure 8.3 is displayed. Information programmed in this screen is described in the Roaming Properties Notes window that is displayed. The RSSI Filter slider bar controls how quickly the radio reacts to dropouts in the RSSI level. The more aggressive the setting, the quicker site switching occurs.

Figure 8.3 SmartZone Customized Roaming Properties Screen (SmartZone/Project 25 Trunked Only)



Other - Disable Site Trunking Operation[10] - When you check this, you disable site trunking on the system.

8.2 SMARTNET and SmartZone System Lists

Select the various SMARTNET and SmartZone lists by the “System Lists” pull-down menu on the SMARTNET and SmartZone **Per System** screen. Refer to Figure 8.1. After you select the desired list, you can edit it by clicking the Edit List ... button.

This section contains descriptions of the following lists:

- Control channels list
- Status alias list
- Message alias list
- Call alias / ID list
- System alias / phone list
- SmartZone talk groups list
- SmartZone announcement groups list
- Priority scan list
- System alias / ID list (SmartZone systems only)
- System wide preferred site list (SmartZone systems only)
- Other band trunking list (VHF/UHF only)
- User group ID list

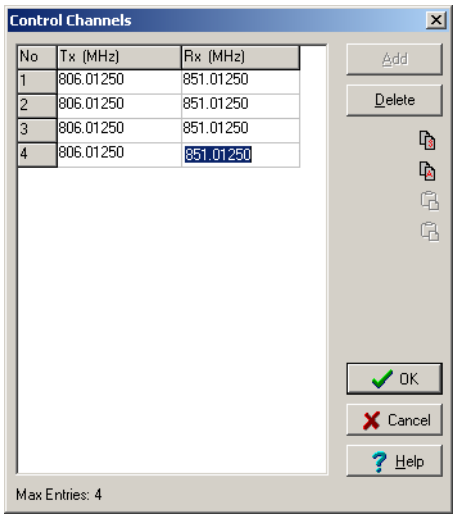
Descriptions of the various lists and the information they program follow.

8.2.1 Control Channels List

The Control Channels list screen shown in Figure 8.4 allows the system manager to view and edit the control channels. Each SMARTNET system can have a maximum of four control channels. Each SmartZone system can have a maximum of 48 control channels. 5300 logic boards through Rev 4 allow a maximum of 32 SmartZone entries. Only one control channel is active at a time.

To display this screen, on the SMARTNET/SmartZone **Per System** screen, select "Control Channel List" in the pull-down menu, then click the Edit List ... button. Refer to Figure 8.1.

Figure 8.4 Control Channels List Screen



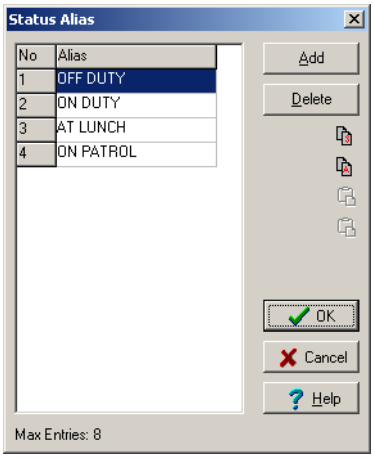
To add a channel, click the Add button. To delete a channel, simply select it and click the Delete button. To edit a channel, select the digits that you want to change and edit them as desired. For the 800 MHz band, you can change only the receive channel frequency. PC Configure automatically calculates the transmit frequency (45 MHz below the receive frequency). These are the mobile frequencies, not the repeater frequencies. Only multiples of 5 kHz and 6.25 kHz are valid.

8.2.2 Status Alias List

The Status Alias list screen shown in Figure 8.5 is the interface where you program the alias for each of a maximum of eight status conditions. The system manager defines meaning of each status number.

To display this screen, on the SMARTNET and SmartZone **Per System** screen, select "Status Alias List" in the pull-down menu, then click the Edit List ... button. Refer to Figure 8.1.

Figure 8.5 Status Alias List Screen



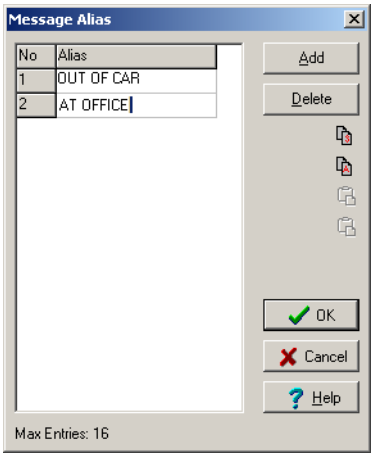
To add an alias, click the Add button. To delete an alias, simply select it and click the Delete button. To edit an alias, select it and change it as desired. You can enter a maximum of 10 characters. This identification displays when the user selects a status condition.

8.2.3 Message Alias List

The Message Alias list screen shown in Figure 8.6 associates an alias (name) with each message number. The system manager defines the meaning of each message number.

To display this screen, on the SMARTNET/SmartZone Per System screen, select "Message Alias List" in the pull-down menu, then click the Edit List ... button. Refer to Figure 8.1.

Figure 8.6 Message Alias List Screen

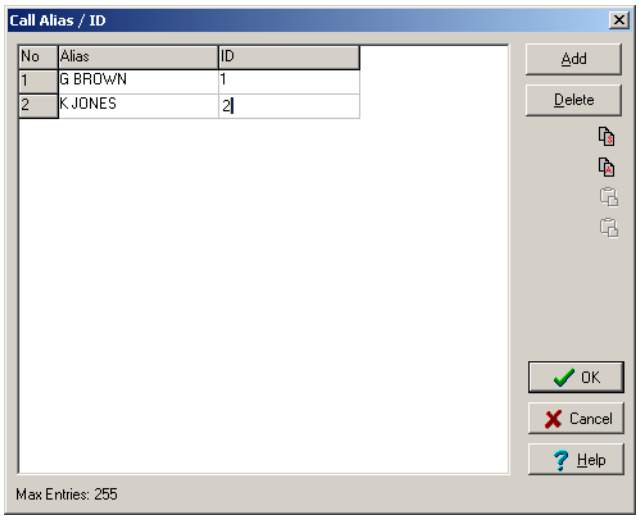


To add an alias, click the Add button. To delete an alias, simply select it and click the Delete button. To edit an alias, select it and change it as desired. You can enter a maximum of ten characters. This identification displays when the user selects a status condition.

8.2.4 Call List

The Call List screen shown in Figure 8.7 programs the list of IDs used for private calls. You can program a maximum of 255 IDs. To display this screen, on the SMARTNET/ SmartZone Per System screen, select “Call List” in the pull-down menu, then click the Edit List ... button. Refer to Figure 8.1.

Figure 8.7 Call List screen



To add a call, click the Add button. To delete a call, simply select it and click the Delete button. To edit an alias or ID, select it and and enter the desired information as follows:

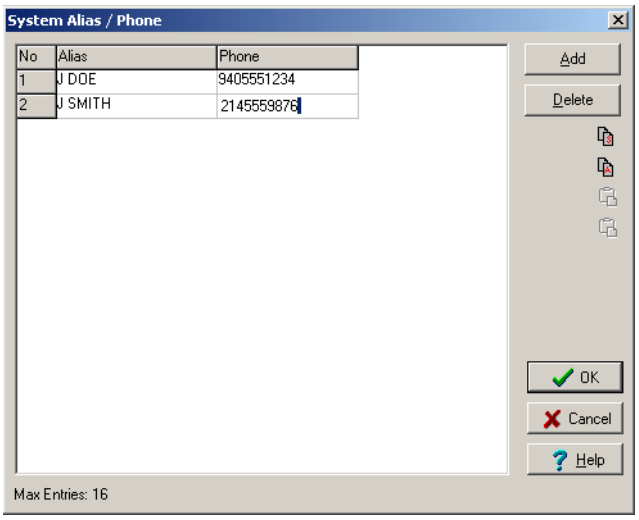
Alias - You can enter a maximum of ten characters to identify the user being called. This identification displays when the user selects the mobile radio to be called from the list. When the user receives a call from a unit in this list, the alias of the unit displays for the user instead of the calling unit's ID number. You can enter only capital letters, so PC Configure automatically converts any lowercase letters that you enter to capital letters.

ID - This is the ID of the radio that the user is calling. Valid entries are 0 through 65535. PC Configure detects zero ("0") as no entry.

8.2.5 Phone List

The Phone list screen shown in Figure 8.8 programs the telephone number list that the radio user may place telephone calls from (if you program the system to use this feature). You can program a maximum of 255 numbers. To display this screen, on the SMARTNET and SmartZone Per System screen, select "Phone List" in the pull-down menu, then click the Edit List ... button. Refer to Figure 8.1.

Figure 8.8 Phone List Screen



To add a call, click the Add button. To delete a call, simply select it and click the Delete button. To edit an alias or number, select it and enter the desired information as follows

Alias - You can enter a maximum of ten characters to identify the number being called. This identification displays when the user selects the number to be called from the list. You can enter only capital letters, so PC Configure automatically converts any lowercase letters that you enter to capital letters.

ID - This is the telephone number that the radio dials when the radio user selects the location. Enter the three-digit area code and seven-digit telephone number using the numbers 0 through 9.

8.2.6 Talk Groups List

The SmartZone Talk Groups List screen shown in Figure 8.10 sets up SMARTNET and SmartZone talk groups and programs unique talk group information. To display this screen, on the SMARTNET and SmartZone Per System screen, select “Talk Group List” in the pull-down menu, then click the Edit List ... button. Refer to Figure 8.1.

Figure 8.9 SMARTNET Talk Groups List screen

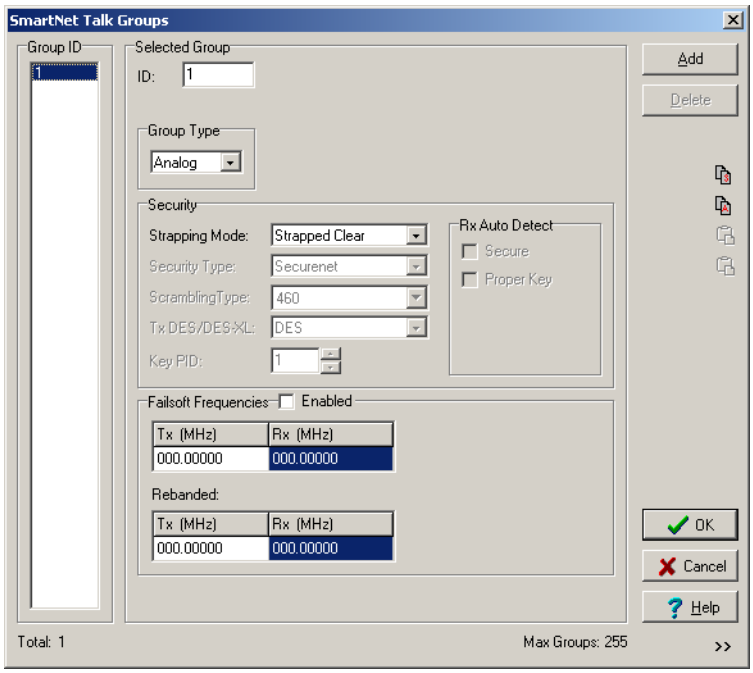
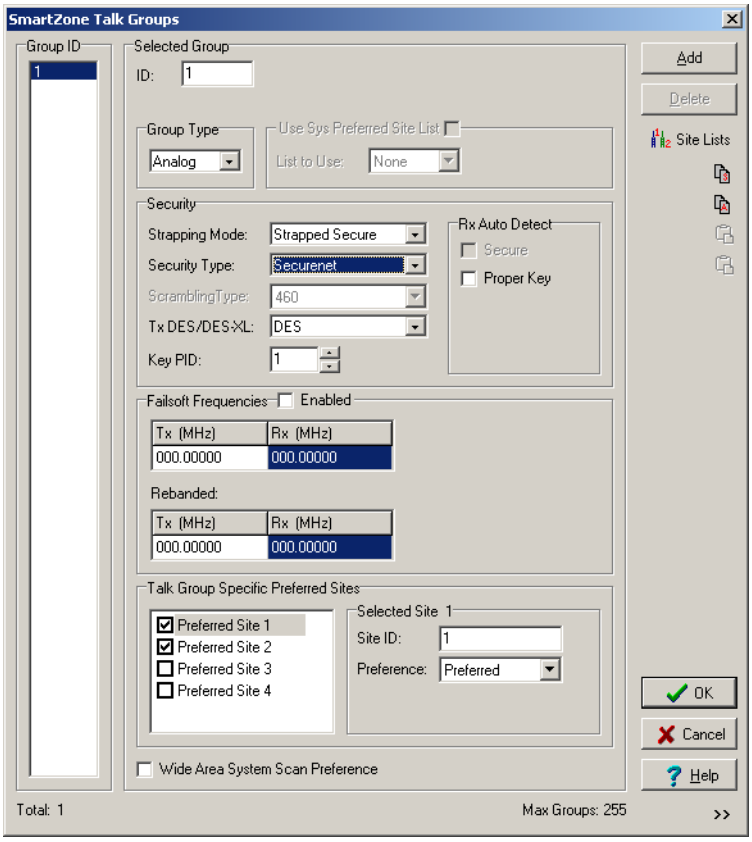


Figure 8.10 SmartZone Talk Groups List screen



The parameters programmed in this screen are as follows:

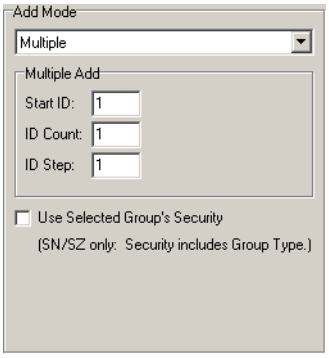
ID - This list displays the talk group IDs contained in the Talk Group list. To edit a talk group ID in this list, select it and then change it in the **Selected Group** box. This is the actual ID of the talk group. You assign talk groups to channels in the **Zone** screen. Refer to Page 6-10.

Note *You can enter this ID in either the decimal or hexadecimal format as described in Section 1.9.4.*

Add - Click this button to add the next available talk group ID to the list. You can program each SMARTNET and SmartZone system with up to 255 talk groups.

Add Mode - To add an entire block of talk group IDs or a specific ID, click the arrow button >> in the lower right corner of the screen. The Talk Groups screen is expanded and the Add Mode panel shown in Figure 8.11 is displayed:

Figure 8.11 Add Mode Screen



Add Mode Pull-Down

Single - Adds the next available ID similar to the **Add** button.

Multiple - Adds a block of IDs as follows: To initiate the selected add operation, click the **Add** button. If the specified ID range results in duplicate IDs, an error message displays and PC Configure adds no IDs.

Start ID - Specifies the starting ID of the block.

ID Count - Specifies the number of IDs to be added.

ID Step - Specifies if consecutive IDs are added or some other step rate is used. For example, if Start ID =10, ID Count = 5, and ID Step = 10, the IDs added are 10, 20, 30, 40 and 50.

Use Selected Group's Security - When selected, PC Configure automatically programs the added groups with the Strapping Mode and Encryption Key ID of the selected group.

Delete - Clicking this button deletes the selected talk group.

Group Type - Select either "Analog" or "Digital" signaling on the talk group.

Use System Preferred Site List (SmartZone Only) - Selects one of the preferred site lists for the talk group. Refer to the "Preferred Sites" description which follows for more information.

Security

Strapping Mode

Strapped Clear - All transmissions on the talk group occur in the clear (unencrypted) mode.

Strapped Secure - All transmissions on the talk group occur in the secure (encrypted) mode selected as follows.

Switched - The clear or secure status of the talk group is selected by the Clear/Secure option switch.

Security Type - Select SecureNet or Scrambling (if programmed)

Note *Voice encryption is an optional feature that requires factory programming and possibly special hardware.*

SecureNet - Selects the Motorola SecureNet DES type of secure communication when you select either the coded or switched strapping mode.

Tx DES/DES-XL

With analog channels, when you select “Securenet” secure communication, you select either the DES or DES-XL type. DES-XL is available only in later models equipped with the UCM module.

On digital channels, you cannot select the type. Digital channels support both DES-OFB and AES encryption. The encryption key that the talk group selects determines the encryption type.

Note *AES encryption is not available with the 51SL or 53SL.*

Key PID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure calls on the group if applicable.

Rx Auto Detect

Secure - If this option is checked, an encrypted signal is automatically detected and received. This option may increase the response time to incoming signals. If it is not checked, those signals are detected only if they are coded like the transmit signals.

Proper Key - If this option is checked, the radio will search the available encryption keys until it finds a match for the current transmission.

Failsoft Frequencies

Enabled - If you check this box, you enable a failsoft channel on the talk group if a controller or other major failure occurs. If you do not check this box, the radio does not enter failsoft mode if a failure occurs.

Tx (MHz) - Programs the failsoft transmit frequency if you checked Enabled.

Rx (MHz) - Programs the failsoft receive frequency if you checked Enabled.

Talk Group Specific Preferred Sites (SmartZone Only) - With SmartZone systems, you can associate a maximum of four preferred sites and/or a preferred site list[13] with each talk group. Check the box of a preferred site to associate it with a talk group. This forces a call on the talk group to access the specified sites. The system manager can then keep mobiles on specific sites even if you do not enable the Site Search feature. You program the preference for each site as “Least”, “None”, “Preferred”, or “Always” as follows.

Program the preferred site lists at the System Preferred Site Lists screen described on Page 8-19. You can program a maximum of 16 lists. Each site can include up to 16 sites.

If both a preferred site list and one or more preferred sites (selected at bottom of screen) are associated with a talk group, the preferred sites at the bottom are searched first. The first entry found for a given site is used. If the same site is in both lists, the entry in the list at the bottom of the screen is used first.

Selected Site

RFSS ID- Designates a zone controller that the talk group can roam to.

Site ID - Designates a site that the talk group can roam to.

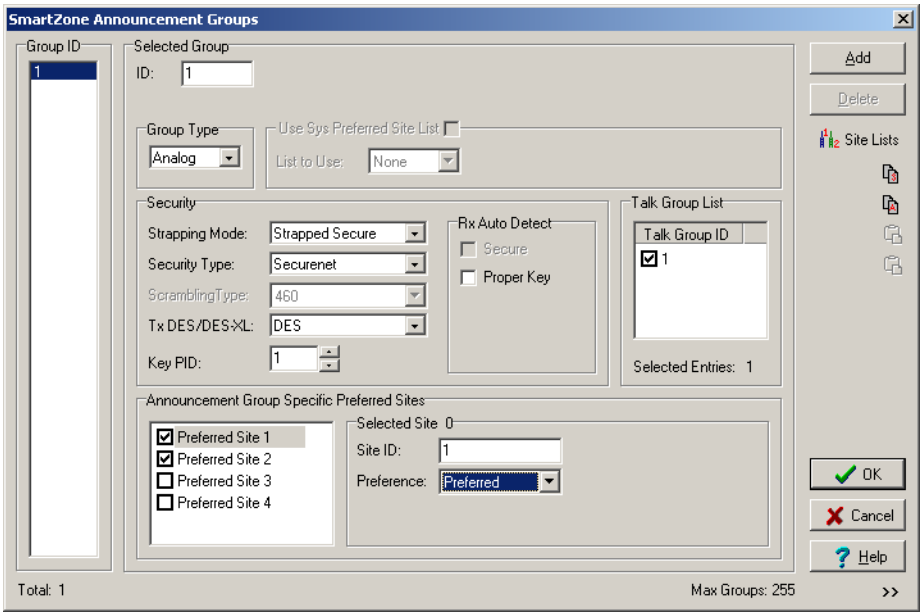
Preference - “Least”, “None” (no preference), “Preferred”, or “Always (preferred) is a weighting for steering to different sites.

Wide Area System Scan Preference - The feature is exclusive to the talkgroup site preference settings. You can use talkgroup site preferences or you can use Wide Area System Scan. (You can also use the System Site Preference lists with Wide Area System Scan.) Once you enable the feature, PCConfigure blocks the talkgroup site preference boxes on the form.

8.2.7 SmartZone Announcement Groups List

The Announcement Group List screen shown in Figure 8.12 sets up SMARTNET/ SmartZone announcement groups that are used to communicate with several talk groups simultaneously. Each announcement group can have up to 15 talk groups.

Figure 8.12 Announcement Group List screen



To display this screen, on the SMARTNET or SmartZone **Per System** screen, select the Announcement Group List in the drop-down list and then click the Edit List ... button (see Figure 8.1). The parameters programmed in this screen are as follows:

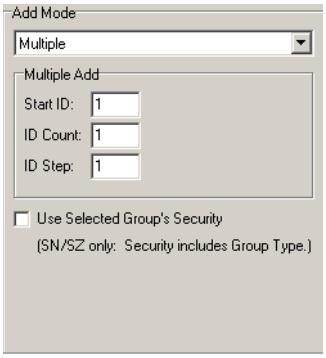
Group ID - This list displays the Announcement group IDs currently contained in the Announcement Group list. To edit an ID in this list, select and change it in the Selected Group box. This is the actual ID of the announcement group. Announcement groups are assigned to channels in the **Zone** screen (see Page 6-10).

Note *You can enter this ID in either decimal or hexadecimal format as described in Section 1.9.4.*

Add - Click this button to add the next available announcement group ID to the list. You can program each SMARTNET/SmartZone system with up to 255 announcement groups.

To add an entire block of announcement group IDs or a specific ID, click the arrow button >> in the lower right corner of the screen. The Annuncement Group List screen is expanded and the Add Mode panel is displayed. Refer to the preceding "Talk Group List" description for more information on this screen.

Figure 8.13 Add Mode screen



Delete - Click this button to delete the announcement group that is currently selected in the list.

Group Type - Select either Analog or Digital signaling on the announcement group.

Use System Preferred Site List (SmartZone Only) - Select one of the preferred sites for the announcement group. Refer to the preceding Talk Group List description for more information.

Security

Strapping Mode

Strapped Clear - All transmissions on the talk group occur in the clear (unencrypted) mode.

Strapped Secure - All transmissions on the talk group occur in the secure (encrypted) mode selected as follows.

Switched - The clear or secure status of the talk group is selected by the Clear/ Secure option switch.

Security Type - Select SecureNet or Scrambling (if programmed).

Note *Voice encryption is an optional feature that requires factory programming and possibly special hardware.*

SecureNet - Selects the Motorola SecureNet DES type of secure communication when you select either the coded or switched strapping mode.

Tx DES/DES-XL

With analog channels, when you select “Securenet” secure communication, you select either the DES or DES-XL type. DES-XL is available only in later models equipped with the UCM module.

On digital channels, you cannot select the type. Digital channels support both DES-OFB and AES encryption. The encryption key that the talk group selects determines the encryption type.

Note *AES encryption is not available with the 51SL or 53SL.*

Key PID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure calls on the group if applicable.

Rx Auto Detect

Secure - If this option is checked, an encrypted signal is automatically detected and received. This option may increase the response time to incoming signals. If it is not checked, those signals are detected only if they are coded like the transmit signals.

Proper Key - If this option is checked, the radio will search the available encryption keys until it finds a match for the current transmission.

Talk Group List - Select the talk groups that are included in each announcement group. You can enter this ID in either decimal or hexadecimal format as described in Section 1.9.4.

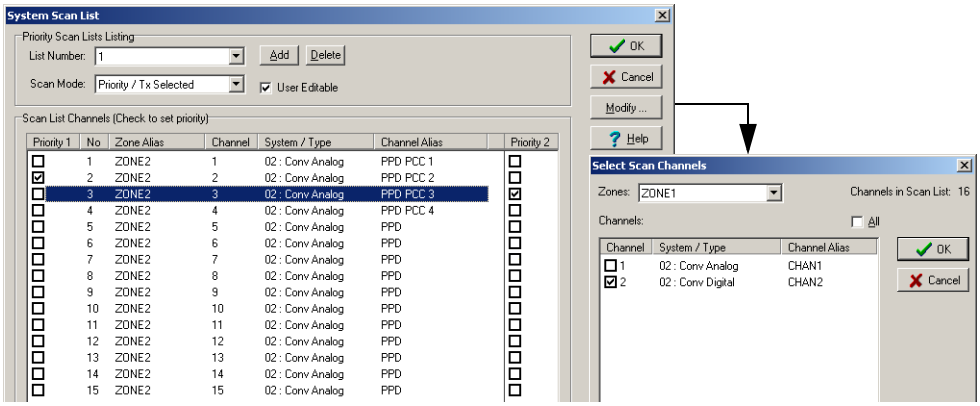
Announcement Group Specific Preferred Sites (SmartZone Only) - Program the preferred site information similar to talk groups described in the preceding “Talk Group List” description. You can associate up to four Preferred Sites and/or a Preferred Site List with each announcement group.

8.2.8 Priority Scan List

Note *Before the priority monitor scan lists can be programmed as follows, you must set up the channels to be included in these lists in the **Zone** screen as described in Section 6.4 on Page 6-10.*

The Priority Scan List screen shown in Figure 8.14 sets up the Priority (Standard) Scan lists that can be programmed on each SMARTNET or SmartZone system. Each scan list can include up to 16 channels, one of which may be a priority channel. These channels must be from the same SMARTNET or SmartZone system: Channels from other systems are not allowed.

Figure 8.14 Priority Scan List screen



To display this screen, on the SMARTNET/SmartZone Per System screen, select Priority Scan List in the drop-down list and click the Edit List ... button (see Figure 8.1).

List Number - This drop-down list allows you to select the scan list to edit. Click the "Add" button to add a scan list and "Delete" to delete a scan list.

Modify ... - Click this button to display the screen shown on the right above which is used to edit the selected scan list. Check the channels in each zone to be included in the selected scan list. Repeat for the other scan lists if applicable.

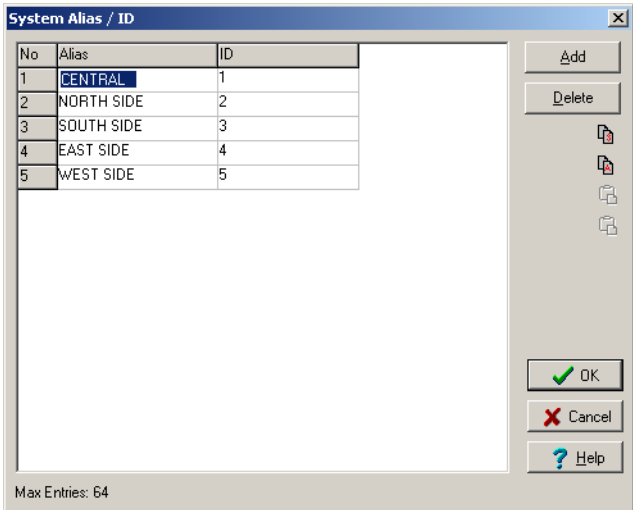
Scan Mode - If priority scan is used on a list, select "Priority on Selected" (51xx/53xx only) or "Priority on Programmed" from the drop down list. If priority scanning is not used, select "Non Priority Scan". If "Priority on Programmed" is selected, check the priority box of the desired priority channel.

Note *Priority talk group scanning must also be supported at the system level for it to occur as programmed. Talk Groups programmed as "Priority" in PC Configure must also be designated as Priority Monitor Groups by the System Control software.*

8.2.9 System Alias / ID List (SmartZone Systems Only)

Sites in a SmartZone system are designated by a number. The Site List screen shown below allows you to program an alias for each site number that is displayed when using the Site Search feature.

Figure 8.15 System Alias / ID screen



To display this screen, from the SmartZone Per System screen, select Site List in the drop-down list and then click the Edit List ... button (see Figure 8.1). To add an alias, click the Add button. To delete an alias, select it and click the Delete button. To edit an alias or ID, select it and make the desired changes.

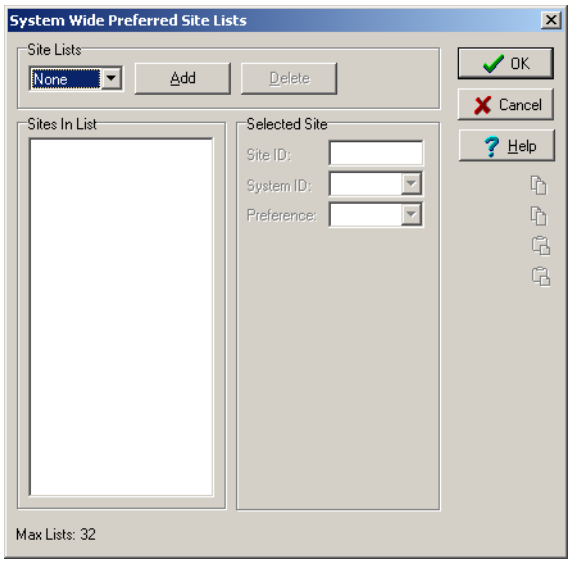
Alias - Programs up to ten alphanumeric characters that identify the site.

ID - Site ID from 0-48. Up to 255 entries are supported with the 5300 Rev 6 logic board.

8.2.10 System Wide Preferred Site List (SmartZone Systems Only)[13]

You can program up to 16 Preferred Site Lists using the System Wide Preferred Site List screen shown in Figure 8.16. These lists can be associated with individual talk groups on the Talk Group List screen described starting on Page 8-12. This forces calls on a talk group to access specific sites. The preference for each site in a list can be set for Least, None, Preferred, or Always as follows.

Figure 8.16 System Wide Preferred Site List



Each list can be programmed with up to 16 sites. Therefore, the use of Preferred Site Lists allows up to 16 sites to be associated with a group instead of just 4 available on the Talk Group List screen. In addition, if several talk groups are associated with the same sites, a list can simply be selected instead of separate sites.

Site Lists - This drop down list selects the list to be edited. To add a new list, click the "Add" button. To delete the selected list, click the "Delete" button.

Sites In List - To add/delete a site from the list, click the checkbox.

Site ID - Enter the site ID from 0-255. Thirty-two (32) lists are available.

Preference - Select the site preference in the drop down list. A default weighting is usually assigned to these preference levels which results in the most preference given to "Always" and the least preference to "Least" as follows:

1. Always (preferred)
2. Preferred
3. None (no preference)
4. Least (preferred)

8.2.11 STAR List (Smart Zone Only)

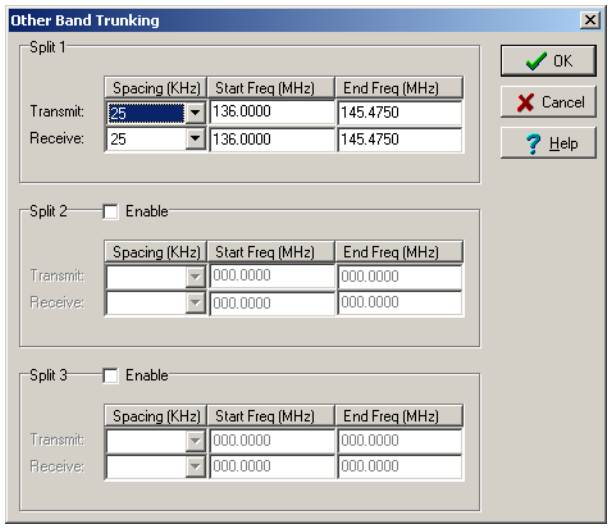
The STAR List is used to create a list of control channels for each separate zone. This function is not used at this time.

8.2.12 Other Band Trunking List (VHF/UHF Only)

The Other Band Trunking screen shown above is displayed only when programming channels in the VHF and UHF frequency bands. It is used to define the relationship

between transmit and receive channel frequencies in these bands. With 800 MHz systems, this is not required because the difference between transmit and receive frequency is always 45 MHz.

Figure 8.17 Other Band Trunking screen



To display this screen, on the SMARTNET/SmartZone Per System screen, select the Other Band Trunking in the drop-down list and click the Edit List ... button (see Figure 8.1).

This screen organizes the available frequency band into three sub-bands, called splits. Each split is defined by a start frequency, stop frequency, and channel spacing as follows. Frequencies outside the defined split cannot be accessed by the radio. These frequency splits must be defined the same way they are defined for the trunking controller.

Tx and Rx Spacing - Spacing in kHz between each potential transmit and receive frequency.

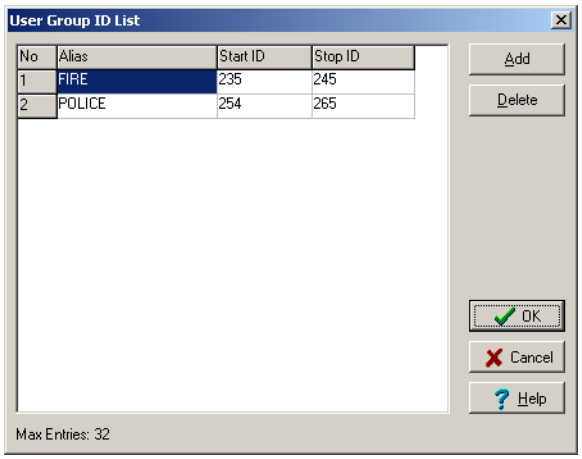
Tx and Rx Start Frequency - Start in MHz of the band split for transmit and receive frequencies.

Tx and Rx Stop Frequency - Stop in MHz of the band split for transmit and receive frequencies.

8.2.13 User Group ID List[11]

This User Group ID List screen shown in Figure 8.18 allows you to program aliases that can be displayed if a call is received on a talk group ID within the programmed block. For example, with the preceding screen, if a group call is received on group IDs 234-264, the alias “Fire” can be displayed. The display of this alias is controlled by the “User Group ID” parameter on the **Radio Wide** screen.

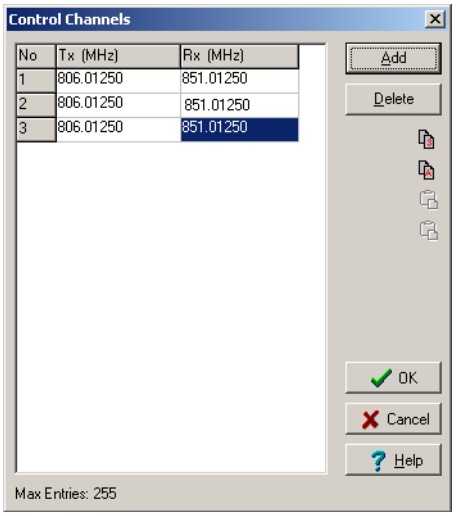
Figure 8.18 User Group ID List screen



8.2.14 Rebanded CC List

This Control Channels list is the control channels for sites that have been rebanded.

Figure 8.19 Control Channels (rebanded system list) screen



SECTION 7

9

Project 25 Trunked Systems

Two screens contain the interface where you program individual Project 25 trunked system parameters. This section contains descriptions of the parameters that you find on these screens. You can program these parameters after you set-up the desired systems as described in Section 1.10.

There are also Project 25 radio wide system parameters that you program at the **Radio Wide** screen described in Section 5.6.

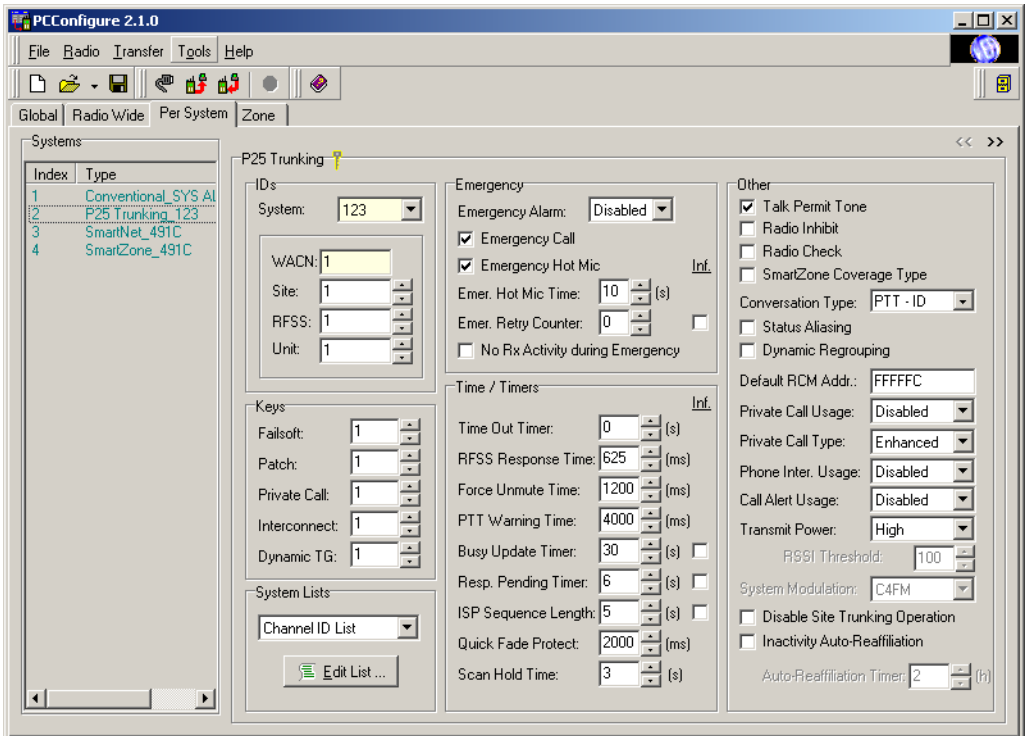
Note *You can edit some Project 25 trunking parameters only if PC Configure detects the proper system key. PC Configure detects a key if a yellow key icon is indicated as shown in Figure 8.1. If there is a red "X" through this icon, PC Configure does not detect a key. Refer to Section 13 for more information.*

Some parameters described in this section apply only to certain revision levels. In this section, index numbers in superscript appear next to the names of such features (for example, "**Example Feature**[9]"). Table 1.1 shows the relationship between these numbers and the revision levels they represent.

9.1 Project 25 Trunked System Parameters: Initial Screen

Figure 9.1 shows the initial Project 25 trunked system programming screen.

Figure 9.1 Initial Project 25 Trunked System Screen



The parameters in the initial Project 25 trunked system programming screen are as follows:

IDs

Note *You can enter these IDs in either decimal or hexadecimal format as described in Section 1.9.4.*

System ID - This pull-down menu allows you to select the radio's home system ID. This must be a unique ID within a Wide Area Communications Network (WACN). This ID comes from the system key in the *Keys* folder. (Refer to the related Note at beginning of this section.) System ID numbers can be 1 through 4094 (001 through FFE hex). If PC Configure does not detect a valid system key, you can only select the default ID of "1".

WACN - This ID determines the home Wide Area Communications Network the radio is assigned to. One or more systems make up a WACN. Valid WACN IDs are 1 through 1048574 (00001 through FFFFE hex).

Site - Specifies the home site of the radio. If the Zone Fail Site Lock feature is enabled, this also determines the site the radio is restricted to if the zone controller goes down. (Zone Fail Site Lock is disabled by default in the subscriber units. It is enabled by setting the Zone Fail Site Lock option in PCIssue.)

RFSS - Specifies the default RF subsystem [RFSS (zone controller)], or the RFSS that the radio is restricted to if you enabled the SmartZone coverage option. One or more RF Subsystems make up a system. Valid IDs are 0 through 254.

Unit - Provides a unique identification of the radio on a system. Therefore, each radio must have a different Unit ID. Valid Unit IDs are 1 through 16,777,215 (000001 through FFFFFF hex). The decimal version of this ID is the private call ID of the radio.

Keys - Programs the following encryption key ID (hardware location) that the radio uses for all calls except group calls.

Failsoft - Key used in failsoft conditions.

Patch - Key used in patch calls.

Private Call - Key used for unit-to-unit (private) calls.

Interconnect - Key used for telephone calls.

Dynamic Talk Group - Key used for dynamic talk groups.

System Lists - Refer to Section 9.3 for more information.

Emergency

Emergency Alarm

Disabled - The radio sends no emergency signal when the user presses the Emergency option switch.

Normal - The radio sends an emergency alarm when the user presses the Emergency switch. If you disabled emergency calls, the alarm always occurs on the selected group. If you enabled emergency calls, it occurs—in order of preference—on the emergency group, selected group, and announcement group. When radio sends an emergency signal, the red transmit indicator lights, an emergency tone sounds, and “EMERGNCY” flashes in the display. “EMERGNCY” and the initiating ID continue to flash alternately until power is cycled, or the radio user presses and holds the Emergency switch.[1]

Silent - Same as **Normal** except none of the preceding audio or visual indications occurs.

Emergency Call

Enable - When you check this box, if the radio user presses the Emergency option switch and then the PTT switch, an emergency group call transmits on the emergency group. The radio user cancels the emergency mode by cycling power or pressing and holding[1] the emergency switch.

Disable - When you do not check this box, no emergency group call is authorized.

Emergency Hot Mic

Enable - When you check this box and the radio user sends an emergency alarm by pressing the Emergency switch, automatic transmitting occurs. The microphone audio is unmuted (without user intervention) for the time specified by the following **Emergency Hot Mic Time**. If you do not check this or if you do not select either emergency call, automatic transmissions do not occur. This feature initiates only by the first press of the Emergency switch. Subsequent presses do not trigger automatic transmissions. This function resets if the radio user changes the channel.

Disable - If you do not check this box, automatic transmissions do not occur.

Emergency Hot Mic Time - Specifies the time period during which transmissions occur. You can select time periods of 10 through 120 seconds in ten-second increments.

Emergency Retry Counter - If you check **Inf** (infinite), the radio system repeats emergency calls until they are acknowledged or canceled. If you do not check it, the radio system repeats these calls only the specified number of times.

No Rx Activity During Emergency[12] **-** When you check this box, the following radio receive indications do not display in the emergency mode: Receive audio, receive LED, and receive icons.

Time/Timers

Time-Out Timer - This timer determines the maximum time period of a continuous transmission. You can program it for 15 through 225 seconds in 15-second intervals, or you can disable it (0).

RFSS Response Time - Specifies the time between attempts to affiliate on RFSS sites. You can program times of 625 through 7000 ms. The default is 625 ms.

Force Unmute Time - Specifies the maximum time the radio remains muted after transmitting because of probable system delay. If the radio determines that the incoming audio signal is from some other radio, the radio disregards this delay. You can program times of 25 to 6375 ms. The default is 1200 ms.

PTT Warning Time - Specifies the time the radio waits before sounding the PTT Prohibit tone. This tone warns the user that the PTT request is being processed and the user should release the PTT switch. You can program times of 25 through 6375 ms. The default is 4000 ms.

Busy Update Timer - Specifies the time the radio waits in a busy state for a reject, grant, or another busy update from the radio system. When this timer expires, the radio no longer expects a response from the system and the ratio tries the transmission again. You can program times of 15 through 945 seconds. The default is 30 seconds.

Resp. Pending Timer - Specifies the time the radio waits when it expects a further response from the radio system to a request. This occurs when the system sends a response that indicates the request is being processed and a response is coming. When this timer expires, the radio no longer expects a response and the radio returns to the idle state. You can program times of 1 through 255 seconds or infinity. The default is 6 seconds.

ISP Sequence Length - Specifies the time the radio system allows each site for an ISP retry request. The radio retries until this timer expires. The radio makes at least five retries, regardless of this timer setting. You can program times of 1 through 255 seconds or infinity. The default is 5 seconds.

Quick Fade Protect - Specifies the time the radio will stay on the control channel when it loses synchronization before the radio tries to synchronize again. This allows recovery without completely synchronizing the channel again. You can program times of 200 through 6575 ms. The default is 2000 ms.

Scan Hold Time - Specifies the delay that occurs after the radio no longer receives a message before scanning resumes. You can program times of 2 through 10 seconds. The default is 3 seconds.

Other

Talk Permit Tone - If you check this, a short tone sounds after the main controller approves a request for a group call. This indicates that speaking can begin. If you do not check this, the radio user hears no audio signal to indicate when speaking can begin.

Radio Inhibit - If you check this, the dispatcher can disable or enable the radio. When the radio receives this command, the radio sends an acknowledgment to the dispatcher. Then, the radio is disabled as follows.

- Receive audio is muted and transmit audio is disabled.
- All radio controls are inoperative.
- Scanning is disabled on the selected mode (Project 25 trunking).
- The transmit indicator is disabled and the display is blanked.

The dispatcher can then enable the radio again. As an alternative, you can enable the radio again by reading and then rewriting the programming data using PC Configure.

Radio Check - If you check this, the radio will respond to a remote check command. The dispatcher can send this command to confirm that the radio is active and operational on the system. If you do not check this, this command is ignored.

SmartZone Coverage Type - If you check this, roaming can occur only within the selected RFSS controller. If you do not check this, roaming can occur across all available RFSS controllers in the WACN system.

Conversation Type

Message Trunking - Not available with Project 25 trunking.

PTT - ID - Always select this mode with Project 25 trunking. The radio can key during the programmed hang time and continue the conversation on the active channel. If a user keys during the hang time, reaffiliation with the system occurs before using the voice channel. The radio holds the voice channel while this reaffiliation occurs. The call then connects to the open voice channel. This results in all traffic being logged, even from the radios which transmit during the hang time.

Transmission Trunking - Not available with Project 25 trunking.

Status Aliasing - Enables and disables status aliasing for the system. This function allows you to customize status numbers and allows you to assign an alias name to each number.

Dynamic Regrouping - If you check this, you can program a dynamic regrouping channel. This is a Project 25 trunked channel that has the talk group dynamically set by the dispatcher. Select it on the zone screen. Refer to Section 6.5.

Default RCM Address - Specifies the Radio Control Manager used as the target address of Inbound Signaling Packet (ISP) transmissions such as status and message transmissions. You can program hexadecimal addresses from 000000 to FFFFFF. The default is FFFFFC.

Private Call Usage

Disabled - The radio user cannot place private calls or receive them.

Response Only - The radio user can receive private calls but cannot place them.

List Only - The radio user can place private calls and receive them. The user can recall numbers from a programmed list only.

Note *To enter the following mode, the radio user must press the phone key and hold it until a tone sounds.*

Unlimited - The radio user can place private calls and receive them. The user can recall numbers from a programmed list or dial them from the keypad. 53xx radios support this mode only when they use the HHC control unit (firmware Version 1.28/ 2.6/3.6/4.2 or later only). Standard 53xx front and remote models do not support number dialing.

Phone Interconnect Usage[12] **-** Programs operation of telephone calls same as the preceding **Private Call Usage**.

Call Alert Usage - Programs operation of call alert calls (pages) the same as the preceding **Private Call Usage**.

Transmit Power - Fixes the system's transmit power at the high or low level, or makes it selectable. If it is selectable, the radio must have a high/low power function switch.

RSSI Threshold (SmartZone Only) - Sets the Receive Signal Strength Indicator (RSSI) levels that determine when searching for and switching to another site occurs.

System Modulation - Reserved for future use.

Disable Site Trunking Operation - The radio will go "Out of Range" if the site is in "Site Trunking".

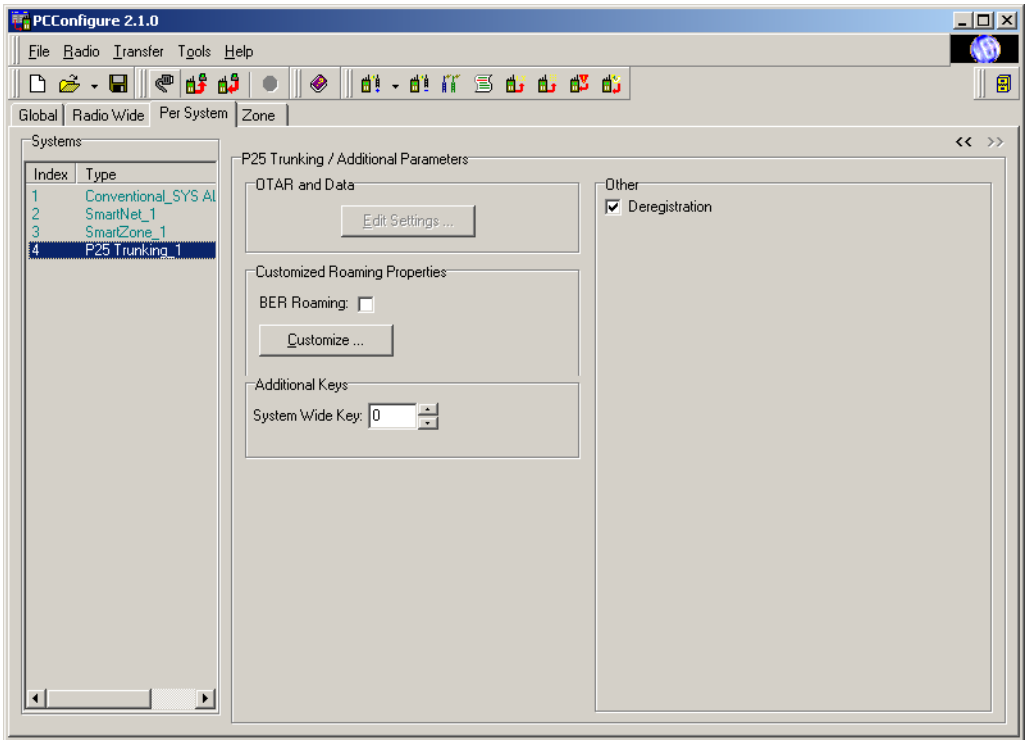
Inactivity Auto-Reaffiliation - If you check this, the radio attempts reaffiliation on the system if the radio has had no activity for the time period programmed by the **Auto-Reaffiliation Timer**.

Auto-Reaffiliation Timer - This parameter specifies the time the radio waits with no activity to attempt reaffiliation on the system.

9.2 Project 25 Trunked System Parameters: Second Screen

You open and close a second Project 25 trunked system programming screen when you click the << >> buttons in the upper right corner of the screen. Figure 9.2 shows the parameters that display on this second screen.

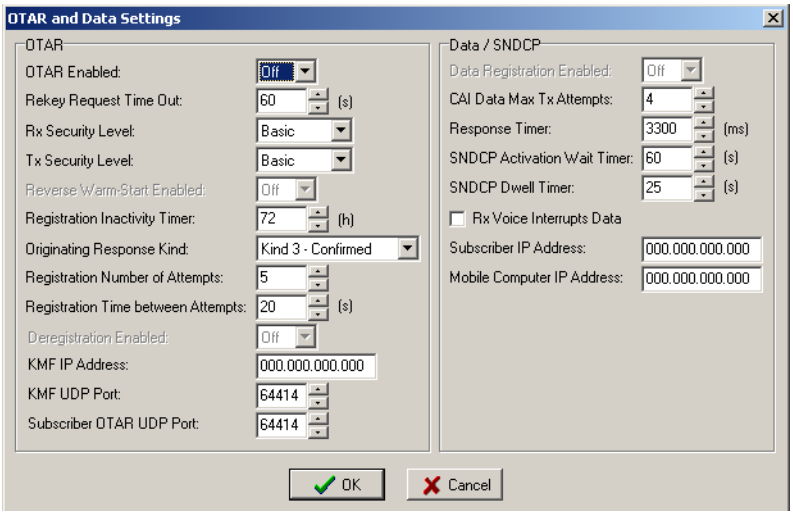
Figure 9.2 Second Project 25 Trunked System Screen



Note *To select OTAR and the data parameters that follow, you must select **SLN/CKR Mode** key management on the second **Global** screen. Refer to Section 4.2.*

Clicking the Edit Settings ... button displays the screen shown in Figure 9.3. This screen is the interface where you program various OTAR and Project 25 data parameters.

Figure 9.3 OTAR and Data Settings screen.



OTAR

OTAR Enabled - Select “On” to enable OTAR. Select “Off” to disable this feature.

Rekey Request Time Out - When the radio initiates rekeying (that is, when it sends an OTAR rekey request message), this setting determines how long the radio waits for a response from the Key Management Facility (KMF). You can program times of 20 through 180 seconds.

Rx Security Level

Enhanced - The radio accepts only encrypted and authenticated KMMs from the KMF (except for warm-start, which is authenticated only).

Basic - The radio accepts any KMM that is in a format allowed by the OTAR standard.

Tx Security Level

Enhanced - All OTAR procedures originating from the radio are encrypted and authenticated. If they cannot be encrypted and authenticated, the radio does not send the KMM.

Basic - The radio always sends unencrypted KMMs if the OTAR standard allows them to be unencrypted and unauthenticated.

Registration Inactivity Timer - If the radio has not registered any OTAR activity within the time period set by this timer (in hours), the radio attempts to re-register with the KMF.

Originating Response Kind - Selects if a response is required from the KMF to outgoing messages.

Kind 1-Unconfirmed - Requests no response.

Kind 3-Confirmed - Requests immediate response.

Registration Number of Attempts - Specifies the maximum number of times that the radio tries to complete a successful OTAR registration.

Registration Time Between Attempts - Specifies the time in seconds that the radio waits after an unsuccessful OTAR registration attempt before it tries to register again. This time period should be greater than the **Data/SNDCP > Response Timer** below.

KMF IP Address - The KMF's IP address.

KMF UDP Port - The UDP port that the radio uses when it sends Key Management Messages (KMMs) to the KMF. The default value is 64414.

Subscriber OTAR UDP Port - The UDP port that the radio uses for OTAR. The default value is 64414.

Data/SNDCP (Simple Network Data Control Protocol)

CAI Data Max Tx Attempts - Selects the maximum number of times the radio attempts to send a CAI data packet. Attempts to send the data packet continue until the radio receives an acknowledgment confirming the successful receipt of the packet, or until the radio exceeds the selected amount of transmit attempts.

Response Timer - Selects the period of time the radio waits for an acknowledgment that a CAI transmission is successful before it tries the transmission again.

SNDCP Activation Wait Timer - Controls the time that a radio waits for the KMF to respond to a SNDCP context activation request.

SNDCP Dwell Timer - Controls the dwell time.

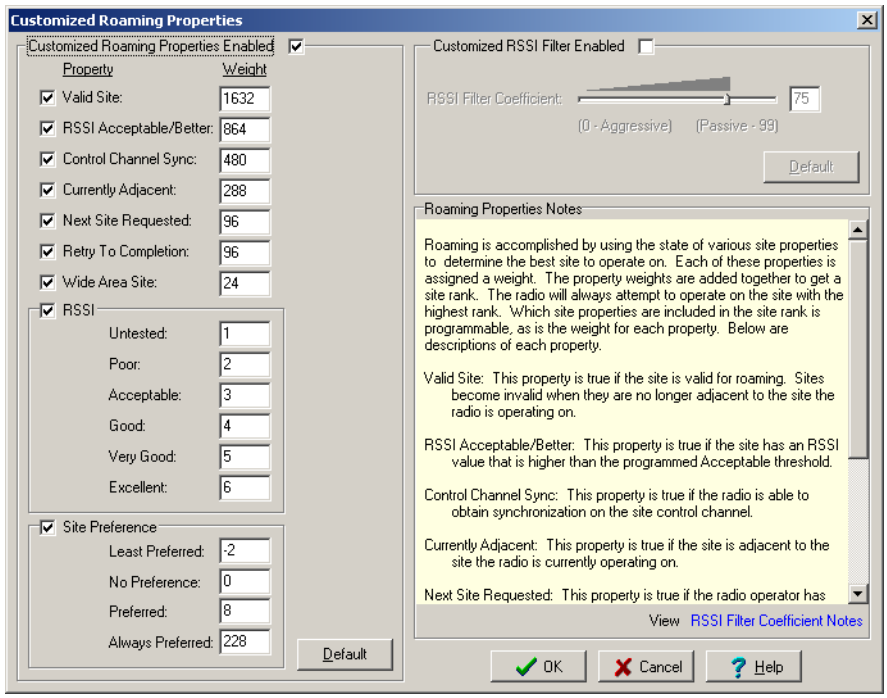
Rx Voice Interrupts Data - When checked, a voice call can interrupt data.

Subscriber IP Address - Not used.

Mobile Computer IP Address - Not used.

Customized Roaming Properties (P25 Only) - You can customize SmartZone and Project 25 Trunked roaming properties by clicking the Customize ... button. The screen shown in Figure 9.4 is displayed. Information programmed in this screen is described in the Roaming Properties Notes window. The RSSI Filter slider bar controls how quickly the radio reacts to dropouts in the RSSI level. The more aggressive the setting, the quicker site switching occurs.

Figure 9.4 SmartZone Customized Roaming Properties screen (SmartZone/Project 25 Trunked Only)



9.3 Project 25 Trunked System Lists

Select the various Project 25 trunking lists by the “System Lists” pull-down menu on the Project 25 Trunking **Per System** screen. Refer to Figure 9.1. After you select the desired list, you can edit it by clicking the Edit List ... button.

This section contains descriptions of the following lists:

- Channel identifiers list
- Control channels list
- Status alias list

- Call list
- Phone list
- P25 Trunking talk groups list
- P25 Trunking announcement groups list
- Site list
- Priority scan list
- System wide preferred site list
- User group ID list
- Rebanded CC list

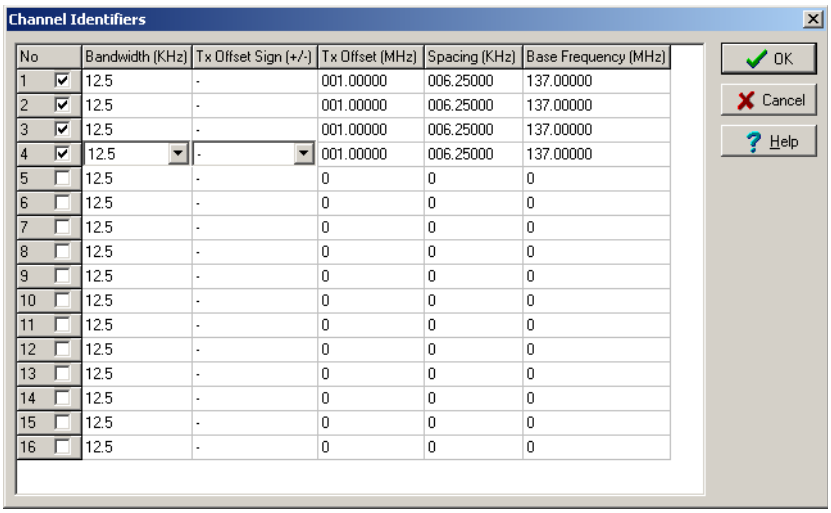
Descriptions of the various lists and the information they program follow.

9.3.1 Channel Identifiers List

The **Channel Identifiers** list screen shown in Figure 9.5 displays only when programming channels in the VHF, UHF, and 700/800 MHz frequency bands (Other Band Trunking). Both Explicit[1] and Implicit addressing is available.

Note *The system manager provides Channel ID and Control Channel information. This information must match the programming assigned to other subscriber units for it to function properly on the system.*

Figure 9.5 Channel Identifiers List Screen



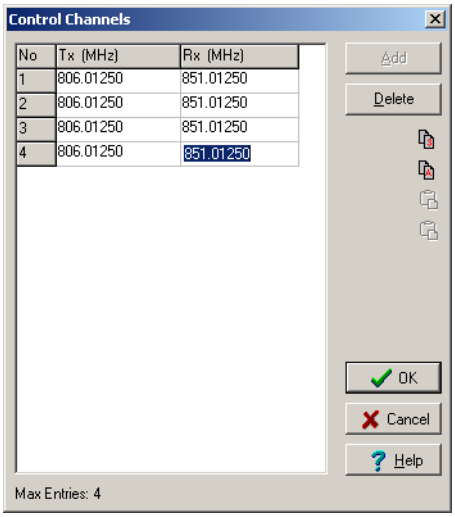
With Implicit Addressing, the control channel sends only the receive frequency. Information in this table determines the transmit frequency. With Explicit Addressing, the control channel sends both the receive and transmit frequencies. Both types reference information in this table. 800 MHz systems do not require this table because the difference between transmit and receive frequency is always 45 MHz.

9.3.2 Control Channels List

The **Control Channels** list screen shown in Figure 9.6 allows the system manager to view and edit the control channels. Each Project 25 trunking system can have a maximum of 255 control channels. Only one control channel is active at a time.

To display this screen, on the Project 25 Trunking System screen, select “Control Channel List” in the pull-down menu, then click the Edit List ... button. Refer to Figure 9.1.

Figure 9.6 Control Channels List Screen

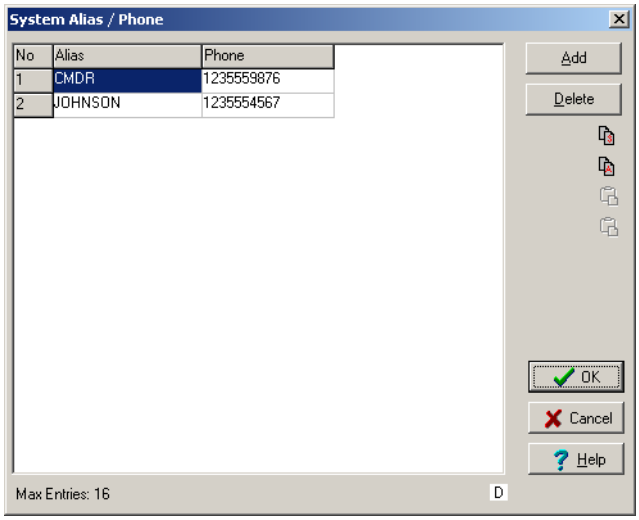


To add a channel, click the **Add** button. To delete a channel, simply select it and click the **Delete** button. To edit a channel, select the digits that you want to change and edit them as desired. For the 800 MHz band, you can change only the receive channel frequency. PC Configure automatically calculates the transmit frequency (45 MHz below the receive frequency). These are the mobile frequencies, not the repeater frequencies. Only multiples of 5 kHz and 6.25 kHz are valid.

9.3.3 Status Alias List

The **Status Alias** list screen shown in Figure 9.7 is the interface where you program the alias for each of a maximum of eight status conditions. The system manager defines meaning of each status number.

Figure 9.7 Status Alias List screen



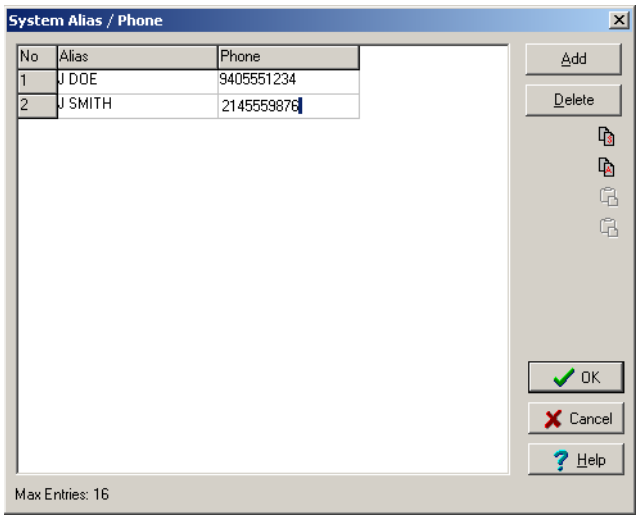
To display this screen, on the Project 25 Trunking **Per System** screen, select "Status Alias List" in the pull-down menu, then click the Edit List ... button. Refer to Figure 9.1.

To add an alias, click the **Add** button. To delete an alias, simply select it and click the **Delete** button. To edit an alias, select it and change it as desired. You can enter a maximum of 10 characters. This identification displays when the user selects a status condition.

9.3.4 Phone List

The Phone list screen shown in Figure 9.8 programs the telephone number list that the radio user may place telephone calls from (if you program the system to use this feature). You can program a maximum of 255 numbers. To display this screen, on the SMARTNET and SmartZone Per System screen, select "Phone List" in the pull-down menu, then click the Edit List ... button. Refer to Figure 9.1.

Figure 9.8 Phone List screen



To add a call, click the Add button. To delete a call, simply select it and click the Delete button. To edit an alias or number, select it and enter the desired information as follows

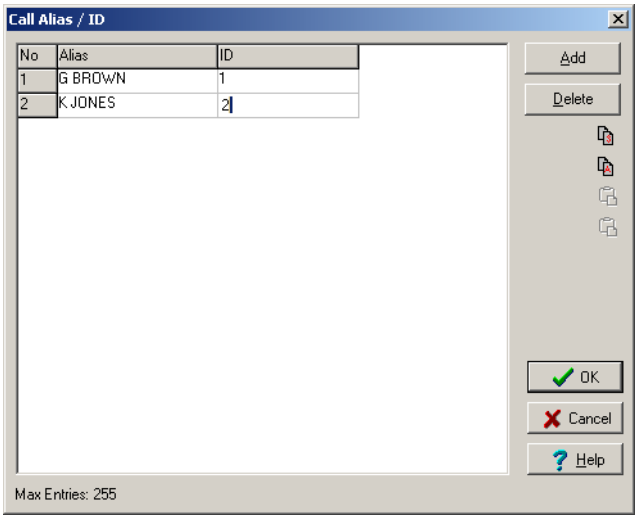
Alias - You can enter a maximum of ten characters to identify the number being called. This identification displays when the user selects the number to be called from the list. You can enter only capital letters, so PC Configure automatically converts any lowercase letters that you enter to capital letters.

ID - This is the telephone number that the radio dials when the radio user selects the location. Enter the 3-digit area code and 7-digit telephone number using the numbers 0 through 9.

9.3.5 Call Alias / ID List

The **Call Alias / ID** list screen shown in Figure 9.9 is the interface where you program the list of IDs used for unit calls. You can program a maximum of 255 IDs. To display this screen, on the Project 25 Trunking **Per System** screen, select **"**Call List" in the pull-down menu, then click the Edit List ... button. Refer to Figure 9.1.

Figure 9.9 Call Alias / ID List Screen



To add a call, click the **Add** button. To delete a call, simply select it and click the **Delete** button. To edit an Alias or ID, select it and enter the desired information as follows:

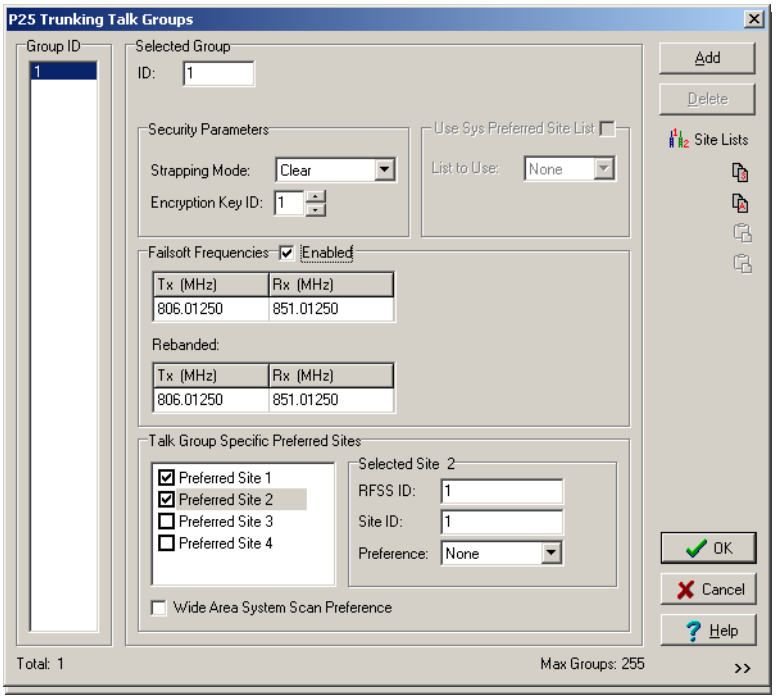
Alias - You can enter a maximum of ten characters to identify the user being called. This identification displays when the user selects the mobile radio to be called from the list. When the user receives a call from a unit in this list, the alias of the unit displays for the user instead of the calling unit's ID number. You can enter only capital letters, so PC Configure automatically converts any lowercase letters that you enter to capital letters.

ID - This is the ID of the radio that the user is calling. Valid entries are 1 through 16,777,215. PC Configure detects zero ("0") as no entry.

9.3.6 P25 Trunking Talk Groups List

The **P25 Trunking Talk Groups** list screen shown in Figure 9.10 sets up Project 25 Trunking talk groups. It is the interface at which you program unique talk group information. To display this screen, on the Project 25 Trunking **Per System** screen, select the "Talk Group List" pull-down menu, then click the Edit List ... button. Refer to Figure 9.1.

Figure 9.10 P25 Trunking Talk Groups screen



The parameters programmed in this screen are as follows:

ID - This list displays the talk group IDs contained in the Talk Group list. To edit a talk group ID in this list, select it and then change it in the **Selected Group** box. This is the actual ID of the talk group. You assign talk groups to channels in the **Zone** screen. Refer to Figure 6.6.

Note *You can enter this ID in either the decimal or hexadecimal format as described in Section 1.9.4.*

Add - Click this button to add the next available talk group ID to the list. You can program each Project 25 trunking system with up to 255 talk groups.

Add Mode - To add an entire block of talk group IDs or a specific ID, click the arrow button >> in the lower right corner of the screen. The P25 Trunking Talk Group screen is expanded and the **Add Mode** panel shown in Figure 9.11 is displayed:

Figure 9.11 Add Mode Screen

***Add Mode* Pull-Down**

Single - Adds the next available ID similar to the **Add** button.

Multiple - Adds a block of IDs as follows: To initiate the selected add operation, click the **Add** button. If the specified ID range results in duplicate IDs, an error message displays and PC Configure adds no IDs.

Start ID - Specifies the starting ID of the block.

ID Count - Specifies the number of IDs to be added.

ID Step - Specifies if consecutive IDs are added or some other step rate is used. For example, if Start ID =10, ID Count = 5, and ID Step = 10, the IDs added are 10, 20, 30, 40 and 50.

Use Selected Group's Security - When selected, PC Configure automatically programs the added groups with the Strapping Mode and Encryption Key ID of the selected group.

Delete - Clicking this button deletes the selected talk group.

Security Parameters

Strapping Mode

Clear - All transmissions on the talk group occur in the clear (unencrypted) mode.

Secure - All transmissions on the talk group occur in the secure (encrypted) mode selected as follows.

Selectable - The radio user select the clear or secure status of the talk group is with the **Clear/Secure** option switch.

Encryption Key ID - Selects the location from 0 to 15 (PID/ASN mode) or 1 to 16 (SLN/CKR mode) of the key used for secure calls on the group if applicable.

Use System Preferred Site List[13] **-** Selects one of the preferred sites for the talk group. Refer to the **Preferred Sites** description which follows for more information.

Failsoft Frequencies

Failsoft Enable - If you check this box, you enable a failsoft channel on the talk group if a controller or other major failure occurs. If you do not check this box, the radio does not enter the failsoft mode if a failure occurs.

Tx (MHz) - Programs the failsoft transmit frequency if you checked **Failsoft Enable**.

Rx (MHz) - Programs the failsoft receive frequency if you checked **Failsoft Enable**.

Talk Group Specific Preferred Sites

With Project 25 trunked systems, you can associate a maximum of four preferred sites. You can also associate a preferred site list[4] with each talk group. This forces a call on the talk group to access the specified sites. The system manager can then keep mobiles on specific sites even if you do not enable the Site Search feature. You can program the preference for each site as “Least”, “None”, “Preferred”, or “Always” as follows.

You program the preferred site lists at the **System Wide Preferred Site List** screen described on Section 9.3.10. You can program a maximum of 16 lists. Each list can include a maximum of 16 sites.

If you associate a talk group with both a preferred site list and one or more preferred sites, the radio searches the preferred sites first. The first entry found for a given site is used. If the same site is in both lists, the entry in the list at the bottom of the screen is used first.

Selected Site

RFSS ID- Designates a zone controller that the talk group can roam to.

Site ID - Designates a site that the talk group can roam to.

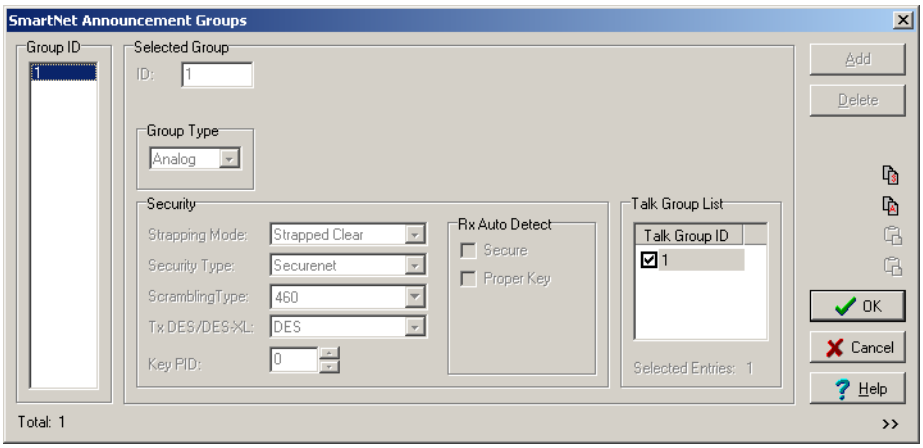
Preference - “Least”, “None” (no preference), “Preferred”, or “Always (preferred) is a weighting for steering to different sites.

Wide Area System Scan Preference - If the radio does not register on the system, it begins scanning to the last valid preference site on which it was registered.

9.3.7 P25 Trunking Announcement Groups List

The P25 Trunking Announcement Groups list screen shown in Figure 9.12 sets up Project 25 Trunking announcement groups that communicate with several talk groups simultaneously. Each announcement group can have a maximum of 15 talk groups.

Figure 9.12 P25 Trunking Announcement Groups screen



To display this screen, on the Project 25 Trunking **Per System** screen, select the "Announcement Group List" in the pull-down menu, then click the Edit List ... button. Refer to Figure 9.1.

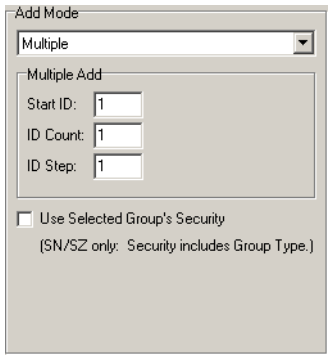
Group ID - This list displays the announcement group IDs contained in the announcement group list. To edit an ID in this list, select it and then change it in the **Selected Group** box. This is the actual ID of the announcement group. You assign announcement groups to channels in the **Zone** screen. Refer to Section 6.5.

Note *You can enter these IDs in either decimal or hexadecimal format as described in Section 1.9.4.*

Add - Clicking this button adds the next available announcement group ID to the list. You can program each Project 25 Trunked system with a maximum of 255 announcement groups.

To add an entire block of announcement group IDs or a specific ID, click the arrow button >> in the lower right corner of the screen. The **Add Mode** screen shown in Figure 9.11 then displays.

Figure 9.13 Add Mode Screen



***Add Mode* Pull-Down list**

Single - Adds the next available ID similar to the **Add** button.

Multiple - Adds a block of IDs as follows: To initiate the selected add operation, click the **Add** button. If the specified ID range results in duplicate IDs, an error message displays and PC Configure adds no IDs.

Start ID - Specifies the starting ID of the block.

ID Count - Specifies the number of IDs to be added.

ID Step - Specifies if consecutive IDs are added or some other step rate is used. For example, if Start ID =10, ID Count = 5, and ID Step = 10, the IDs added are 10, 20, 30, 40 and 50.

Use Selected Group's Security - When selected, PC Configure automatically programs the added groups with the Strapping Mode and Encryption Key ID of the selected group.

Delete - Clicking this button deletes the selected announcement group.

Security

Strapping Mode

Strapped Clear - All transmissions on the talk group occur in the clear (unencrypted) mode.

Strapped Secure - All transmissions on the talk group occur in the secure (encrypted) mode selected as follows.

Switched - The clear or secure status of the talk group is selected by the Clear/ Secure option switch.

Security Type - Select SecureNet or Scrambling (if programmed).

Note *Voice encryption is an optional feature that requires factory programming and possibly special hardware.*

SecureNet - Selects the Motorola SecureNet DES type of secure communication when you select either the coded or switched strapping mode.

Tx DES/DES-XL

With analog channels, when you select "Securenet" secure communication, you select either the DES or DES-XL type. DES-XL is available only in later models equipped with the UCM module.

On digital channels, you cannot select the type. Digital channels support both DES-OFB and AES encryption. The encryption key that the talk group selects determines the encryption type.

Note *AES encryption is not available with the 51SL or 53SL.*

Key PID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure calls on the group if applicable.

Rx Auto Detect

Secure - If this option is checked, an encrypted signal is automatically detected and received. This option may increase the response time to incoming signals. If it is not checked, those signals are detected only if they are coded like the transmit signals.

Proper Key - If this option is checked, the radio will search the available encryption keys until it finds a match for the current transmission.

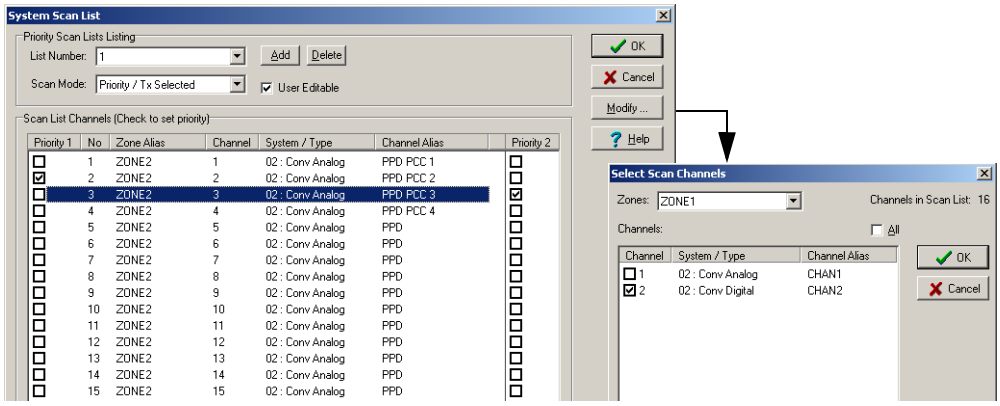
Talk Group List - Select the talk groups that are included in each announcement group. You can enter this ID in either decimal or hexadecimal format as described in Section 1.9.4.

9.3.8 Priority Scan List

Note *Before you can program the priority monitor scan lists, you must set up the channels that you want to include in these lists. You program them in the screen shown in Figure 6.6.*

The **Priority Scan List** screen shown in Figure 9.14 sets up the Priority (Standard) Scan lists that you can program on each Project 25 Trunking system. Each scan list can include up to 16 channels, one of which may be a priority channel. These channels must be from the same Project 25 Trunking system. You cannot program channels from other systems. You can program as many lists as can be stored in the available memory.

Figure 9.14 Priority Scan List Screen



To display this screen, on the Project 25 Trunking **Per System** screen, select "Priority Scan List" in the pull-down menu and then click the Edit List ... button (see Figure 9.1).

List Number - This pull-down menu is the interface where you select the scan list to edit. Click the **Add** button to add a scan list. Click the **Delete** button to delete a scan list.

Modify ... - Click this button to display the screen shown in Figure 9.14. This screen is the interface where you edit the selected scan list. Check the channels in each zone that you want to include in the selected scan list. Repeat for the other scan lists if applicable.

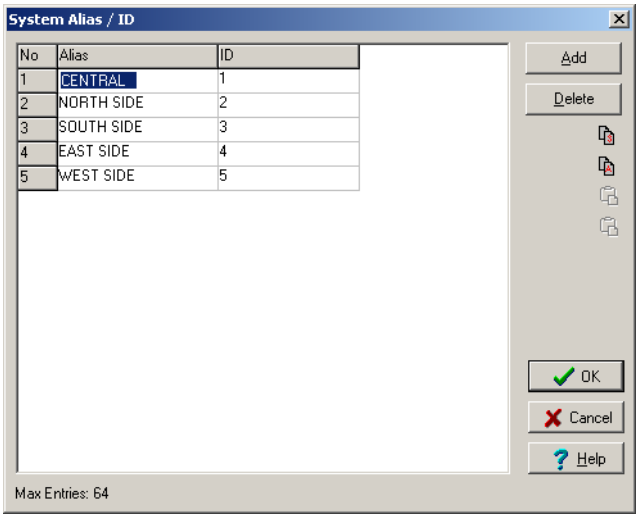
Scan Mode - To use priority scan on a list, select "Priority on Selected" (51xx/53xx only) or "Priority on Programmed" from the pull-down menu. If you select "Priority on Programmed", check the box of the desired priority channel. If you do not want to use priority scan, select "Non Priority Scan".

Note *To use Priority talk group scanning, your system must support it for it to occur as programmed. You must designate talk groups programmed as "Priority" as Priority Monitor Groups by the System Control software.*

9.3.9 Site Alias / ID List

Sites in a Project 25 Trunking system are designated by a site number and an RF subsystem (RFSS) number. The **Site Alias / ID** list screen shown in Figure 9.15 is the interface where you can program an alias for each site that displays when using the Site Search feature.

Figure 9.15 Site Alias / ID screen



To display the preceding screen, on the Project 25 Trunking **Per System** screen, select "Site List" in the drop-down list and then click the Edit List ... button. Refer to Figure 9.1.

To add an alias, click the Add button to display the **Add Alias/ID** screen. To delete an alias, simply select it and click the **Delete** button. To edit an alias or ID, simply select it and make the desired changes.

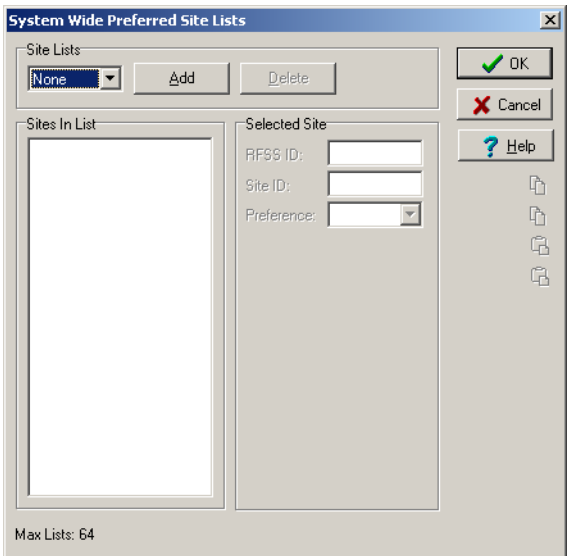
Alias - Programs up to 10 alphanumeric characters that identify the site.

Site ID - Values can be from 0 through 48.

9.3.10 System Wide Preferred Site List

The **System Wide Preferred Site List** screen shown in Figure 9.16 is the interface where you program up to 16 preferred site lists. You can associate these lists with individual talk groups on the **P25 Trunking Talk Groups** list screen shown in Figure 9.10. This forces calls on a talk group to access specific sites. You set the preference for each site in a list as "Least", "None", "Preferred", or "Always" as follows:

Figure 9.16 System Wide Preferred Site List Screen



You can program each list with a maximum of 16 sites. Therefore, using preferred site lists allows you to associate a group with a maximum of 16 sites, rather than just 4 sites as available through the **P25 Trunking Talk Groups** list screen. Also, if you associate several talk groups with the same sites, you can simply select a list instead of separate sites.

Site Lists - This pull-down menu is the interface where you select the list that you want to edit. To add a new list, click the **Add** button. To delete the selected list, click the **Delete** button.

Sites In List - To add or delete a site from the list, click its check box.

Site ID - Enter the site ID from 0 through 48.

Preference - Select the site preference from the pull-down menu. A default weighting is usually assigned to these preference levels. This results in the most preference given to "Always" and the least preference to "Least" as follows:

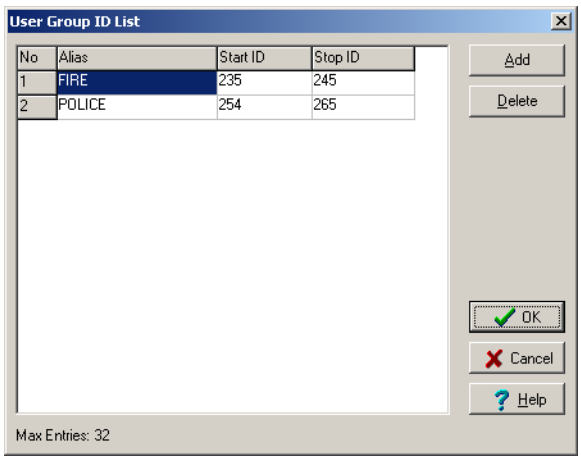
1. Always (always preferred)
2. Preferred
3. None (no preference)
4. Least (least preferred)

9.3.11 User Group ID List

This **User Group ID List**[11] screen shown in Figure 9.17 is the interface where you program aliases that display if a radio user receives a call on a talk group ID within the programmed block. For example, in the screen shown in Figure 9.17, if a radio user

receives a group call from Group IDs 234 through 264, the alias “Fire” displays. The **User Group ID** parameter on the **Radio Wide** screen controls the display of this alias.

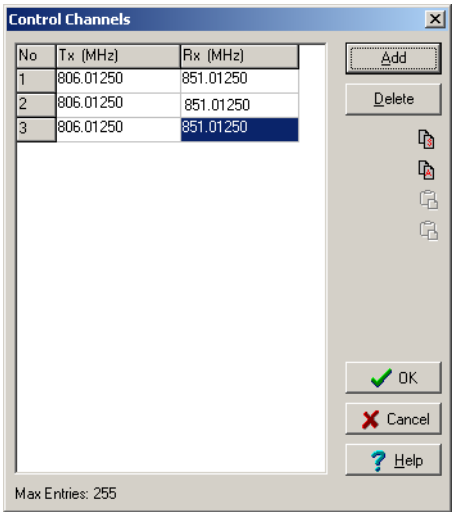
Figure 9.17 User Group ID List screen



9.3.12 Rebanded CC List

This Control Channels list is the control channels for sites that have been rebanded.

Figure 9.18 Control Channels (rebanded system list) screen



SECTION

10

Password Description

This section contains the following information about passwords:

- Password enhancements
- Programming passwords
- Password description
- Zone password

10.1 Password Enhancements

5100 portables and 5300 mobiles have an enhanced password feature. You can assign more passwords. Also, more functions can be under password control. The following passwords replace the single Power-On password:

- Four power-on (User x) passwords
- Download and upload passwords
- Master password

These new enhanced password features require the following revised PC Configure and radio software:

PC Configure - Version 1.21.8 or later

51xx Portable

Version 1.x Models - 1.12.1 or later

Version 2.x Models - 2.2.1 or later

Version 3.x Models - 3.2.1 or later

53xx Mobile

Version 1.x Models - 1.24.1 or later ARM

Version 2.x Models - 2.2.1 or later

Version 3.x Models - 3.2.1 or later

Note *Refer to Section 16 for more information on the preceding radio firmware versions.*

You can use PC Configure 1.21.2.8 or later to program the power-on password feature available with earlier versions of radio firmware. To program that feature in earlier radio models, you must use an earlier version of PC Configure. You program it using the **Password at Power Up** function on the **Global** screen.

Note *You can use PC Configure 1.21.2.8 or later to program earlier radio models. However, any new features that require updated firmware will not be available.*

10.2 Programming Passwords

With the latest versions of PC Configure, the **Password at Power Up** parameter is removed from the **Global** screen as described in Section 10.1. You program passwords using a password management screen displayed by the **Tools > Password Management** menu. Refer to Section 3.4. You must power-up the radio and connect the radio to the computer to display this screen.

PC Configure transfers password data and stores it in an encrypted format for security purposes. In addition, PC Configure never displays actual passwords. They are always indicated by eight asterisks (********). Therefore, you cannot use PC Configure to determine what passwords are in a radio.

Passwords must be 1-8 characters in length and consist of the numbers 0-9. Zeros are valid characters in any location, even as leading characters. Initially, all passwords are null (deleted) characters. Therefore, when you first program a password, you do not need to make an entry in the **Original/Master Password** box.

10.2.1 Lost Passwords

If you lose a password, you can change it using PC Configure by entering the master password, as Section 10.3.3 describes. If the master password is lost or was not used, you can erase all passwords using the PCTune software as follows:

1 With PCTune 1.1.1.0 or later, simply select **Radio > Reset Passwords**. Only password information is erased.

2 With earlier versions of PCTune, after starting the PCTune program, press <Shift> <Ctrl> <E> to toggle the following **Erase EEPROM** function. Otherwise, it is grayed and you cannot select it. Then select **Radio > Erase EEPROM > Params Only**. This erases all password and personality information, so you must then reprogram the radio.

⚠ CAUTION ***Do not select* COMPLETE** *because that erases all information. Then, you must send the radio back to the factory to make it usable again.*

10.2.2 Changing Password

A user can change an assigned password only if the **Set User Password** option button or menu parameter (51xx only) is programmed on the radio. Selecting this function displays prompts for entering and confirming a new password.

Note *With the 51xx portable and 53xx Handheld Control Unit (HHC), you should not use a number key for this function. This is because you exit the password mode if you press the assigned key when you enter a number.*

10.2.3 Password Entry Procedure

When the radio prompts you to enter a password, perform the following procedure to enter it:

51xx Portable - With DTMF keypad models, enter each number using the keypad and press the <F2> key after you enter the last digit. With limited keypad models, enter each number by pressing the Up/Down switch and press the <F2> key after each digit.

53xx Mobile - Rotate and press the **Select** switch.

10.3 Password Description

This section contains descriptions of the following types of passwords:

- User (power-on) passwords
- Download/Upload passwords
- Master password

10.3.1 User (Power-On) Passwords

When you enable a user password, you must enter it each time you turn on the radio's power. You can program a maximum of four different user passwords (User 1/User 2/User 3/User 4). The same radio features are enabled for each. When you enter any user password at power up, you enable normal radio operation.

10.3.2 Download/Upload Passwords

You can program separate download (write) and upload (read) passwords to prevent unauthorized downloading or uploading of radio programming parameters. Refer to Section 3.3. When you use either of these passwords, you must enter the proper password to perform the desired operation. You do not need a user password to upload or download parameters.

10.3.3 Master Password

The master password overrides all the preceding passwords. The system administrator can use it as a “pass key” to a password-controlled function or to change a lost or unintentionally-changed password. Master passwords are set up and changed the same as the other passwords. It does not override the zone password described in Section 10.4.

10.4 Zone Password

Note *The programming and use of the zone password has not changed. It is independent of the preceding passwords. You program it in the **Zone > Edit Zones and Channels** screen.*

You can program a zone password for the 53xx mobile and 51xx portable. It prevents unauthorized reprogramming of zones by keypad programming. When you use this password, you must enter it before you can change system or channel parameters in that zone. You program the zone password in the **Edit Zones and Channels** screen. To display this screen, click the **Edit Zone** button on the **Zone** screen. Refer to Section 6.1.

You can program a different password for each zone. When you select a password-protected zone, “PASSWORD” flashes the first time you try to select a system or channel parameter in that zone. You then enter each digit of the password as previously described. The password is always eight digits long. After you enter the eighth digit, you can program system and channel parameters for that zone normally.

SECTION

11

51xx Portable Keypad Programming

Note *Keypad programming is permitted by United States federal government users only. It is not permitted by any user regulated by the United States Federal Communications Commission (FCC). Radios with ARM code 1.22.0 or later require that the Keypad Programming option be factory enabled to program this feature. Refer to Section 3.3.*

Since only United States federal government users are permitted to use keypad programming, you can only program United States federal government models of this radio with this feature.

You can only use keypad programming if it has been enabled by factory programming and a conventional mode option switch or menu parameter is programmed for the **Keypad Programming** function. You then select it by simply pressing that switch or selecting that menu parameter. The keypad programming mode is indicated by “CHNG ZONE” and  in the display.

Keypad programming allows you to change conventional channel parameters such as the transmit and receive frequency, Call Guard squelch code, and encryption code. In addition, several conventional mode timers can be changed. You cannot use it to reprogram disabled channels or any Project 25 Trunked and SMARTNET/SmartZone information.

This section covers the following aspects of 51xx portable keypad programming:

- Menu description
- Zone change parameter
- Channel change parameter
- System parameters
- Channel parameters

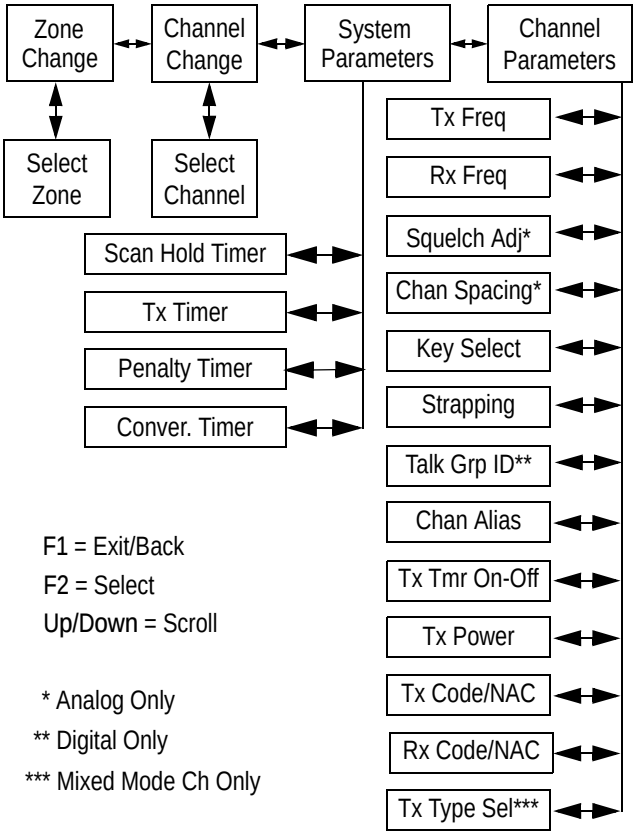
11.1 Menu Description

51xx portable keypad programming uses a menu system to let you select the parameters you want to change in the keypad programming mode. Figure 11.1 is a flowchart that shows the keypad programming mode menu structure. When you select the keypad programming mode by the **Keypad Programming** option button or menu parameter, the first menu parameter “CHNG ZONE” displays as just described. Press the Up/Down switch to scroll through the following parameters:

- CHNG ZONE (Section 11.2)
- CHNG CHAN (Section 11.3)
- SYS PARMS (Section 11.4)
- CHAN PARMS (Section 11.5)

Press the <F2> (Select) key to select a highlighted parameter, and press the <F1> key from one of the main menus to exit keypad programming. When you press the <F1> key in the other menus, you return to the previous menu. You also use the Up/Down switch in several menus to scroll through available selections. The following sections describe these parameters.

Figure 11.1 51xx Keypad Programming Menu Flowchart



11.2 Zone Change Parameter

The “CHNG ZONE” menu parameter selects the zone containing the conventional channel that you want to reprogram. It does not change the zone selected for normal operation.

Press the <F2> key to select the “ZONE CHG” parameter and then scroll through the programmed zones by pressing the Up/Down switch. When the desired zone displays, select it by pressing the <F2> key.

11.3 Channel Change Parameter

The “CHNG CHAN” menu parameter selects the conventional channel to be reprogrammed. You cannot select disabled channels or Project 25 Trunked/SMARTNET/SmartZone channels. This does not change the channel selected for normal operation.

Press the Select switch to select the “CHNG CHAN” parameter and then scroll through the programmed channels by pressing the Up/Down switch. When the desired channel appears, select it by pressing <F2> key.

11.4 System Parameters

Note *If “PASSWORD” displays briefly when you try to select one of the following parameters, you must enter the zone password before you can make any changes. Refer to Section 10.4 for more information.*

The “SYS PARMS” menu parameter lets you select the conventional mode timer that you want to reprogram from among the following. Press the <F2> key to select the “SYS PARMS” parameter, then press the Up/Down switch to display the desired parameter. Press the <F2> key again to select it.

SCAN TIMER - Selects the Scan Hold timer. Press the Up/Down switch to decrement or increment the timer in 0.5-second steps from 0-7.5 or set it to 0 seconds to disable it. When the desired value appears, store it by pressing the <F2> key.

TX TIMER - Selects the transmit time-out timer. Press the Up/Down switch to decrement or increment the timer in 15-second steps from 0-225 or disable it by selecting 0 seconds. When the desired value appears, store it by pressing the <F2> key.

PEN TIMER - Selects the penalty timer. Press the Up/Down switch to decrement or increment the timer in 15-second steps from 0-225 or disable it by selecting 0 seconds. When the desired value appears, store it by pressing the <F2> key.

CONV TIMER - Selects the conversation timer. Press the Up/Down switch to decrement or increment the timer in 30-second steps form 0-450 or disable it by selecting 0 seconds. When the desired value appears, store it by pressing the <F2> key.

11.5 Channel Parameters

Note *If “PASSWORD” displays briefly when you try to select one of the following parameters, you must enter the zone password before you can make any changes. Refer to Section 10.4 for more information.*

The “CHAN PARMS” menu parameter selects the following conventional channel parameters that you can reprogram. Press the <F2> key to select the “CHAN PARMS” parameter, then press the Up/Down switch to display the desired parameter. Next, press the <F2> key to select it. The squelch control parameters are unique to the type of conventional channel selected (analog or Project 25).

Note *If you select a mixed-mode channel, you can program both the **RX CODE** (analog) and **RX NAC** (Project 25) parameters that are described below. Also, if the **Transmit Type** is analog, a **TX CODE** is programmed. If the **Transmit Type** is Digital (Project 25), a **TX NAC** is programmed.*

TX FREQ - Programs the transmit channel frequency. The digits that you change begin to flash. Press the Up/Down switch to select the desired number for that digit. Then, press the <F2> key to move to the next digit. If you try to enter an invalid frequency, a beep sounds, “INVALID” displays briefly, and you must reenter the number.

RX FREQ - Programs the transmit frequency the same as **RX FREQ** above.

SQ ADJ (analog only) **-** Changes the preset squelch setting on that channel. “0” is the default setting. You can select values from –7 to +7. Increasing this setting toward +7 causes the squelch to open sooner so you can receive weaker signals. Decreasing it toward –7 causes the opposite to occur.

Note *The channel spacing is not set with Project 25 channels because it is always narrow. You cannot change the squelch because the setting is critical for proper receiver operation.*

CHAN SPC (analog only) **-** Selects either wide or narrow band channel spacing on analog channels only. Press the Up/Down switch to select “WIDE” or “NARROW”. When the desired setting displays, store it by pressing the <F2> key.

Note *You program the next two parameters only if the radio is programmed for encryption.*

Key Select* **-** Selects the encryption key for the channel if applicable. The key storage location of 0-15 (PID) or 1-16 (SLN) is selected. Refer to Section 4.2. If no keys are programmed, “No Keys” appears. Requires code 1.12.1/2.2.1/3.2.1 or later.

Strapping* **-** Selects the encryption strapping mode for the channel as Clear, Secure, or Switched. Requires code 1.12.1/2.2.1/3.2.1 or later.

TG ID (Project 25 Only) **-** Selects the talk group for the selected channel. Press the <F2> key to display the current talk group ID, then press the <F2> key again to enter a different ID from 1-65,535*. You must enter this number directly using the DTMF keypad. Requires code 1.12.1/2.2.1/3.2.1 or later.

Channel Alias* **-** Programs the alias for the channel (DTMF keypad models only). You can enter a maximum of ten characters. Press the <F2> key once to display the current alias, then press it again to program a new alias. You program alphanumeric characters using the 0-9 keys. Pressing a key once enters the first letter on the key, then pressing it successive times enters the letters and the number on the key. For example, press the <2> key twice to enter “B”. Press the <F2> key to move to the next position or press it twice to enter a space. Requires code 1.12.1/2.2.1/3.2.1 or later.

TX TIMER - Enables or disables the time-out timer on the current channel. Press the Up/Down switch to select the on and off mode. When the desired setting displays, store it by pressing the <F2> key.

TX POWER - Selects the desired power output level. Press the Up/Down switch to scroll through the following choices. When the desired setting displays, store it by pressing the <F2> key.

- Power High - High transmit power
- Power Low - Low transmit power
- Power SW - Switchable power selectable by the High/Low power switch. You cannot choose this if that switch is not programmed.

CTCSS/DCS Squelch Control (analog channel)

TX CODE - Programs the transmit Call Guard (CTCSS/DCS) code. The currently selected code displays. Press the Up/Down switch to select the desired code type (CTCSS analog or DCS digital). Then press the <F2> key to select it and enter the code number. This process is similar to programming a channel frequency as just described.

RX CODE - Selects the receive codes the same as **TX CODE** above.

NAC Squelch Control (Project 25 Channel)

TX NAC - Programs the transmit Network Access Code (NAC) which can be any number from 0-4095. With later models, this number appears in hexadecimal from 000-FFF. The procedure is similar to programming a **TX FREQ** as just described. If you enter an invalid code, a beep sounds, “INVALID” appears briefly, and you must reenter the code.

RX NAC - Selects the receive NAC through a similar process as described for **TX NAC** above.

Transmit Type (Project 25 mixed mode only) **-** If the selected channel is a mixed mode, analog and Project 25 channel, this selects the transmit type. You can select either analog or digital (Project 25). This then determines if a TX CODE or TX NAC is programmed above.

SECTION

12

53xx Mobile Keypad Programming

Note *Keypad programming is permitted by United States federal government users only. It is not permitted by any user regulated by the United States Federal Communications Commission (FCC). Radios with ARM code 1.22.0 or later require that the Keypad Programming option be factory enabled to program this feature. Refer to Section 3.3.*

Since only United States federal government users are permitted to use keypad programming, you can only program United States federal government models of this radio with this feature.

You can only use keypad programming if it has been enabled by factory programming and a conventional mode option switch or menu parameter is programmed for the **Keypad Programming** function. You then select it by simply pressing that switch. You do not need to enter a password to use it. The text “CHNG ZONE” and a triangle in the display indicate keypad programming mode as follows:

Keypad programming allows you to change conventional channel parameters such as the transmit and receive frequencies, Call Guard squelch code, and encryption key. Also, you can use it to change several conventional mode timers. You cannot use it to reprogram disabled channels or any Project 25 Trunked, SMARTNET, or SmartZone information.

This section covers the following aspects of 51xx portable keypad programming:

- Menu description
- Zone change parameter
- Channel change parameter
- System parameters
- Channel parameters

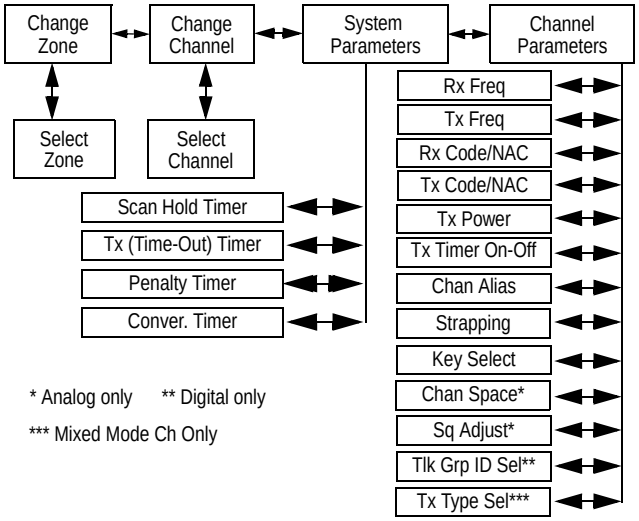
12.1 Menu Description

53xx mobile keypad programming uses a menu system to let you select the parameters you want to change in the keypad programming mode. Rotate and press the **Select** switch to scroll through and select the available parameters. The available parameters and the section in which each is described are as follows:

- CHNG ZONE (Section 12.2)
- CHNG CHAN (Section 12.3)
- SYS PARMS (Section 12.4)
- CHAN PARMS (Section 12.5)

Press the **Select** switch to select the displayed parameter. Press the **Keypad Programming** option switch from one of the main menus to exit keypad programming, or from other menus to exit back one level. Figure 12.1 shows the keypad programming mode menu structure.

Figure 12.1 53xx Keypad Programming Menu Flowchart



12.2 Zone Change Parameter

The “CHNG ZONE” menu parameter selects the zone containing the conventional channel that you want to reprogram. It does not change the zone selected for normal operation.

Press the **Select** switch to select the “CHNG ZONE” parameter, then scroll through the programmed zones by rotating that switch. When the desired zone displays, select it by pressing the **Select** switch.

12.3 Channel Change Parameter

The “CHNG CHAN” menu parameter selects the conventional channel that you want to reprogram. You cannot select disabled or Project 25 Trunked/SMARTNET/SmartZone channels. This does not change the channel selected for normal operation.

Press the **Select** switch to display “CHNG CHAN” and then rotate that switch to scroll through the programmed channels. When the desired channel displays, select it by pressing the **Select** switch.

12.4 System Parameters

Note *If “ENTER PSWD” displays briefly when you try to select one of the following parameters, you must enter the zone password before you can make any changes. Refer to Section 10.4 for more information.*

The “SYS PARMS” menu parameter selects the conventional mode timer that you want to reprogram. Press the **Select** switch to select the “SYS PARMS” parameter and then rotate that switch to display the desired parameter. Then press the **Select** switch again to select it.

SCAN TIMER - Selects the Scan Hold timer. Rotate the **Select** switch to decrement or increment the timer in 0.5-second steps from 0-7.5 or set it to 0 seconds to disabled it. When the desired value displays, store it by pressing the **Select** switch.

TX TIMER - Selects the transmit time-out timer. Rotate the **Select** switch to decrement or increment the timer in 15-second steps from 0-225 or disable it by selecting 0 seconds. When the desired value displays, store it by pressing the **Select** switch.

PEN TIMER - Selects the penalty timer. Rotate the **Select** switch to decrement or increment the timer in 15-second steps from 0-225 or disable it by selecting 0 seconds. When the desired value displays, store it by pressing the **Select** switch.

CONV TIMER - Selects the conversation timer. Rotate the **Select** switch to decrement or increment the timer in 30-second steps from 0-450 or disable it by selecting 0 seconds. When the desired value displays, store it by pressing the **Select** switch.

12.5 Channel Parameters

Note *If “ENTER PSWD” displays briefly when you try to select one of the following parameters, you must enter the zone password before you can make any changes. Refer to Section 10.4 for more information.*

The “CHAN PARMS” menu parameter selects the following conventional channel parameters that can be reprogrammed. Press **Select** switch to select the “CHAN PARMS”

parameter and then rotate that switch to display the desired parameter. Then press the **Select** switch again to select it. The squelch control parameters are unique to the type of conventional channel selected (analog or Project 25).

Note *If you select a mixed mode channel, you can program either the Rx Code (analog) and Rx NAC (Project 25) which follow. Also, if the Tx Type is Analog, a Tx Code is programmed, and if it is Digital (Project 25), a Tx NAC is programmed.*

RX FREQ - Sets the receive channel frequency. To select the digit to change or move the cursor to the right, press the **Select** switch. Then to display the desired digit, rotate the **Select** switch. The frequency is stored after programming the last digit. If you enter an invalid frequency, a beep sounds, “INVALID” is displays briefly, and the frequency editing mode continues to be selected.

TX FREQ - Selects the transmit frequency the same as RX FREQ above.

CTCSS/DCS Squelch Control (Analog Channel)

RX CODE - Sets the receive Call Guard (CTCSS/DCS) code. The currently selected code is initially displayed. If required, rotate and press the **Select** switch to select the desired type (CTCSS analog or DCS digital). Then enter the desired code similar to programming a receive frequency as just described. If an invalid code is entered, a beep sounds, “INVALID” is briefly displayed, and the editing mode continues to be selected.

TX CODE - Selects the transmit codes the same as RX CODE above.

NAC Squelch Control (Project 25 Channel)

RX NAC - Selects the receive Network Access Code (NAC) which can be any number from 0-4095. With later models, this number displays in hexadecimal from 000-FFF. Rotate and press the **Select** switch to enter the desired code. The displayed code is stored after the last digit is programmed. If you enter an invalid code, a beep sounds, “INVALID” is displays briefly, and the NAC editing mode continues to be selected.

TX NAC - Selects the transmit NAC the same as RX NAC above.

TX POWER - Selects the desired power output level. Rotate the **Select** switch to scroll through the following choices. When the desired setting displays, store it by pressing the **Select** switch.

- **POWER HIGH -** High transmit power
- **POWER LOW -** Low transmit power
- **POWER SW -** Switchable power selectable by the High/Low power switch. This choice is not available if that switch is not programmed.

TX TIMER - Enables or disables the time-out timer on the current channel. Rotate the **Select** switch to toggle between the on and off mode, and when the desired setting displays, store it by pressing the **Select** switch.

Channel Alias - Programs the alias for the channel. Up to ten characters from A-Z and 0-9 and spaces can be entered. Press **Select** switch once to display the current alias and then press it again or rotate it to program a new alias. Rotate the **Select** switch to display the

desired character and then press it to move to the next position. The number is stored after the **Select** switch is pressed with the last position selected.

Note *The next two parameters are programmed only if the radio is programmed for encryption.*

Strapping - Selects the encryption strapping mode for the channel as Clear, Secure, or Switched.

Key Select - Selects the encryption key for the channel if applicable. The key storage location of 0-15 (PID) or 1-16 (SLN) is selected. Refer to Section 4.2. If no keys are programmed, “No Keys” displays.

CHAN SPACE (analog only) - Selects either wide or narrow band channel spacing on analog channels only. Rotate the **Select** switch to toggle between “WIDE” and “NARROW”, and when the desired setting displays, store it by pressing the **Select** switch.

SQ ADJUST (analog only) - Changes the preset squelch setting on that channel. The default setting is “0” and values of –7 to +7 can be selected. Increasing this setting toward +7 causes the squelch to open sooner so the radio can receive weaker signals, and decreasing it toward –7 causes the opposite to occur.

TG ID (Project 25 only) - Selects the talk group for the selected channel. Rotate the **Select** switch to display the alias of each preprogrammed talk group and then press it to store the desired talk group.

Transmit Type (Project 25 mixed mode only) - If the selected channel is a mixed mode, analog and Project 25 channel, this selects the transmit type. You can select either analog or digital (Project 25). This then determines if a Tx Code or Tx NAC is programmed above.

SECTION

13

System Key

To program certain SMARTNET/SmartZone and Project 25 Trunking parameters, PC Configure must detect the proper system key. EFJohnson provides the system key to authorized users. It is not the same as the encryption (hardware) key. You do not need it to program conventional analog and conventional Project 25 parameters.

The following sections describe the parameters that are available only with the system key. Other parameters associated with trunking, such as zones and channels, continue to be editable. If a system key has no trunking parameters enabled, a default trunking system of "One" is assigned and disabled parameters are unavailable for assignment to this system even though the radio can operate in trunking mode.

This section describes the following aspects of the PC Configure system key:

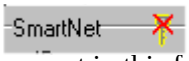
- Location
- Disabled SMARTNET/SmartZone parameters
- Disabled Project 25 trunking parameters

13.1 System Key Location

Copy the system key to the *Keys* folder of the PC Configure directory. This folder is automatically created when you install PC Configure. The default directory in which PC Configure is installed is as follows; some other location may also have been selected:

Program Files\EF Johnson\PCConfigure1_x.x.

You can also load the system key from other folders using the **Radio > Load System Keys** function. A dialog box appears that allows you to select the folder. When you restart the program, either the *Keys* folder or the last selected folder is selected, depending on the **Tools > Preferences** programming.Refer to Section 3.4.



- This icon on the system screen (Figure 8.1) indicates that a system key is present in this folder. If a system key is not present, this yellow key icon has a red “X” over it as shown above and you cannot program any of the following parameters.

Note *If the red “X” is still displayed after a key is copied to the Keys folder, you may need to restart the PC Configure program for it to recognize the key. In addition, be sure to select the new system ID contained in the key in the* ***IDs > System*** *drop down list on the* ***Per System*** *screen.*

13.2 Disabled SMARTNET/SmartZone Parameters

You cannot add or delete the following SMARTNET/SmartZone parameters without the proper system key:

- System ID - You can only select the system IDs from available keys
- Individual ID
- Control channels
- Talk groups
- Announcement groups
- Emergency groups
- Connect tone
- Splinter channel option

13.3 Disabled Project 25 Trunking Parameters

The following Project 25 Trunked parameters cannot be added or deleted without the proper system key. You can still edit conventional analog and Project 25 parameters

- WACN ID
- Home system ID
- Site ID
- RFSS ID
- Individual ID
- Control channels
- Talk groups
- Announcement groups

SECTION
14

51xx Cloning Procedure

After an introduction to 51xx Series cloning, this section describes PC Configure's wireless cloning feature and tells how to perform cloning.

The cloning feature enables one radio to program another with identical information. You do not need PC Configure programming software to do this. This feature is available with 51xx portables only. Other requirements are as follows:

- You must enable the Clone menu parameter in the master (sending) radio. The slave (receiving) radio does not need this parameter.
- The master and slave radios must be identical models (same frequency range and options).
- Both radios require Flash code Version 1.5.0/2.0.0/3.0.0 or later. Refer to Section 16.1. You need PC Configure Version 1.17 or later to program the Clone menu parameter.

You can only transfer zones with conventional analog and Project 25 channels using this function. This function will not transfer any SMARTNET/SmartZone or Project 25 trunked information. Also, this function does not transfer Project 25 Unit ID, encryption keys, or the RSI ID or other OTAR information. The slave radio indicates cloned zones by an asterisk in the first character position of the zone alias. The first character is replaced by this asterisk.

14.1 Wireless Cloning

A wireless cloning feature is available that allows one radio to program another using an RF link instead of having to be connected by a cloning cable. Only 5100 radios with the following firmware or later have this feature. Refer to Section 16.1 for more information on 5100 versions.

Version 1 Radio - 1.12.1 to 1.14.3 only

Version 2 Radios - 2.2.1 to 2.4.6 only

Version 3 Radios - Not available

Version 4 Radios - Available with all versions

The wireless cloning feature uses the Project 25 data functionality of the radio. Therefore, you must program a conventional Project 25 channel in both radios. You must program the slave radio with a Project 25 Unit ID. You must also enable Data Registration on Page 2 of the **Per System** screen Refer to Page 7-6. If it is not enabled, "Disabled" is displayed. Radios with wireless cloning capability have a selection in the cloning menu to select either Clone N (Normal) or Clone W (Wireless). If you select "Wireless,", an additional menu appears. In this menu, you enter the Project 25 Unit ID of the slave radio. You then select the Zone/Complete mode.

14.2 Cloning Procedure

1 With normal (non-wireless) cloning, connect the master radio to the slave radio using Cloning Cable, Part No. 023-5100-930.

2 On the master radio, select the **Clone** menu parameter and press the <F2> key. If applicable, select either **Clone W** (Wireless) or **Clone N** (Normal). If you select normal cloning or if you cannot select either, proceed to Step 4.

3 With wireless cloning, a screen appears for entering the Project 25 Unit ID of the slave radio. Enter this ID using the keypad (or the Up/Down keys) and the <F2> key.

4 Select the **Zone** or **Complete** clone mode as desired. Operation in these modes is as follows:

Zone - This mode allows you to transfer only channel information for the selected zone. Information programmed on the **Global**, **Radio Wide**, and **By System** screens does not change. A list of the current conventional zones appears. Select the desired zone by highlighting it and pressing the <F2> key. A selected zone is indicated by an asterisk (*****). Scroll to **OK** and press the <F2> key to begin the data transfer. This overwrites the selected zone in the slave radio. Previously, you could select multiple zones. They were appended to those in the slave radio.

Complete - This mode transfers all conventional programming information. This includes information on the **Global**, **Radio Wide**, and **By System** screens. Simply highlight **Complete** and press the <F2> key to begin the data transfer. This mode overwrites all this information currently in the slave radio. The radio does not retain any of the previous information except for the IDs as described in this section.

SECTION

15

Anti-Cloning Features

Note *The following information refers to copying parameters from one radio to another using the PC Configure software. It does not refer to cloning using two radios described in Section 14.*

The latest releases of 5100 and 5300 radios and PC Configure software include safeguards to prevent unauthorized cloning of radios programmed for trunked operation using the PC Configure software. The trunked operating modes are SMARTNET, SmartZone, and Project 25 Trunking.

Many trunking parameters are restricted. You can program and edit them only with the correct system key as described in Section 13. These new safeguards prevent anyone from cloning another radio with restricted trunking information unless they have the correct system key.

15.1 Software Versions

The following PC Configure and radio software releases support these new cloning safeguards:

PC Configure - Version 1.20 or later
5100 Portable - Flash Code Version 1.9.0/2.0/3.0 or later
5300 Mobile - Flash Code Version 2.0/3.0 or later; ARM Code Version 1.22.0 or later (early models).

Programming 51xx and 53xx radios with the preceding software requires PC Configure Version 1.20 or later. You can also use PC Configure software to program radios with earlier software. However, 51xx/53xx radios with the earlier software do not support the new cloning safeguards.

15.2 Description of Changes

All programming files uploaded from a radio with the new version of PC Configure now include information on the specific radio from which it was read (uploaded). The Electronic Serial Number (ESN) and other information is stored in an encrypted form in the data file. This information is also included with the file if you save the file to disk. The following sections describe these other operations that have changed:

- Saving a new file
- Writing a file to radios containing new software
- Checking radios for earlier software
- Using earlier versions of PC Configure

15.2.1 Saving a New File

Note *You can no longer save any type of new programming file to disk without a radio connected.*

If you save any file to disk, you must associate it with a specific radio. Therefore, when you save a new file for the first time, you must connect the radio to the computer so the ESN and other information can be read and stored with the file. However, you can open and edit a previously-saved disk file and then save it to disk again without a radio connected. Also, you do not need a system key to save files that contain trunking parameters.

15.2.2 Writing a File To Radios Containing New Software

Correct System Key Available - If you have a system key, you can edit a file with trunking parameters and write it to any radio.

Correct System Key Not Available - If you do not have a system key, you cannot change restricted trunking parameters. Refer to Section 13. However, you can still change non-restricted trunking and conventional parameters. You can only write the revised file to the radio that it originally came from. If you try to write it to a different radio, the data is scrambled and “Params Fail” is displayed by the radio when programming is finished.

File Containing Only Conventional Parameters (Project 25 or Analog) - There are no editing restrictions. You can write data files to any radio.

15.2.3 Checking Radios for Earlier Software

When you initiate a file write operation, PC Configure checks the software version of the radio. If it is an earlier version than those listed in Section 15.1, the file is written regardless of the system key or the data file’s source radio.

15.2.4 Using Earlier Versions of PC Configure

As described in Section 15.1, you must use PC Configure Version 1.20 or later to program radios with the new software. This applies to both conventional and trunked operation. Improper operation results if you use earlier versions.

SECTION

16

51xx and 53xx Firmware Versions

This section lists specifications of 51xx and 53xx firmware.

16.1 51xx Portable Firmware Versions

Beginning in November 2004, a new version of the 51xx portable is planned to begin shipping (Version 4 Table). This version has new RF, Logic, and Universal Interface boards, and uses different firmware (application code) that is not compatible with earlier or other models. Table 16.1 shows the four 51xx radio versions and their associated firmware code bases.

Table 16.1 51xx Encryption Hardware Configurations

Radio Version	Application (Firmware) Code Base	Analog Channel Encryption		Digital Channel Encryption	
		DES	DES-XL	DES-OFB	AES
Version 1 (no module/software encryption) Uses the -110 Logic board and -410 UI Board. Not FIPS approved.	1.xx	Yes	No	Yes	Yes
Version 2 (uses EFJ SEM module) Has the EFJohnson Subscriber Encryption Module (SEM) on the logic board. This version uses the -150 Logic and -450 UI boards. All radios include the SEM. Factory programming enables the desired encryption options (if any). FIPS approved.	Initially same as above, then 2.xx	Yes	No	Yes	Yes

Note
The version number is indicated by the 13th digit of the radio part number (242-51xx-xxx-xxV).

Table 16.1 51xx Encryption Hardware Configurations (continued)

Radio Version	Application (Firmware) Code Base	Analog Channel Encryption		Digital Channel Encryption	
		DES	DES-XL	DES-OFB	AES
Version 3 (uses Motorola UCM module) Has the Motorola Universal Crypto Module (UCM) on the logic board. This version uses the -160 Logic and -460 UI boards. Order this when you require DES-XL encryption. FIPS approved.	3.xx	Yes	Yes	Yes	Yes
Version 4 (uses EFJ SEM module) Uses the same EFJohnson Subscriber Encryption Module (SEM) as Version 2 boards above. With the 51xx, the 5500-120 Logic and 5500-420 UI boards are used. With the 53xx, the 5500-600 Logic board is used. All radios include the SEM. Factory programming enables the desired encryption options (if any). FIPS approved.	4.xx	Yes	No	Yes	Yes
Note *The version number is indicated by the 13th digit of the radio part number (242-51xx-xxx-xxV).*					

16.1.1 Firmware Version Used

Table shows the firmware code base used by each of the preceding four versions. This is the operating code of the radio that may occasionally be updated using the **Transfer > Write Code To Radio** function. Refer to Section 3.3. For example, if you load firmware with new features or fixes into a Version 2 radio, the radio will have a 2.xx version number.

Initially, a few Version 2 radios used Version 1.11.9 code, which was the same as that used with the Version 1 radios. However, later code releases for Version 2 radios were not compatible with Version 1 radios, so Version 2.xx code must be used.

Note *The code version (and therefore radio version) display briefly when you power-up the radio.*

16.1.2 Programming Software Required

You must use PC Configure Version 1.25.0 or later to program radios with the Version 4 boards. You can also use this software to program radios with the earlier boards.

16.2 53xx Mobile Firmware Versions

Beginning in November 2003, a revised logic board began shipping in 53xx models. This board uses a new control logic design similar to that used in the Version 2 and 3 51xx

portable. This board is available in the following configurations. All versions are FIPS approved.

SEM Version - This version has the EFJohnson Security Encryption Module (SEM) soldered to the board. It is used whenever DES, DES-OFB, or AES encryption is required. It does not provide DES-XL encryption.

UCM Version - This includes a plug-in Motorola UCM encryption module. It is used whenever DES-XL Motorola proprietary encryption is required. It also provides DES, DES-OFB, or AES encryption.

No Encryption Version - If encryption is not required, either the earlier logic board (described in Section 16.2.1) or the UCM version without the UCM module is used.

16.2.1 Early Unrevised Logic Board

This logic board's part number is 035-1800-4xx. It is being replaced by boards described in the preceding paragraphs. This board has an ARM processor and a jack for plugging in Motorola encryption modules that provide DES, DES-XL, DES-OFB, and AES encryption. It does not use the SEM module.

16.2.2 Programming Software Required

You need PC Configure Version 1.21.2.5 or later to program radios with the revised board. You can also use this software to program radios with the unrevised board. Select the "5300" radio series for both boards. The software automatically detects which board is used when parameters are written to the radio.

16.2.3 Firmware Required

Radios with the revised and unrevised logic boards use different firmware (operating/ Flash software) as follows. When you download code using the PC Configure software (such as when you buy new features), you must power-up the radio when you enter the password so the logic board version can be detected.

Models with Revised Board - These models use a single code file similar to the 5100 portable. SEM code has a 2.xx version number, and UCM code has a 3.xx version number.

Models with Unrevised Board - These models use two code files. One programs DSP parameters. The other programs ARM processor parameters. These code sets have a 1.xx version number.

16.2.4 Identifying Radios With Revised Logic Board

Refer to the radio serial number on the label on the bottom cover to determine if it is a version with the revised logic board. Radios with the new revised logic board have a revision letter (letter following 53xx0) of “G” or higher. Radios with an A-F revision letter have the early unrevised -4xx logic board described in Section 16.2.1.

You can also determine the board version by noting the software version number that displays briefly when the radio is powered-up. The version numbers are as follows:

Software Version Displayed	Board Version
Version 1.xx	Early unrevised
Version 2.xx	SEM version
Version 3.xx	UCM version

16.2.5 Version 4 Models

Early 2005 availability is planned for 53xx models that have the Version 4 configuration described in Table 16.1. These models will also have new RF, logic, interface, and interconnect boards.

SECTION

17

Call Guard (CTCSS/DCS) and 800 MHz Channel Tables

Table 17.1 lists tone-based Call Guard tones and their associated frequencies. Table 17.2 lists digital Call Guard codes.

Table 17.1 Recommended Tone Call Guard Codes

Code	Freq	Code	Freq	Code	Freq	Code	Freq	Code	Freq
		09	91.5	18	123.0	27	167.9	36*	233.6
01	67.0	10	94.8	19	127.3	28	173.8	37*	241.8
02	71.9	11**	97.4	20	131.8	29	179.9	38*	250.3
03	74.4	12	100.0	21	136.5	30	186.2	39**	69.3
04	77.0	13	103.5	22	141.3	31	192.8	40**	206.5
05	79.7	14	107.2	23	146.2	32	203.5	41**	229.1
06	82.5	15	110.9	24	151.4	33	210.7	42**	254.1
07	85.4	16	114.8	25	156.7	34*	218.1		
08	88.5	17	118.8	26	162.2	35*	225.7		

* These tones normally are not used because of their close proximity to the voice frequencies.
** These tones normally are not used because they may cause interference with adjacent tones.

Table 17.2 Recommended Digital Call Guard Codes

023	065	131	172	261	346	431	532	654	743
025	071	132	174	263	351	432	546	662	754
026	072	134	205	265	364	445	565	664	
031	073	143	223	271	365	464	606	703	
032	074	152	226	306	371	465	612	712	
043	114	155	243	311	411	466	624	723	
047	115	156	244	315	412	503	627	731	
051	116	162	245	331	413	506	631	732	
054	125	165	251	343	423	516	632	734	

SECTION
18

Project 25 Packet Data Mode

Project 25 packet data transmissions are available with 5100 portable and 5300 mobile radios. A Project 25 Packet Data option button or menu parameter (5100 only) toggles the data mode.

The Project 25 packet data mode allows a radio to act as a packet data modem for a remote application connected to the subscriber unit through an RS-232 or Serial Line Internet Protocol (SLIP) connection. The SLIP connection requires an Ethernet port which is available with the 5300x mobile radio.

18.1 Hardware Required

The 5100 Series portable radio connects to the external data equipment with the standard PC Configure programming cable through the RS-232 port (female DB9 connector).

The 5300 Series mobile radio must have a special data pigtail cable installed in it (Part No. 597-2002-282) to provide external access to the RS-232 lines. This cable also has a female DB9 connector for connecting the external equipment.

Table 18.1 lists the U. S. Federal Communications Commission's (FCC's) 800 MHz channels and each channel's associated receive frequency (RX Freq) and transmit frequency (TX Freq).

Table 18.1 800 MHz Channels (continues on following pages)

FCC Channel	RX Freq	TX Freq
1	851.0125	806.0125
2	851.0375	806.0375
3	851.0625	806.0625
4	851.0875	806.0875
5	851.1125	806.1125
6	851.1375	806.1375
7	851.1625	806.1625
8	851.1875	806.1875

FCC Channel	RX Freq	TX Freq
9	851.2125	806.2125
10	851.2375	806.2375
11	851.2625	806.2625
12	851.2875	806.2875
13	851.3125	806.3125
14	851.3375	806.3375
15	851.3625	806.3625
16	851.3875	806.3875
17	851.4125	806.4125
18	851.4375	806.4375
19	851.4625	806.4625
20	851.4875	806.4875
21	851.5125	806.5125
22	851.5375	806.5375
23	851.5625	806.5625
24	851.5875	806.5875
25	851.6125	806.6125
26	851.6375	806.6375
27	851.6625	806.6625
28	851.6875	806.6875
29	851.7125	806.7125
30	851.7375	806.7375
31	851.7625	806.7625
32	851.7875	806.7875
33	851.8125	806.8125
34	851.8375	806.8375
35	851.8625	806.8625
36	851.8875	806.8875
37	851.9125	806.9125
38	851.9375	806.9375
39	851.9625	806.9625
40	851.9875	806.9875
41	852.0125	807.0125
42	852.0375	807.0375
43	852.0625	807.0625
44	852.0875	807.0875
45	852.1125	807.1125
46	852.1375	807.1375
47	852.1625	807.1625
48	852.1875	807.1875
49	852.2125	807.2125
50	852.2375	807.2375
51	852.2625	807.2625
52	852.2875	807.2875
53	852.3125	807.3125
54	852.3375	807.3375
55	852.3625	807.3625
56	852.3875	807.3875
57	852.4125	807.4125
58	852.4375	807.4375
59	852.4625	807.4625
60	852.4875	807.4875
61	852.5125	807.5125
62	852.5375	807.5375
63	852.5625	807.5625
64	852.5875	807.5875
65	852.6125	807.6125
66	852.6375	807.6375
67	852.6625	807.6625
68	852.6875	807.6875
69	852.7125	807.7125
70	852.7375	807.7375
71	852.7625	807.7625
72	852.7875	807.7875
73	852.8125	807.8125
74	852.8375	807.8375
75	852.8625	807.8625
76	852.8875	807.8875
77	852.9125	807.9125
78	852.9375	807.9375
79	852.9625	807.9625
80	852.9875	807.9875
81	853.0125	808.0125
82	853.0375	808.0375
83	853.0625	808.0625
84	853.0875	808.0875
85	853.1125	808.1125
86	853.1375	808.1375
87	853.1625	808.1625
88	853.1875	808.1875
89	853.2125	808.2125
90	853.2375	808.2375
91	853.2625	808.2625
92	853.2875	808.2875
93	853.3125	808.3125
94	853.3375	808.3375
95	853.3625	808.3625
96	853.3875	808.3875
97	853.4125	808.4125
98	853.4375	808.4375
99	853.4625	808.4625
100	853.4875	808.4875
101	853.5125	808.5125
102	853.5375	808.5375
103	853.5625	808.5625
104	853.5875	808.5875
105	853.6125	808.6125
106	853.6375	808.6375
107	853.6625	808.6625
108	853.6875	808.6875
109	853.7125	808.7125
110	853.7375	808.7375
111	853.7625	808.7625
112	853.7875	808.7875
113	853.8125	808.8125
114	853.8375	808.8375
115	853.8625	808.8625
116	853.8875	808.8875
117	853.9125	808.9125
118	853.9375	808.9375
119	853.9625	808.9625
120	853.9875	808.9875
121	854.0125	809.0125
122	854.0375	809.0375
123	854.0625	809.0625
124	854.0875	809.0875
125	854.1125	809.1125
126	854.1375	809.1375
127	854.1625	809.1625
128	854.1875	809.1875
129	854.2125	809.2125
130	854.2375	809.2375
131	854.2625	809.2625
132	854.2875	809.2875
133	854.3125	809.3125
134	854.3375	809.3375

FCC Channel	RX Freq	TX Freq
135	854.3625	809.3625
136	854.3875	809.3875
137	854.4125	809.4125
138	854.4375	809.4375
139	854.4625	809.4625
140	854.4875	809.4875
141	854.5125	809.5125
142	854.5375	809.5375
143	854.5625	809.5625
144	854.5875	809.5875
145	854.6125	809.6125
146	854.6375	809.6375
147	854.6625	809.6625
148	854.6875	809.6875
149	854.7125	809.7125
150	854.7375	809.7375
151	854.7625	809.7625
152	854.7875	809.7875
153	854.8125	809.8125
154	854.8375	809.8375
155	854.8625	809.8625
156	854.8875	809.8875
157	854.9125	809.9125
158	854.9375	809.9375
159	854.9625	809.9625
160	854.9875	809.9875
161	855.0125	810.0125
162	855.0375	810.0375
163	855.0625	810.0625
164	855.0875	810.0875
165	855.1125	810.1125
166	855.1375	810.1375
167	855.1625	810.1625
168	855.1875	810.1875
169	855.2125	810.2125
170	855.2375	810.2375
171	855.2625	810.2625
172	855.2875	810.2875
173	855.3125	810.3125
174	855.3375	810.3375
175	855.3625	810.3625
176	855.3875	810.3875
177	855.4125	810.4125
178	855.4375	810.4375
179	855.4625	810.4625
180	855.4875	810.4875
181	855.5125	810.5125
182	855.5375	810.5375
183	855.5625	810.5625
184	855.5875	810.5875
185	855.6125	810.6125
186	855.6375	810.6375
187	855.6625	810.6625
188	855.6875	810.6875
189	855.7125	810.7125
190	855.7375	810.7375
191	855.7625	810.7625
192	855.7875	810.7875
193	855.8125	810.8125
194	855.8375	810.8375
195	855.8625	810.8625
196	855.8875	810.8875
197	855.9125	810.9125
198	855.9375	810.9375
199	855.9625	810.9625
200	855.9875	810.9875
201	856.0125	811.0125
202	856.0375	811.0375
203	856.0625	811.0625
204	856.0875	811.0875
205	856.1125	811.1125
206	856.1375	811.1375
207	856.1625	811.1625
208	856.1875	811.1875
209	856.2125	811.2125
210	856.2375	811.2375
211	856.2625	811.2625
212	856.2875	811.2875
213	856.3125	811.3125
214	856.3375	811.3375
215	856.3625	811.3625
216	856.3875	811.3875
217	856.4125	811.4125
218	856.4375	811.4375
219	856.4625	811.4625
220	856.4875	811.4875
221	856.5125	811.5125
222	856.5375	811.5375
223	856.5625	811.5625
224	856.5875	811.5875
225	856.6125	811.6125
226	856.6375	811.6375
227	856.6625	811.6625
228	856.6875	811.6875
229	856.7125	811.7125
230	856.7375	811.7375
231	856.7625	811.7625
232	856.7875	811.7875
233	856.8125	811.8125
234	856.8375	811.8375
235	856.8625	811.8625
236	856.8875	811.8875
237	856.9125	811.9125
238	856.9375	811.9375
239	856.9625	811.9625
240	856.9875	811.9875
241	857.0125	812.0125
242	857.0375	812.0375
243	857.0625	812.0625
244	857.0875	812.0875
245	857.1125	812.1125
246	857.1375	812.1375
247	857.1625	812.1625
248	857.1875	812.1875
249	857.2125	812.2125
250	857.2375	812.2375
251	857.2625	812.2625
252	857.2875	812.2875
253	857.3125	812.3125
254	857.3375	812.3375
255	857.3625	812.3625
256	857.3875	812.3875
257	857.4125	812.4125
258	857.4375	812.4375
259	857.4625	812.4625
260	857.4875	812.4875

FCC Channel	RX Freq	TX Freq
261	857.5125	812.5125
262	857.5375	812.5375
263	857.5625	812.5625
264	857.5875	812.5875
265	857.6125	812.6125
266	857.6375	812.6375
267	857.6625	812.6625
268	857.6875	812.6875
269	857.7125	812.7125
270	857.7375	812.7375
271	857.7625	812.7625
272	857.7875	812.7875
273	857.8125	812.8125
274	857.8375	812.8375
275	857.8625	812.8625
276	857.8875	812.8875
277	857.9125	812.9125
278	857.9375	812.9375
279	857.9625	812.9625
280	857.9875	812.9875
281	858.0125	813.0125
282	858.0375	813.0375
283	858.0625	813.0625
284	858.0875	813.0875
285	858.1125	813.1125
286	858.1375	813.1375
287	858.1625	813.1625
288	858.1875	813.1875
289	858.2125	813.2125
290	858.2375	813.2375
291	858.2625	813.2625
292	858.2875	813.2875
293	858.3125	813.3125
294	858.3375	813.3375
295	858.3625	813.3625
296	858.3875	813.3875
297	858.4125	813.4125
298	858.4375	813.4375
299	858.4625	813.4625
300	858.4875	813.4875
301	858.5125	813.5125
302	858.5375	813.5375
303	858.5625	813.5625
304	858.5875	813.5875
305	858.6125	813.6125
306	858.6375	813.6375
307	858.6625	813.6625
308	858.6875	813.6875
309	858.7125	813.7125
310	858.7375	813.7375
311	858.7625	813.7625
312	858.7875	813.7875
313	858.8125	813.8125
314	858.8375	813.8375
315	858.8625	813.8625
316	858.8875	813.8875
317	858.9125	813.9125
318	858.9375	813.9375
319	858.9625	813.9625
320	858.9875	813.9875
321	859.0125	814.0125
322	859.0375	814.0375
323	859.0625	814.0625
324	859.0875	814.0875
325	859.1125	814.1125
326	859.1375	814.1375
327	859.1625	814.1625
328	859.1875	814.1875
329	859.2125	814.2125
330	859.2375	814.2375
331	859.2625	814.2625
332	859.2875	814.2875
333	859.3125	814.3125
334	859.3375	814.3375
335	859.3625	814.3625
336	859.3875	814.3875
337	859.4125	814.4125
338	859.4375	814.4375
339	859.4625	814.4625
340	859.4875	814.4875
341	859.5125	814.5125
342	859.5375	814.5375
343	859.5625	814.5625
344	859.5875	814.5875
345	859.6125	814.6125
346	859.6375	814.6375
347	859.6625	814.6625
348	859.6875	814.6875
349	859.7125	814.7125
350	859.7375	814.7375
351	859.7625	814.7625
352	859.7875	814.7875
353	859.8125	814.8125
354	859.8375	814.8375
355	859.8625	814.8625
356	859.8875	814.8875
357	859.9125	814.9125
358	859.9375	814.9375
359	859.9625	814.9625
360	859.9875	814.9875
361	860.0125	815.0125
362	860.0375	815.0375
363	860.0625	815.0625
364	860.0875	815.0875
365	860.1125	815.1125
366	860.1375	815.1375
367	860.1625	815.1625
368	860.1875	815.1875
369	860.2125	815.2125
370	860.2375	815.2375
371	860.2625	815.2625
372	860.2875	815.2875
373	860.3125	815.3125
374	860.3375	815.3375
375	860.3625	815.3625
376	860.3875	815.3875
377	860.4125	815.4125
378	860.4375	815.4375
379	860.4625	815.4625
380	860.4875	815.4875
381	860.5125	815.5125
382	860.5375	815.5375
383	860.5625	815.5625
384	860.5875	815.5875
385	860.6125	815.6125
386	860.6375	815.6375

FCC Channel	RX Freq	TX Freq
387	860.6625	815.6625
388	860.6875	815.6875
389	860.7125	815.7125
390	860.7375	815.7375
391	860.7625	815.7625
392	860.7875	815.7875
393	860.8125	815.8125
394	860.8375	815.8375
395	860.8625	815.8625
396	860.8875	815.8875
397	860.9125	815.9125
398	860.9375	815.9375
399	860.9625	815.9625
400	860.9875	815.9875
401	861.0125	816.0125
402	861.0375	816.0375
403	861.0625	816.0625
404	861.0875	816.0875
405	861.1125	816.1125
406	861.1375	816.1375
407	861.1625	816.1625
408	861.1875	816.1875
409	861.2125	816.2125
410	861.2375	816.2375
411	861.2625	816.2625
412	861.2875	816.2875
413	861.3125	816.3125
414	861.3375	816.3375
415	861.3625	816.3625
416	861.3875	816.3875
417	861.4125	816.4125
418	861.4375	816.4375
419	861.4625	816.4625
420	861.4875	816.4875
421	861.5125	816.5125
422	861.5375	816.5375
423	861.5625	816.5625
424	861.5875	816.5875
425	861.6125	816.6125
426	861.6375	816.6375
427	861.6625	816.6625
428	861.6875	816.6875
429	861.7125	816.7125
430	861.7375	816.7375
431	861.7625	816.7625
432	861.7875	816.7875
433	861.8125	816.8125
434	861.8375	816.8375
435	861.8625	816.8625
436	861.8875	816.8875
437	861.9125	816.9125
438	861.9375	816.9375
439	861.9625	816.9625
440	861.9875	816.9875
441	862.0125	817.0125
442	862.0375	817.0375
443	862.0625	817.0625
444	862.0875	817.0875
445	862.1125	817.1125
446	862.1375	817.1375
447	862.1625	817.1625
448	862.1875	817.1875
449	862.2125	817.2125
450	862.2375	817.2375
451	862.2625	817.2625
452	862.2875	817.2875
453	862.3125	817.3125
454	862.3375	817.3375
455	862.3625	817.3625
456	862.3875	817.3875
457	862.4125	817.4125
458	862.4375	817.4375
459	862.4625	817.4625
460	862.4875	817.4875
461	862.5125	817.5125
462	862.5375	817.5375
463	862.5625	817.5625
464	862.5875	817.5875
465	862.6125	817.6125
466	862.6375	817.6375
467	862.6625	817.6625
468	862.6875	817.6875
469	862.7125	817.7125
470	862.7375	817.7375
471	862.7625	817.7625
472	862.7875	817.7875
473	862.8125	817.8125
474	862.8375	817.8375
475	862.8625	817.8625
476	862.8875	817.8875
477	862.9125	817.9125
478	862.9375	817.9375
479	862.9625	817.9625
480	862.9875	817.9875
481	863.0125	818.0125
482	863.0375	818.0375
483	863.0625	818.0625
484	863.0875	818.0875
485	863.1125	818.1125
486	863.1375	818.1375
487	863.1625	818.1625
488	863.1875	818.1875
489	863.2125	818.2125
490	863.2375	818.2375
491	863.2625	818.2625
492	863.2875	818.2875
493	863.3125	818.3125
494	863.3375	818.3375
495	863.3625	818.3625
496	863.3875	818.3875
497	863.4125	818.4125
498	863.4375	818.4375
499	863.4625	818.4625
500	863.4875	818.4875
501	863.5125	818.5125
502	863.5375	818.5375
503	863.5625	818.5625
504	863.5875	818.5875
505	863.6125	818.6125
506	863.6375	818.6375
507	863.6625	818.6625
508	863.6875	818.6875
509	863.7125	818.7125
510	863.7375	818.7375
511	863.7625	818.7625
512	863.7875	818.7875

FCC Channel	RX Freq	TX Freq
513	863.8125	818.8125
514	863.8375	818.8375
515	863.8625	818.8625
516	863.8875	818.8875
517	863.9125	818.9125
518	863.9375	818.9375
519	863.9625	818.9625
520	863.9875	818.9875
521	864.0125	819.0125
522	864.0375	819.0375
523	864.0625	819.0625
524	864.0875	819.0875
525	864.1125	819.1125
526	864.1375	819.1375
527	864.1625	819.1625
528	864.1875	819.1875
529	864.2125	819.2125
530	864.2375	819.2375
531	864.2625	819.2625
532	864.2875	819.2875
533	864.3125	819.3125
534	864.3375	819.3375
535	864.3625	819.3625
536	864.3875	819.3875
537	864.4125	819.4125
538	864.4375	819.4375
539	864.4625	819.4625
540	864.4875	819.4875
541	864.5125	819.5125
542	864.5375	819.5375
543	864.5625	819.5625
544	864.5875	819.5875
545	864.6125	819.6125
546	864.6375	819.6375
547	864.6625	819.6625
548	864.6875	819.6875
549	864.7125	819.7125
550	864.7375	819.7375
551	864.7625	819.7625
552	864.7875	819.7875
553	864.8125	819.8125
554	864.8375	819.8375
555	864.8625	819.8625
556	864.8875	819.8875
557	864.9125	819.9125
558	864.9375	819.9375
559	864.9625	819.9625
560	864.9875	819.9875
561	865.0125	820.0125
562	865.0375	820.0375
563	865.0625	820.0625
564	865.0875	820.0875
565	865.1125	820.1125
566	865.1375	820.1375
567	865.1625	820.1625
568	865.1875	820.1875
569	865.2125	820.2125
570	865.2375	820.2375
571	865.2625	820.2625
572	865.2875	820.2875
573	865.3125	820.3125
574	865.3375	820.3375
575	865.3625	820.3625
576	865.3875	820.3875
577	865.4125	820.4125
578	865.4375	820.4375
579	865.4625	820.4625
580	865.4875	820.4875
581	865.5125	820.5125
582	865.5375	820.5375
583	865.5625	820.5625
584	865.5875	820.5875
585	865.6125	820.6125
586	865.6375	820.6375
587	865.6625	820.6625
588	865.6875	820.6875
589	865.7125	820.7125
590	865.7375	820.7375
591	865.7625	820.7625
592	865.7875	820.7875
593	865.8125	820.8125
594	865.8375	820.8375
595	865.8625	820.8625
596	865.8875	820.8875
597	865.9125	820.9125
598	865.9375	820.9375
599	865.9625	820.9625
600	865.9875	820.9875
-	866.0000	821.0000
601	866.0125	821.0125
-	866.0250	821.0250
602	866.0375	821.0375
603	866.0500	821.0500
604	866.0625	821.0625
605	866.0750	821.0750
606	866.0875	821.0875
607	866.1000	821.1000
608	866.1125	821.1125
609	866.1250	821.1250
610	866.1375	821.1375
611	866.1500	821.1500
612	866.1625	821.1625
613	866.1750	821.1750
614	866.1875	821.1875
615	866.2000	821.2000
616	866.2125	821.2125
617	866.2250	821.2250
618	866.2375	821.2375
619	866.2500	821.2500
620	866.2625	821.2625
621	866.2750	821.2750
622	866.2875	821.2875
623	866.3000	821.3000
624	866.3125	821.3125
625	866.3250	821.3250
626	866.3375	821.3375
627	866.3500	821.3500
628	866.3625	821.3625
629	866.3750	821.3750
630	866.3875	821.3875
631	866.4000	821.4000
632	866.4125	821.4125
633	866.4250	821.4250
634	866.4375	821.4375
635	866.4500	821.4500
636	866.4625	821.4625

FCC Channel	RX Freq	TX Freq
637	866.4750	821.4750
638	866.4875	821.4875
-	866.5000	821.5000
639	866.5125	821.5125
-	866.5250	821.5250
640	866.5375	821.5375
641	866.5500	821.5500
642	866.5625	821.5625
643	866.5750	821.5750
644	866.5875	821.5875
645	866.6000	821.6000
646	866.6125	821.6125
647	866.6250	821.6250
648	866.6375	821.6375
649	866.6500	821.6500
650	866.6625	821.6625
651	866.6750	821.6750
652	866.6875	821.6875
653	866.7000	821.7000
654	866.7125	821.7125
655	866.7250	821.7250
656	866.7375	821.7375
657	866.7500	821.7500
658	866.7625	821.7625
659	866.7750	821.7750
660	866.7875	821.7875
661	866.8000	821.8000
662	866.8125	821.8125
663	866.8250	821.8250
664	866.8375	821.8375
665	866.8500	821.8500
666	866.8625	821.8625
667	866.8750	821.8750
668	866.8875	821.8875
669	866.9000	821.9000
670	866.9125	821.9125
671	866.9250	821.9250
672	866.9375	821.9375
673	866.9500	821.9500
674	866.9625	821.9625
675	866.9750	821.9750
676	866.9875	821.9875

FCC Channel	RX Freq	TX Freq
-	867.0000	822.0000
677	867.0125	822.0125
-	867.0250	822.0250
678	867.0375	822.0375
679	867.0500	822.0500
680	867.0625	822.0625
681	867.0750	822.0750
682	867.0875	822.0875
683	867.1000	822.1000
684	867.1125	822.1125
685	867.1250	822.1250
686	867.1375	822.1375
687	867.1500	822.1500
688	867.1625	822.1625
689	867.1750	822.1750
690	867.1875	822.1875
691	867.2000	822.2000
692	867.2125	822.2125
693	867.2250	822.2250
694	867.2375	822.2375
695	867.2500	822.2500
696	867.2625	822.2625
697	867.2750	822.2750
698	867.2875	822.2875
699	867.3000	822.3000
700	867.3125	822.3125
701	867.3250	822.3250
702	867.3375	822.3375
703	867.3500	822.3500
704	867.3625	822.3625
705	867.3750	822.3750
706	867.3875	822.3875
707	867.4000	822.4000
708	867.4125	822.4125
709	867.4250	822.4250
710	867.4375	822.4375
711	867.4500	822.4500
712	867.4625	822.4625
713	867.4750	822.4750
714	867.4875	822.4875
-	867.5000	822.5000
715	867.5125	822.5125

FCC Channel	RX Freq	TX Freq
-	867.5250	822.5250
716	867.5375	822.5375
717	867.5500	822.5500
718	867.5625	822.5625
719	867.5750	822.5750
720	867.5875	822.5875
721	867.6000	822.6000
722	867.6125	822.6125
723	867.6250	822.6250
724	867.6375	822.6375
725	867.6500	822.6500
726	867.6625	822.6625
727	867.6750	822.6750
728	867.6875	822.6875
729	867.7000	822.7000
730	867.7125	822.7125
731	867.7250	822.7250
732	867.7375	822.7375
733	867.7500	822.7500
734	867.7625	822.7625
735	867.7750	822.7750
736	867.7875	822.7875
737	867.8000	822.8000
738	867.8125	822.8125
739	867.8250	822.8250
740	867.8375	822.8375
741	867.8500	822.8500
742	867.8625	822.8625
743	867.8750	822.8750
744	867.8875	822.8875
745	867.9000	822.9000
746	867.9125	822.9125
747	867.9250	822.9250
748	867.9375	822.9375
749	867.9500	822.9500
750	867.9625	822.9625
751	867.9750	822.9750
752	867.9875	822.9875
-	868.0000	823.0000
753	868.0125	823.0125
-	868.0250	823.0250
754	868.0375	823.0375

FCC Channel	RX Freq	TX Freq
755	868.0500	823.0500
756	868.0625	823.0625
757	868.0750	823.0750
758	868.0875	823.0875
759	868.1000	823.1000
760	868.1125	823.1125
761	868.1250	823.1250
762	868.1375	823.1375
763	868.1500	823.1500
764	868.1625	823.1625
765	868.1750	823.1750
766	868.1875	823.1875
767	868.2000	823.2000
768	868.2125	823.2125
769	868.2250	823.2250
770	868.2375	823.2375
771	868.2500	823.2500
772	868.2625	823.2625
773	868.2750	823.2750
774	868.2875	823.2875
775	868.3000	823.3000
776	868.3125	823.3125
777	868.3250	823.3250
778	868.3375	823.3375
779	868.3500	823.3500
780	868.3625	823.3625
781	868.3750	823.3750
782	868.3875	823.3875
783	868.4000	823.4000
784	868.4125	823.4125
785	868.4250	823.4250
786	868.4375	823.4375
787	868.4500	823.4500
788	868.4625	823.4625
789	868.4750	823.4750
790	868.4875	823.4875
791	868.5000	823.5000
792	868.5125	823.5125
793	868.5250	823.5250
794	868.5375	823.5375
795	868.5500	823.5500
796	868.5625	823.5625
797	868.5750	823.5750
798	868.5875	823.5875
799	868.6000	823.6000
800	868.6125	823.6125
801	868.6250	823.6250
802	868.6375	823.6375
803	868.6500	823.6500
804	868.6625	823.6625
805	868.6750	823.6750
806	868.6875	823.6875
807	868.7000	823.7000
808	868.7125	823.7125
809	868.7250	823.7250
810	868.7375	823.7375
811	868.7500	823.7500
812	868.7625	823.7625
813	868.7750	823.7750
814	868.7875	823.7875
815	868.8000	823.8000
816	868.8125	823.8125
817	868.8250	823.8250
818	868.8375	823.8375
819	868.8500	823.8500
820	868.8625	823.8625
821	868.8750	823.8750
822	868.8875	823.8875
823	868.9000	823.9000
824	868.9125	823.9125
825	868.9250	823.9250
826	868.9375	823.9375
827	868.9500	823.9500
828	868.9625	823.9625
829	868.9750	823.9750
830	868.9875	823.9875
-	869.0000	824.0000
-	869.0125	824.0125
-	869.0250	824.0250
-	869.0375	824.0375
-	869.0500	824.0500
-	869.0625	824.0625
-	869.0750	824.0750
-	869.0875	824.0875
-	869.1000	824.1000
-	869.1125	824.1125
-	869.1250	824.1250
-	869.1375	824.1375
-	869.1500	824.1500
-	869.1625	824.1625
-	869.1750	824.1750
-	869.1875	824.1875
-	869.2000	824.2000
-	869.2125	824.2125
-	869.2250	824.2250
-	869.2375	824.2375
-	869.2500	824.2500
-	869.2625	824.2625
-	869.2750	824.2750
-	869.2875	824.2875
-	869.3000	824.3000
-	869.3125	824.3125
-	869.3250	824.3250
-	869.3375	824.3375
-	869.3500	824.3500
-	869.3625	824.3625
-	869.3750	824.3750
-	869.3875	824.3875
-	869.4000	824.4000
-	869.4125	824.4125
-	869.4250	824.4250
-	869.4375	824.4375
-	869.4500	824.4500
-	869.4625	824.4625
-	869.4750	824.4750
-	869.4875	824.4875
-	869.5000	824.5000
-	869.5125	824.5125
-	869.5250	824.5250
-	869.5375	824.5375
-	869.5500	824.5500
-	869.5625	824.5625
-	869.5750	824.5750
-	869.5875	824.5875
-	869.6000	824.6000
-	869.6125	824.6125

FCC Channel	RX Freq	TX Freq
-	869.6250	824.6250
-	869.6375	824.6375
-	869.6500	824.6500
-	869.6625	824.6625
-	869.6750	824.6750
-	869.6875	824.6875
-	869.7000	824.7000
-	869.7125	824.7125
-	869.7250	824.7250
-	869.7375	824.7375
-	869.7500	824.7500
-	869.7625	824.7625
-	869.7750	824.7750
-	869.7875	824.7875
-	869.8000	824.8000
-	869.8125	824.8125
-	869.8250	824.8250
-	869.8375	824.8375
-	869.8500	824.8500
-	869.8625	824.8625
-	869.8750	824.8750
-	869.8875	824.8875
-	869.9000	824.9000
-	869.9125	824.9125
-	869.9250	824.9250
-	869.9375	824.9375
-	869.9500	824.9500
-	869.9625	824.9625
-	869.9750	824.9750
-	869.9875	824.9875

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