

PC CONFIGURE™

PROGRAMMING SOFTWARE

MULTI-NET® ADDENDUM

For Ascend Mobile and Portable Radios



PCCONFIGURE™ PROGRAMMING SOFTWARE MULTI-NET® USER MANUAL ADDENDUM

This manual covers PCConfigure™ Versions through 1.25.0.3

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SECTION 1 GENERAL

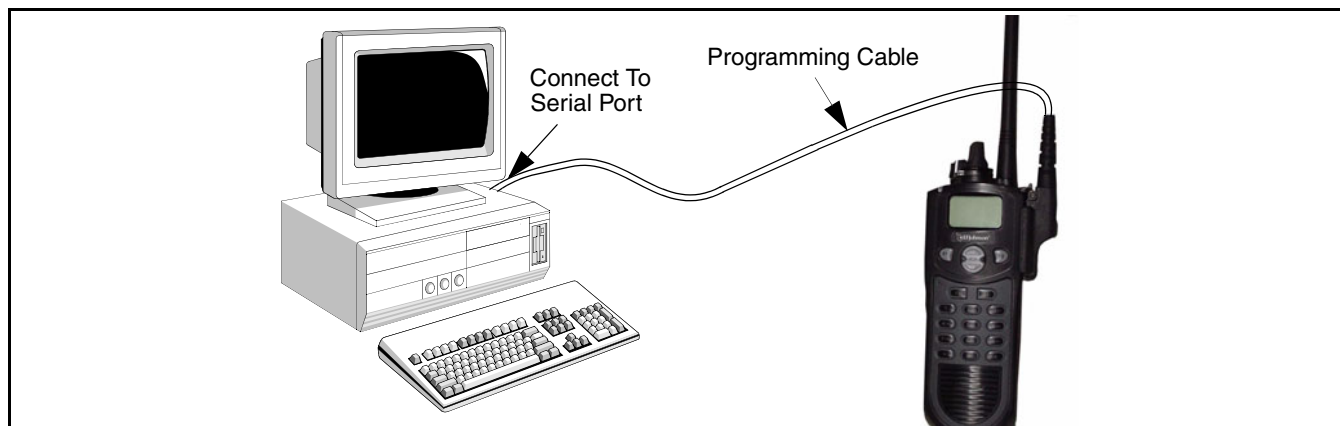


Figure 1-1 Typical Portable Programming Setup

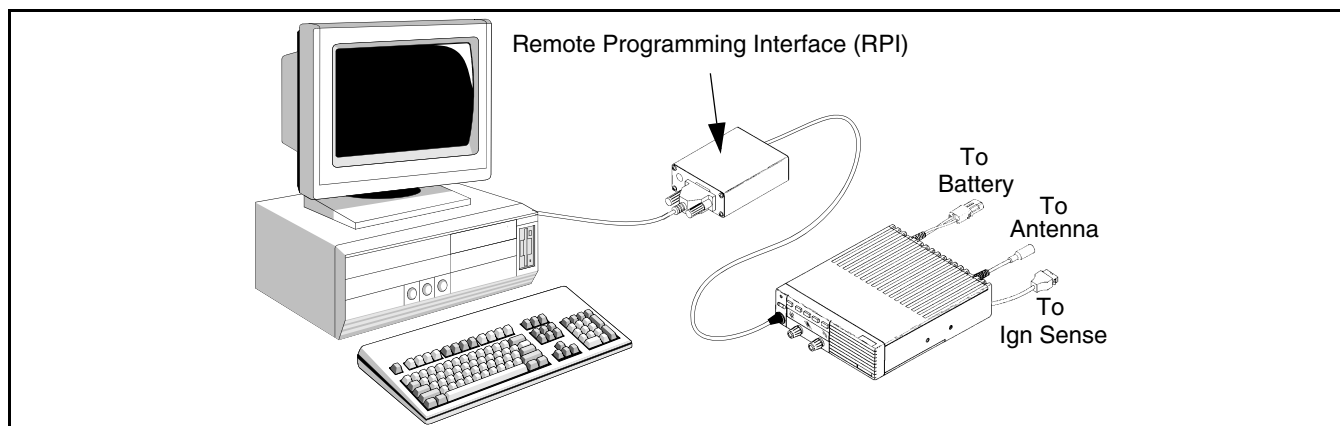


Figure 1-2 Mobile Programming Setup

1.1 SCOPE OF MANUAL

This is an addendum updates the main PCConfigure programming manual with information required to program Ascend radios for Multi-Net operation. Both this manual and the main PCConfigure manual are included on the PCConfigure CD-ROM. Use this addendum to program Multi-Net operation and the main manual to program the other modes.

1.2 PROGRAMMING SETUP

To program the various transceivers, a Windows[®]-based computer, EFJohnson PCConfigure[™] programming software, Part No. 023-9998-488, and the following items are required to

program the various transceivers. The portable programming setup is shown in Figure 1-2, and the mobile setup is shown in Figure 1-1.

5100, 51SL, and Ascend Portable

- Programming cable from computer to transceiver, 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.*

No RPI is required to connect this radio to the computer because the radio contains the interface circuitry. The above programming cable has a female DB9 connector for connecting to the computer.

5300, 53SL, and Ascend Mobile

- Programming cable from RPI to transceiver, 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.*

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 these transceivers.

The Radio Programming Interface (RPI) provides the required logic interface between the computer and transceiver. The cable from the RPI to computer is not included with the RPI or in the programming kit. The current RPI's 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.

The cable from the RPI to the transceiver 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 transceivers. With transceivers using the Handheld Control Unit (HHC), the connection point is the 10-pin programming jack on the HHC junction box using 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.

1.3 COMPUTER REQUIREMENTS

The computer used to run this program must meet the following minimum requirements:

- Windows[®] 95/98/NT/2000/XP (Windows 3.1 cannot be used)
- 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

1.4 OPERATING AND SERVICE MANUALS

This manual includes brief descriptions of the Multi-Net programming parameters. For detailed radio operating information, refer to the Ascend Mobile Operating Manual CD, Part No. 002-5580-001CD, or to the Ascend Portable Operating Manual CD, Part No. 002-5584-1000CD.

1.5 SOFTWARE VERSIONS REQUIRED

PCConfigure, Version 1.24.0 or later, is required to program the Multi-Net operating mode. In addition, the radio must be the Ascend version, Part No. 242-558x-xxx or 242-538x-xxx. The 5100/51SL and 5300/53SL versions cannot be programmed for Multi-Net operation.

NOTE: Currently, the Ascend portable cannot be programmed for P25 trunked operation because of memory limitations. P25 trunked operation is available with Ascend mobile radios. Currently, all Ascend models are the SEM version (use Version 2.x firmware).

1.6 SOFTWARE INSTALLATION

The PCConfigure software is supplied on a CD-ROM. Install this software as follows:

1. Make sure that there are no other applications open during this installation procedure. Also, make sure that the computer meets the minimum requirements listed in the preceding section.
2. Insert the PCConfigure 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 PCConfigure version number). Click the Open button and then from the Run window, click OK and the installation process begins.

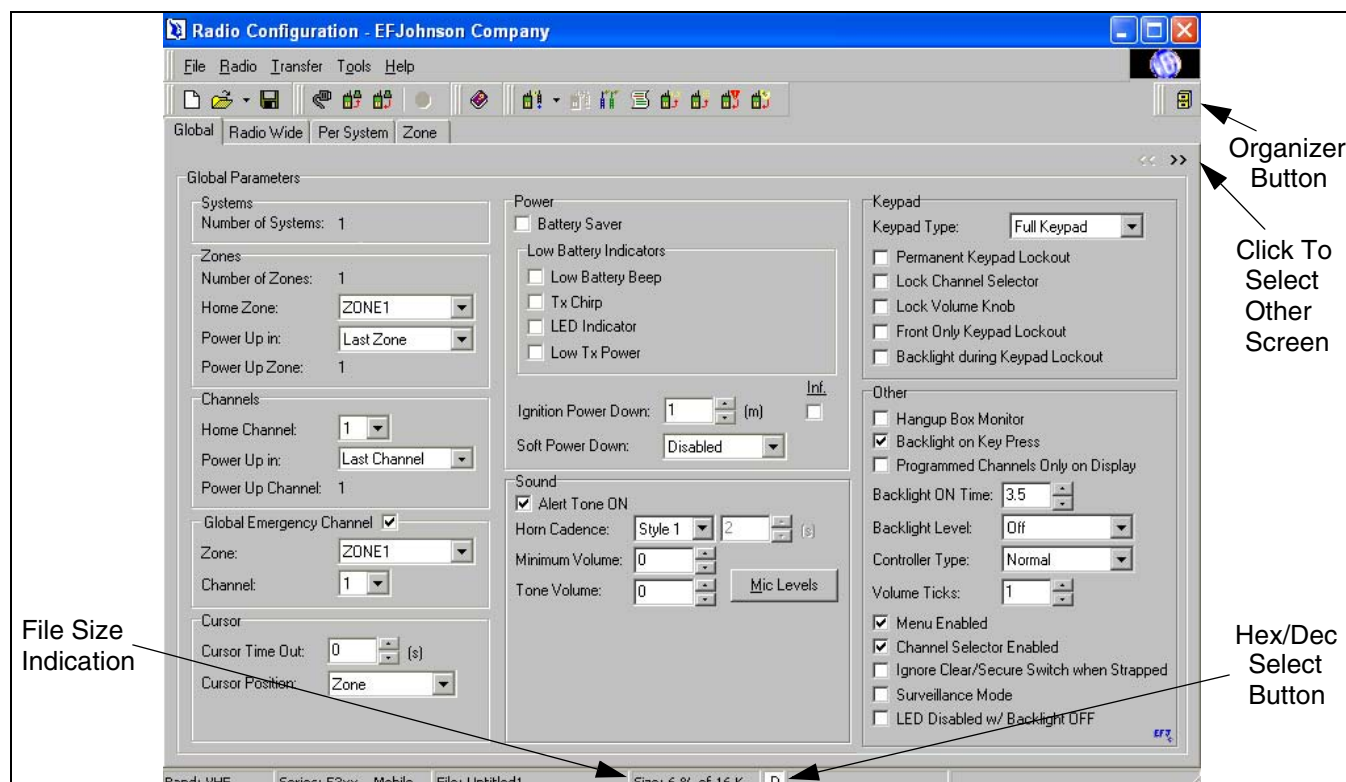


Figure 1-3 Main Screen (Global Screen Shown)

- Follow the on-screen instructions. The default directory for the program is \Program Files\EF Johnson\PCConfigure. This directory can be changed during installation if desired.

NOTE: Before completely removing an old version of PCConfigure, be sure to transfer the files in the Data and Keys folders to those folders of the new version.

1.7 STARTING AND EXITING

To Start PCConfigure

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

The PCConfigure program can also be started from an MS-DOS command prompt (C:\). To display the PCConfigure options that can be selected from the command prompt line, enter **PCConfigure /?**. The following information is then displayed.

To Exit PCConfigure:

Select File > Exit or press ALT and F4.

```
Usage: PCConfig.exe /? FileName -Help
                  /o FileName -Open file
                  /u /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...
```

1.8 PROGRAMMING FILE TYPES

Programming data is stored in a disk file that can be saved, read, copied, and deleted (see Section 3.1). This file is automatically given the extension “.rcf” by the program.

1.9 HELP FILES

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

NOTE: The ReleaseNotes.txt file lists the changes made with the various releases of the PCConfigure software. This file is located in the PCConfigure program folder. The default location of this folder is Program Files\EFJohnson\PCConfigure.

1.10 MAIN SCREENS

Four different screens can be selected by clicking the tabs at the top as shown in Figure 1-3. The functions of these screens are as follows:

Global - This screen is shown in Figure 1-3, and it programs parameters that are the same for all system types. 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 Multi-Net systems. 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 Multi-Net system. The system to be edited is selected by clicking it in the Systems box. Refer to Section 7.1 for more information on parameters in this screen.


Zone - This screen programs the channels and zones. Unique channel parameters include system and talk group encode/decode IDs. Refer to Section 7.2 for more information on parameters in this screen.

1.11 OTHER SCREEN INFORMATION

1.11.1 PROGRAMMABLE TITLE AND LOGO

The title that is displayed after “Radio Configuration” at the top of the screen (see Figure 1-3) is programmable using the Tools > Organization Identity menu item. This can be used, for example, to display a company name on the top line. In addition, the logo that is displayed on the right end of the menu bar can be customized. Refer to Section 3.4 for more information.

1.11.2 ORGANIZER

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

1.11.3 FILE SIZE INDICATION

The maximum number of channels that can be programmed may be limited by the available memory space in the radio. A running indication of the amount of memory used by the current data if it was downloaded to the radio is displayed as a percentage in the “Size:” box in the status bar on the bottom of the screen (see Figure 1-3). When this percentage reaches 100%, the available memory is full and some channels may need to be deleted if more information remains to be programmed.

1.11.4 DECIMAL/HEXADECIMAL SELECT

On some screens, such as the SMARTNET Talk Group, numbers can be entered using either a Decimal or Hexadecimal format. The format is selected globally which means that when a format is selected, it is selected for 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 (see Figure 1-3). A “D” indicates the Decimal format is selected and an “H” indicates the hexadecimal format is selected. In addition, the background color is ivory for all numbers which must be entered in Hexadecimal, 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 is displayed. This mode can also be toggled using the Tools > Preferences screen described in Section 3.4.

1.12 CREATING SYSTEMS

NOTE: To view the current and added systems, select the “Per System” tab and all programmed systems are displayed in the “Systems” pane on the left side.

A Multi-Net system as used with this radio programs the parameters for a single home repeater of all the sites into which a radio will roam. Unique system parameters include such things as home repeater number, emergency Zone/Channel, group scan list, individual (unique) ID, and fixed priority, transmit inhibit, and block IDs. Up to sixteen systems can be created.

To create a new Multi-Net system, select Radio > Add Systems in the menu bar and then select the Multi-Net system type (see Section 3.2). Alternatively, click  in the toolbar and select the desired system type from the drop down list. The current systems are indicated in the “Per System” screen in the “Systems” box. 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.

NOTE: Project 25 operation is currently not available with Ascend portables only (see Section 1.5).

1.13 HOW TO PROGRAM SCANNING

1.13.1 GENERAL

The two types of Multi-Net scanning that can be programmed are Radio Wide and Group (Standard). Generally, these scanning types are utilized as follows:

Radio Wide Scan - This type is usually programmed when two or more types of channels must be scanned at the same time such as conventional and Multi-Net, or if two or more Multi-Net systems (home channels) need to be scanned. If this is not a requirement, use the more efficient Group Scan which follows because there is less chance of missed calls.

Group (Standard) Scan - The Multi-Net group scan feature monitors the Multi-Net groups in the scan list of the selected system (home channel). This list can include up to 32 channels (groups) linked to that system. This type of scan monitors only channels that are the same type as the selected channel.

1.13.2 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 5.2. The channels to be included in the scan list must have been set up 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 . With 51xx portables, a Radio Wide Scan menu parameter can also be programmed as described in Section 5.3.

1.13.3 PROGRAMMING THE GROUP SCAN MODE

Group scan is set up on the Per System and Radio Wide screens. 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 “Group Scan List”. Then click the Edit List button and program the scan list as described in Section 7.1. The channels (groups) to be included in the scan list must have been set up as described in Section 6.
3. Repeat the preceding step for each system that will have Group Scan function.
4. On the Radio Wide screen, select Multi-Net in the left pane and program the Scan Delay Timers as described in Section 5.3.
5. Also on the Radio Wide screen, program the Scan option button by clicking the Assign Buttons button. With 51xx portables, a Scan menu parameter can also be programmed. Refer to Section 5.3 for more information.

SECTION 2 PROGRAMMING PROCEDURE

The following is a general procedure that can be followed to program a transceiver.

2.1 PRELIMINARY

1. Select a programming file as follows:

Create a New File - To start with a new file containing default parameters, select File > New and then when the dialog box appears, select the frequency band of the radio (currently, Multi-Net operation is available only with 800 MHz models).


Open An Existing File - To open an existing file stored on disk, select File > Open and then the file name to be opened.

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. Encryption parameters cannot be uploaded for security reasons. Refer to Section 3.3 for more information.

2. Be sure the correct radio type is selected by the Radio > Series menu (see Section 3.2).

NOTE: Some operating protocols and options may not be available with your radio. To display the options that have been factory enabled, select Transfer > Read Options From Radio (see Section 3.3).

2.2 CREATING SYSTEMS

A conventional system is automatically set up when a new programming file is created. Create a Multi-Net system by selecting Radio > Add System or  in the toolbar as described in Section 1.12.

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 Multi-Net systems as described in Section 5. This includes the Phone and Unit call and Status lists if applicable.

NOTE: The Radio Wide Scan List cannot be programmed 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.

2.6 ENTERING MULTI-NET SYSTEM AND CHANNEL PARAMETERS

1. Display the system programming screen by clicking the Per System tab at the top of the screen.
2. Program the applicable parameters for each Multi-Net system as described in Section 7.1. *NOTE: It may be necessary to further define the channels as described in the next steps before programming the group 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 Multi-Net channel in each zone as described in Section 7.2.
4. If necessary, program the group scan lists in each system (see preceding step 2). After all channel information is programmed, program the Radio Wide scan list in the Radio Wide screen (see Section 2.4).

2.7 PROGRAMMING RADIO (WRITING FILE)

When all the required programming information has been entered in the various programming screens, the information can be written (downloaded) into the radio. When writing a file, be sure that all connections between the computer and radio are secure, the radio is turned on, and the proper serial port is selected (see Section 3.3). Then proceed as follows:

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

2. If the radio has been programmed with a download password, it must be entered before data can be downloaded (see Section 8).
3. If no file is currently loaded, a dialog box appears to select the desired file. Otherwise, the current file is transferred to the radio.

NOTE: The information which follows (Sections 3-7) provides detailed descriptions of the parameters in the various screens that are displayed by the PCConfigure program.

SECTION 3 MENUS, TOOLBAR, AND STATUS BAR



3.1 FILE MENU



New - Creates a new programming file named “Untitled.rcf” containing default parameters and 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 currently open, you are asked if that file should be saved 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 is displayed to specify the file name and destination.

NOTE: It is not possible to save any type of programming file to disk without a radio connected. Refer to Section 9 for more information.

Save As - Saves the current file to disk and displays a screen for changing file name and destination if desired. The default file name is the P25 unit ID in the format “UnitID_xx”.

Close - Closes the current file without exiting the program so that another file can be opened or created if desired. If the current file has been modified and the changes have not been saved, you are asked if the changes should be saved before closing.

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

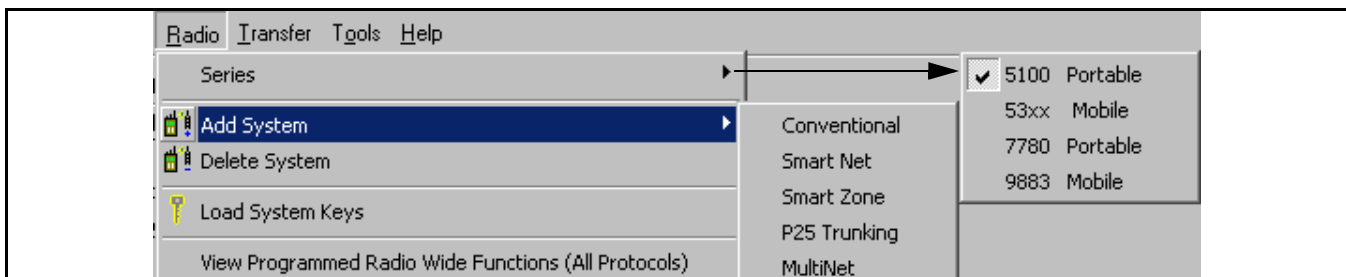
Print - Prints the information in the current file. A screen is displayed to select if Global, Radio Wide, Per System, and/or Zone information is printed.

Convert Band - This function is used to convert UHF files from one band to another (the band is selected when it is created by File > New). It can also be used to convert an 800 MHz file to 700/800 MHz and vice versa. Ascend radios are currently available only in the 800 MHz band.

Exit - Closes the PCCONFIGURE program. If the current file has been modified and the changes have not been saved, you are asked if the changes should be saved before closing.

3.2 RADIO MENU

Series - Selects the specific radio being programmed. Only parameters which apply to that radio are then displayed and others are grayed out.



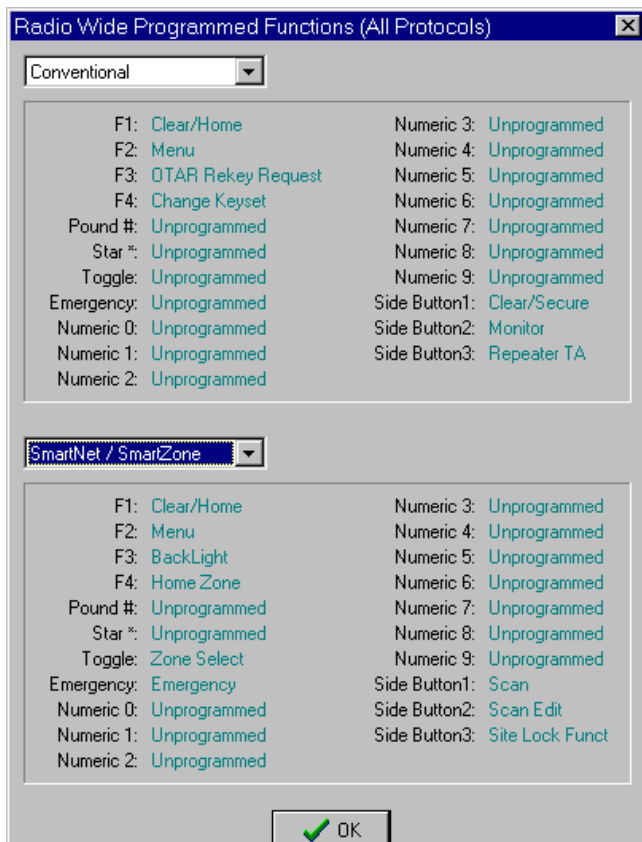
Radio Menu

Add System - Adds a new Conventional, SMARTNET, SmartZone, P25 Trunked (mobile only), or Multi-Net system as described in Section 1.12.

Delete System - If two or more systems have been set up, this function deletes the system that is currently selected in the Per System screen.

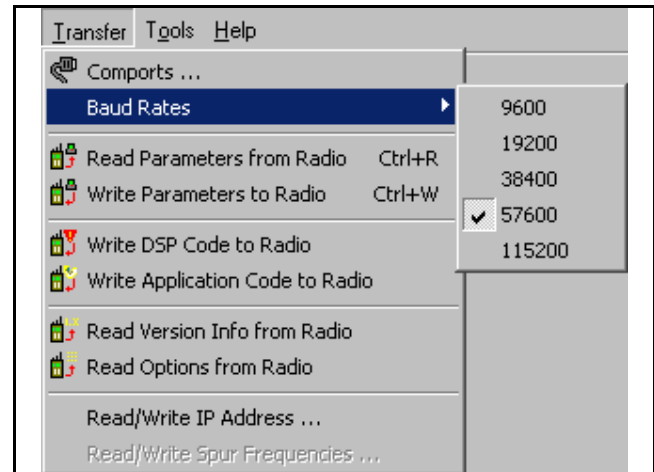
Load System Keys - Allows the SMARTNET/SmartZone/P25 trunked system keys to be loaded from a folder other than the default “Keys” folder. This does not apply to Multi-Net operation.


View Programmed Radio Wide Functions (All Protocols) - Displays the screen shown below which indicates the functions that have been assigned to the programmable option buttons on the Radio Wide screen (see Section 5.3). These buttons can be programmed for a different function in each mode (conventional, SMARTNET/SmartZone, P25 Trunked, Multi-Net). Up to two modes selected by the drop down lists are displayed.



Programmed Option Buttons Screen

3.3 TRANSFER MENU



NOTE: To stop a data transfer in progress, click  in the toolbar (see Section 3.6).

Comports - Displays a dialog box which selects the serial port used to program the transceiver (see Section 1.2). The default is COM1, and the last selected port is saved and then automatically reselected whenever the program is started. Ports 1-12 can be selected. Refer to Preferences in Section 3.4 for more information.

Baud Rates - All Ascend radios use the 19200 baud rate. Higher baud rates can be used when writing application code (see following). Refer to Preferences in Section 3.4 for more information.

Read Parameters From Radio - Transfers the information programmed in a transceiver into a new programming file. If the current file has not been saved when this function is selected, a dialog box is displayed to allow it to be saved if desired. The transferred data can be viewed, edited, or saved to a disk file as desired. An upload password may have to be entered. Refer to Section 8 for more information.

Write Parameters To Radio - Programs the transceiver connected to the computer with the data in the current programming file. A download password may have to be entered. Refer to Section 8 for more information.

Write DSP Code To Radio - This is used only with early 5300 models, so does not apply to Ascend versions.

NOTE: Ascend radios have safeguards to prevent unauthorized cloning. Refer to Section 9 for more information.

Write Application Code to Radio - Programs radios with updated firmware (operating software). Proceed as follows:

NOTE: This version of PCConfigure and later can be used only to upgrade radios to the latest release or later of radio firmware. Refer to Section 1.11 of the main manual for more information.

1. A special computer file containing the operating code must be obtained from EFJohnson. The Application code has a “.hex” extension, and the 5300/53SL DSP code (if applicable) has an “.out” extension. With all 51xx/Ascend portable models, copy the .hex file to the PPC\5100 folder of the PCConfigure program, and with later 53xx/Ascend mobile 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. Other locations can also be used if desired.
2. Put the radio in the firmware programming mode as follows.

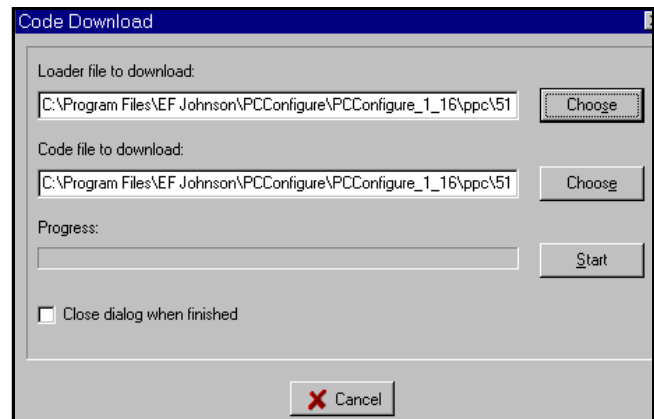
53xx/Ascend Mobile - Turn power on with the special Flash Mode Select Plug, Part No. 023-5300-010, plugged into the microphone jack. Alternately, short pin 3 to 7. With the HHC, plug it into the programming adapter plug that is plugged into the junction box programming connector.

51xx/Ascend Portable - Turn power on with the option button above the PTT switch pressed.
3. Select the 115,200 baud rate with portables and the 57,600 rate with mobiles.
4. If applicable, make sure that the radio is connected to the computer and then select this function. Enter the password (obtained from the EFJohnson Company) in the screen that is displayed and click the OK button.

NOTE: The Boot Loader code may need to be updated in addition to the Application code. The Boot code is then updated first. The Boot Loader

utility is selected by one password and the Application utility by another.

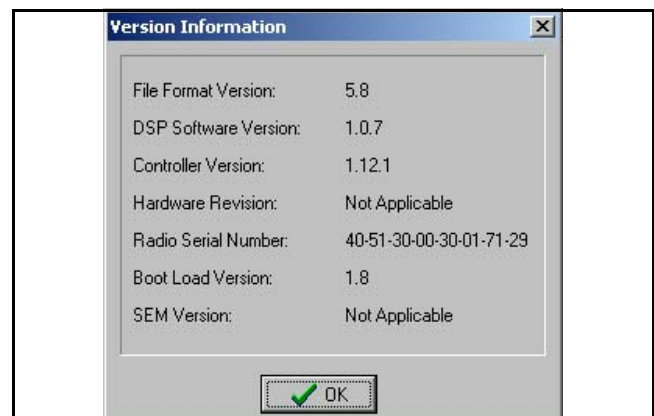
5. The following screen is then displayed. Select the loader and code files if required by clicking the “Choose” button. The loader file is included with PCConfigure software. In some cases, an updated loader file may be required and would then need to be selected instead of the included loader file. The application code file should be in the folder selected in step 1.



6. Click the Start button to begin code downloading (try clicking 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 that the file format is correct.

Read Version Info From Radio - Transfers version information on the software the radio contains and then displays it as follows.



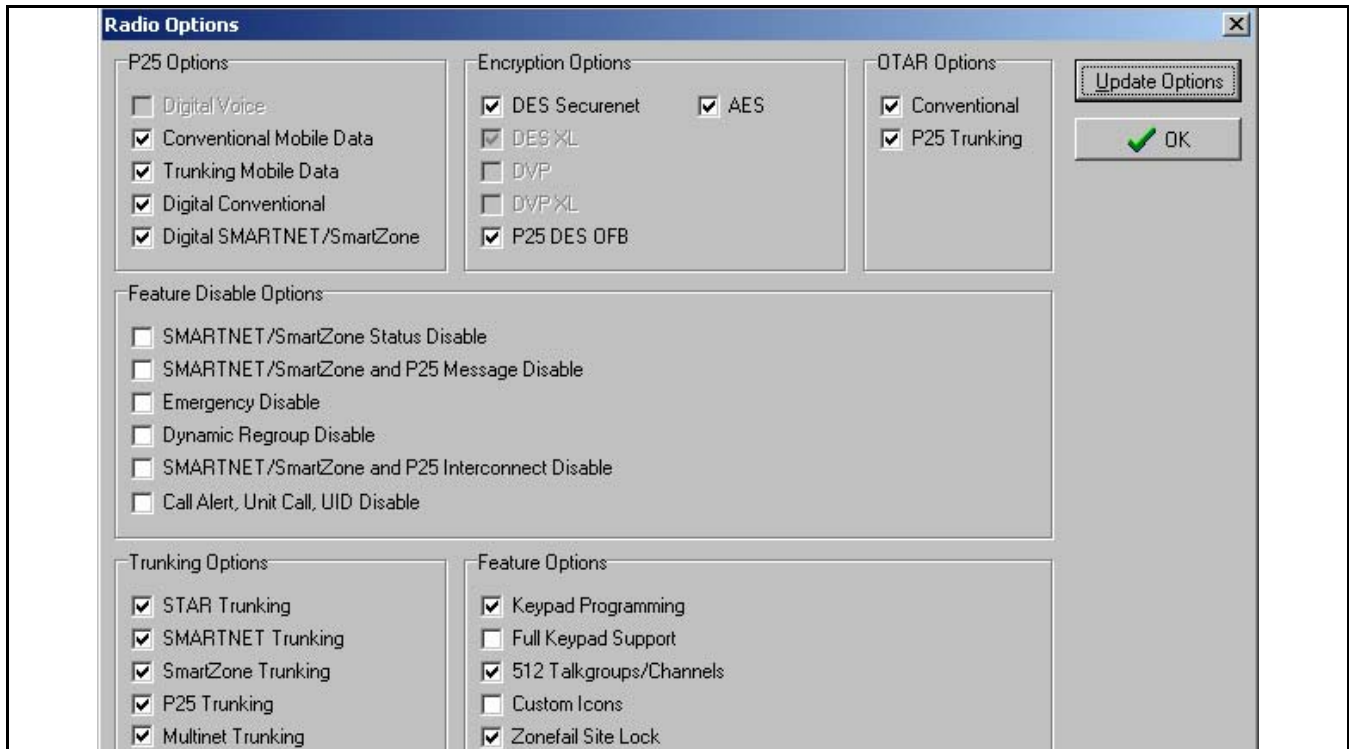


Figure 3-1 Transfer > Read Options Screen

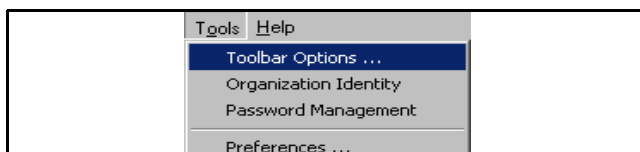
Read Options From Radio - Displays information on which options have been enabled in the radio as shown in Figure 3-1. The check boxes indicate which options are enabled. They are for informational purposes only and cannot be edited.

The “Update Options” button is used to add additional options that have been purchased for the radio. An encrypted data file keyed to the radio serial number is provided to unlock these options. This file has an “.opt” extension and is selected and downloaded by a screen that is displayed when this button is clicked.

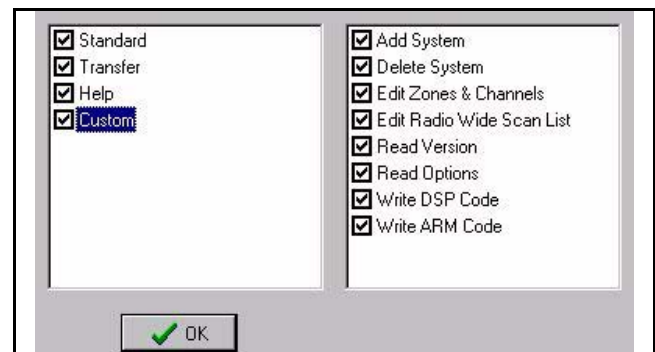
Read/Write IP Address - This function is not currently supported.

Read/Write Spur Frequencies - Not used with the 51xx/53xx/Ascend.

3.4 TOOLS MENU

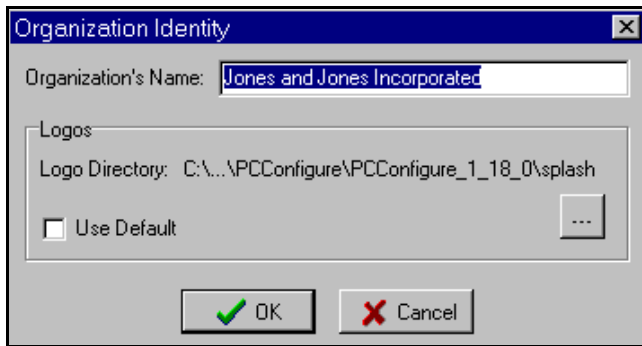


Toolbar Options - Displays the following dialog box which is used to select the icons that are displayed in the toolbar (see Section 3.6). When the “Custom” box is checked and highlighted, the additional window shown below is displayed to select which icons to display. The last selected configuration is saved and then automatically reselected when the program is restarted.



Organization Identity - Displays the following screen which can be used to display a unique company title and logo on the programmer screen. To display a unique company name, enter the desired name in the “Organization’s Name” box in this screen. It is then

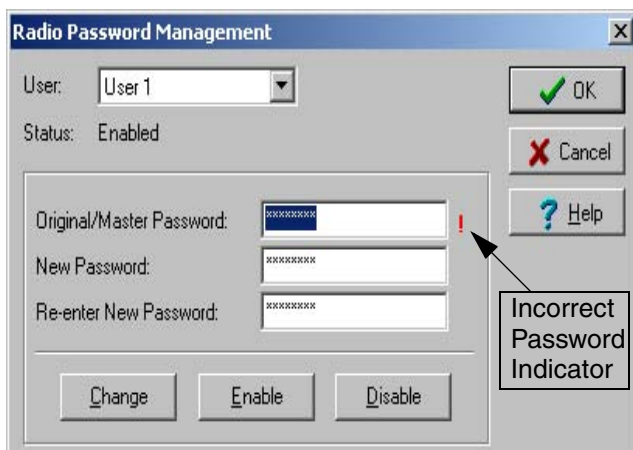
displayed after “Radio Configuration” at the top of the screen (see Figure 1-3).



A logo is displayed on the right end of the toolbar, and when a radio read or write operation is occurring, this logo changes. To display the default logo, check the Use Default box. To display a custom logo in this area, create a bitmap file of the desired graphic that meets the following requirements. A photo editing program such as Photoshop® or Paint Shop Pro® can be used.

- 53 W x 22 H pixels
- .bmp file format
- 256 colors or higher recommended
- Up to 30 files can be created named 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 which is used to enable, disable, and change radio passwords. A radio must be connected to display this screen. Actual passwords are never displayed in this screen. Passwords, no matter what the length, are always represented by eight asterisks (*****).



NOTE: This is a new feature available only with later 51xx and 53xx radios with updated firmware. All Ascend versions have this feature.

User - This drop down list selects the particular password being changed as follows:

User 1, User 2, User 3, User 4 - Up to four different power-on passwords can be programmed. Currently, the same user features are available with each.

Upload, Download - These passwords are required to Upload (read) or Download (write) programming parameters. A preceding “User” password is not required to upload or download parameters.

Master - This password overrides all the other passwords. It can be used by a system administrator or if any of the above passwords are lost.

Selected User - This box indicates status of the selected password (Enabled or Disabled). The Password box always indicates eight asterisks and is not editable.

Proceed as follows to set up or change a password. Passwords must be 1-8 characters in length 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 an incorrect password is entered, a red “!” exclamation point is displayed to the right of the box (see preceding screen) and the password must be re-entered.

1. Select the password in the drop down list.
2. If the password was previously set up, enter the current password in the Original/Master box.

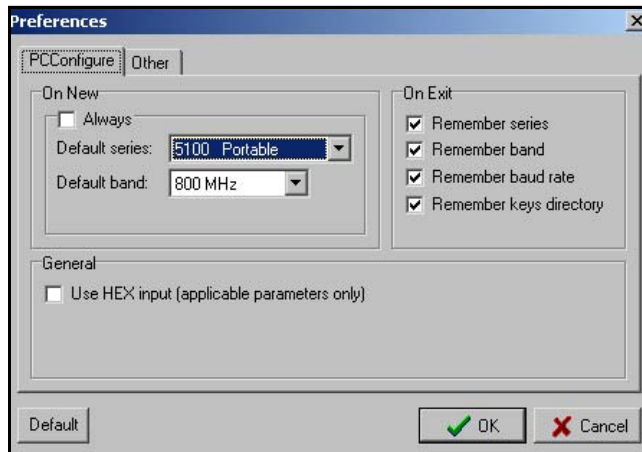
If this is the first time the password is used, it initially consists of null (deleted) characters. In this case, do not enter anything in this box.

3. If the password is simply being enabled or disabled, click the appropriate Enable or Disable button. Proceed to step 6.


4. If the password is being changed or initially set up, enter the new password in the New Password box and then re-enter 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.

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

PCConfigure Screen




On New


When “Always” is checked, a programming file with the Radio Series and Band selected by the drop down lists is automatically created in a single step by File > New or the  button. However, the Band of a file then cannot be changed, so only files with the selected Band can be created. If this is not checked, the Band is selected in a separate step before the file is created (see following).

On Exit

When selected, the parameter is restored to the current condition when the program is restarted. Otherwise, the default is selected. Note that the first two parameters which follow are overridden by the preceding “On New- Always” if it is checked.

Remember Series - The current Radio Series is automatically selected whenever a new file is

created by selecting File > New or the  button. If this is not selected, “5300” is the default.

Remember Band - The current frequency Band is highlighted (and can be changed if desired) when the Band select screen is displayed by selecting File > New or the  button. If this is not selected, “VHF” is the default.

Remember Baud Rate - The currently selected baud rate is automatically reselected (see Section 3.3). If this is not selected, “19200” is the default.

Remember Keys Directory - The currently selected key directory is automatically reselected. If this is not selected, the “Keys” folder is the default (see “Load System Keys” in Section 3.2).

General

Use Hexadecimal Input - When selected, all applicable numbers are entered in Hexadecimal format instead of Decimal format. All Hexadecimal numbers are indicated by an ivory-colored background. Refer to Section 1.11.4 for more information.

“Other” Screen

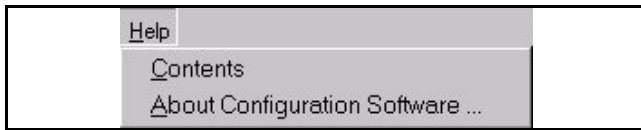


Serial Communication

Send/Get Delay - Allows a serial port delay of 0-18 (x 56 ms) to be programmed. This delay may need to be programmed with computers which are slow to respond to serial port signals. If the software times out during read/write operations, try increasing this delay. In the large majority of cases, the default level of “0” (no delay) should be selected.

3.5 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. The tools that are displayed are selected by the Tools > Toolbar Options menu described in Section 3.4. The Standard, Transfer, Help, and Custom tools can be turned on and off by this menu.

3.6.1 STANDARD TOOLS

Refer to Section 3.1 for more information.


 **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.


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 is displayed, 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** - Not used with 5100 models.

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

3.7 STATUS BAR

The status bar shown in Figure 3-2 indicates the following information:

Band - The frequency band of the file. This is selected when a new file is created by 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. This name is specified the first time the file is saved by the File > Save function or it can be changed by the File > Save As function.

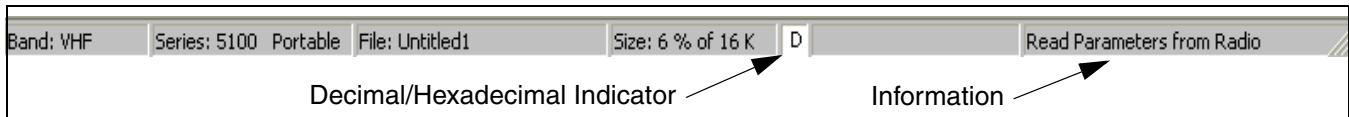


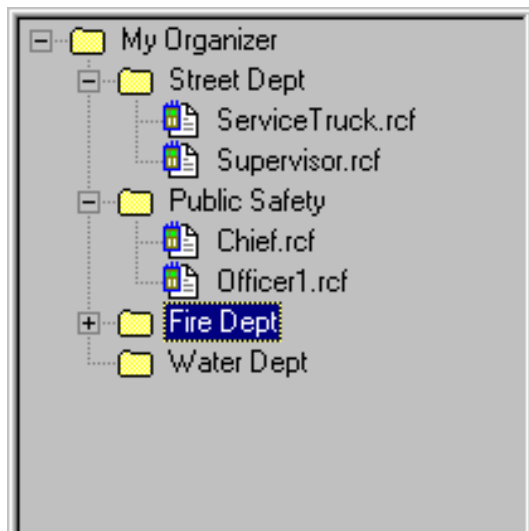
Figure 3-2 Status Bar


Size - Indicates the percent of the available memory space that would be used if the radio was programmed with the current file (see Section 1.11).

D/H Box - Indicates if the Decimal or Hexadecimal number format is selected (see Section 1.11.4).




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



3.8 ORGANIZER



Clicking the organizer button  on the right end of the toolbar toggles the preceding screen which can be used to organize a large number of programming files into groups and subgroups for easier identification when administering a large organization.

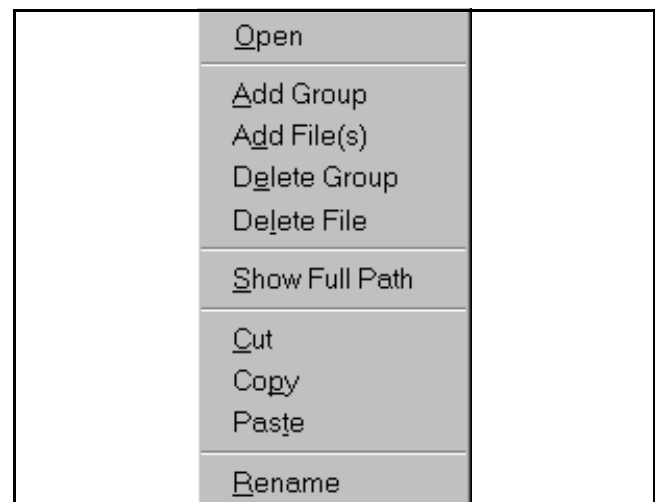
NOTE: This organizer does not add, delete, or move programming files on the hard drive. It simply organizes those files in logical folders and subfolders.

Groups are indicated by a folder symbol , and programming files are indicated by a  symbol. A  symbol next to an item indicates that the branch is expanded, and clicking it collapses the branch. Like-

wise, a  symbol indicates that the branch is collapsed, and clicking it expands the branch. If a file in the organizer has been 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 (see 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 and the following screen is displayed.

Open - Opens the selected file. If the current file has not been saved, you are asked 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 is used to select a file on the hard drive to add to the selected location.

Delete Group - Deletes the selected Group from the Organizer only (the actual files on the hard drive are not deleted).

Delete File - Deletes the selected File from the Organizer only (the actual file on the hard drive is not deleted).

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 file on the clipboard to the selected location

Rename - Renames the selected Group. Files cannot be renamed from the Organizer.

SECTION 4 GLOBAL SCREEN PARAMETERS

Figure 4-1 Global Parameter Programming Screen

4.1 INTRODUCTION

The Global screen shown in Figure 4-1 programs parameters that are the same for all systems, channels, and zones. Only parameters that apply to the selected Radio Series are displayed and the others are grayed out. The parameters in this screen are as follows:

4.2 PARAMETER DESCRIPTION

Systems

Displays the number of systems that have been created as described in Section 1.12.

Zones (A zone is a programmed collection of up to 16 channels of any type.)

Number of Zones - The total number of zones currently set up. The maximum number allowed

is 16 (mobile) or 32 (portable). Zones are created in the Zone > Edit Zones screen by clicking the “+” button (see Section 6.2).

Home Zone - Selects the zone that is selected by the Home Zone option function button (if programmed).

Power Up In - Selects if the transceiver powers up on the Home or Last Selected zone/channel.

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.

Channels

Home Channel - Selects the channel that is selected by the Home Channel function button (if programmed) and when the transceiver powers up on the Home

zone. With the 51xx/Ascend portable, this is selectable only if the channel selector switch is disabled (see “Channel Selector Enabled” parameter on page 23).

Power Up In - Selects if the Home or Last Selected channel is selected on power up. With the “Last Zone”/“Home Channel” power up configuration, the programmed home channel number of the last active zone is selected. If that channel number is not programmed, “Unprogrammd” is displayed. With the 51xx/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 the power-up zone just described.

Global Emergency Channel

Selects the zone and channel on which all emergency calls and alarms are transmitted regardless of the type of channel 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 is transmitted on the conventional global emergency channel. If this is a Multi-Net channel, the auto/manual emergency programming of the selected system determines the emergency mode.

Cursor (53xx/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. Times of 0-255 seconds can be programmed (“0” selects no return).

Cursor Position - Selects if the Zone or Channel select mode is enabled when power is turned on and after the preceding time-out period expires.

Battery Saver (51xx/Ascend Portable Only)

If this is checked, the portable automatically switches to the low transmit power mode when the RSSI signal indicates the site is probably nearby. This feature is currently not supported by Multi-Net operation.

Low Battery Indicators (Portables Only)

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

Tx Chirp - When checked, a chirp sounds each time the PTT switch is pressed while a low battery condition is being detected.

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

Low Power - If this box is checked, low transmit power is automatically selected while a low battery condition is being detected.

Ignition Power Down (Mobiles Only)

When the ignition switch controls transceiver power, this sets the delay that occurs between when the ignition switch is turned off and when transceiver power actually turns off. Times of 0-254 minutes or an infinite time (no turn-off) can be selected.

Soft Power Down (51xx/Ascend Portable Only)

The soft power down feature prevents radio power from being turned off by accidentally turning the top panel on-off/volume control. Any side option button can be programmed for this function (in addition to its normal function). Then for power to turn off, this button must be pressed during or just after power is turned off by the on-off switch.

Sound

Alert Tone On - If checked, all supervisory tones sound. If not checked, no tones sound.


Horn Cadence (53xx/Ascend Mobile Only) - Programs the following styles when the horn alert is enabled by the horn alert option switch. Repeating does not occur with either style.

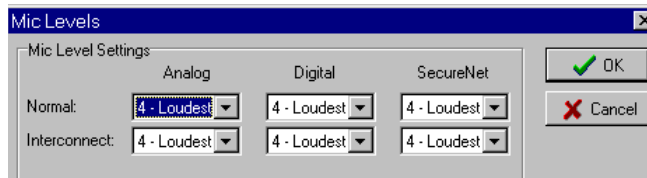
Style 1 - The horn is on for 1 second and off for 0.5 second for three cycles.

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

Minimum Volume - Sets the minimum volume level that can be selected by the volume control. This can be used to prevent missed messages caused by inadvertently turning the volume down too far. Relative levels of 0-255 in steps of 1 can be set ("0" sets the lowest minimum volume).

Tone Volume - This adjusts the alert tone volume level relative to the volume control setting. This can also be done by a Tone Volume Edit option button if programmed. Changes made by this button permanently override this setting. Relative levels of -170 to +170 in steps of 1 can be set ("0" is the standard default setting).

 Mic Levels - Displays the following screen which sets the microphone sensitivity for various types of calls. Relative levels of 0 (less sensitive) to 4 (most sensitive) are set for Analog, Digital, and SecureNet® (encrypted) calls with "4" the default. "Analog" sets the level for Multi-Net operation.



Keypad (Portables Only)

Keypad Type - Selects if the portable being programmed has a Full DTMF Keypad or a Limited Keypad (without the 0-9, *, # DTMF keys).

Permanent Keypad Lockout* - If checked, the front and side panel keys are permanently disabled and cannot be re-enabled by the user. If the "Front Only Keypad Lockout" parameter which follows is selected, only the front panel keys are permanently disabled and the side panel keys can still be used.

Lock Channel Selector - When checked, the top panel channel selector switch 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, do not select "Channel Selector Enabled" which follows.

Lock Volume Knob - 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 (see following "Volume Ticks" parameter).

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

Backlight During Keypad Lockout - When checked the backlight turns on normally when a key is pressed with the keypad is locked (if Backlight on Keypress which follows is enabled). If not checked, the backlight is also disabled when the keypad is disabled.

Other

Hang-Up 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 affect on these functions.

Backlight on Keypress (Portables Only) - If checked, the backlight turns on for the Backlight On Time whenever a key is pressed.

Programmed Channels Only on Display (53xx/Ascend Mobile Only) - If checked, only programmed channels can be selected, and if not checked, all channels are displayed. When an unprogrammed channel is selected, "UNPROGRAMD" is indicated and a tone sounds.

Backlight On Time (Portables Only) - Programs the length of time in seconds that the backlight stays on after it is enabled by pressing a key (see preceding). Times of 0-7.5 seconds in 0.5-second steps can be programmed. When turned on by the option switch or menu parameter, it stays on until turned off again.

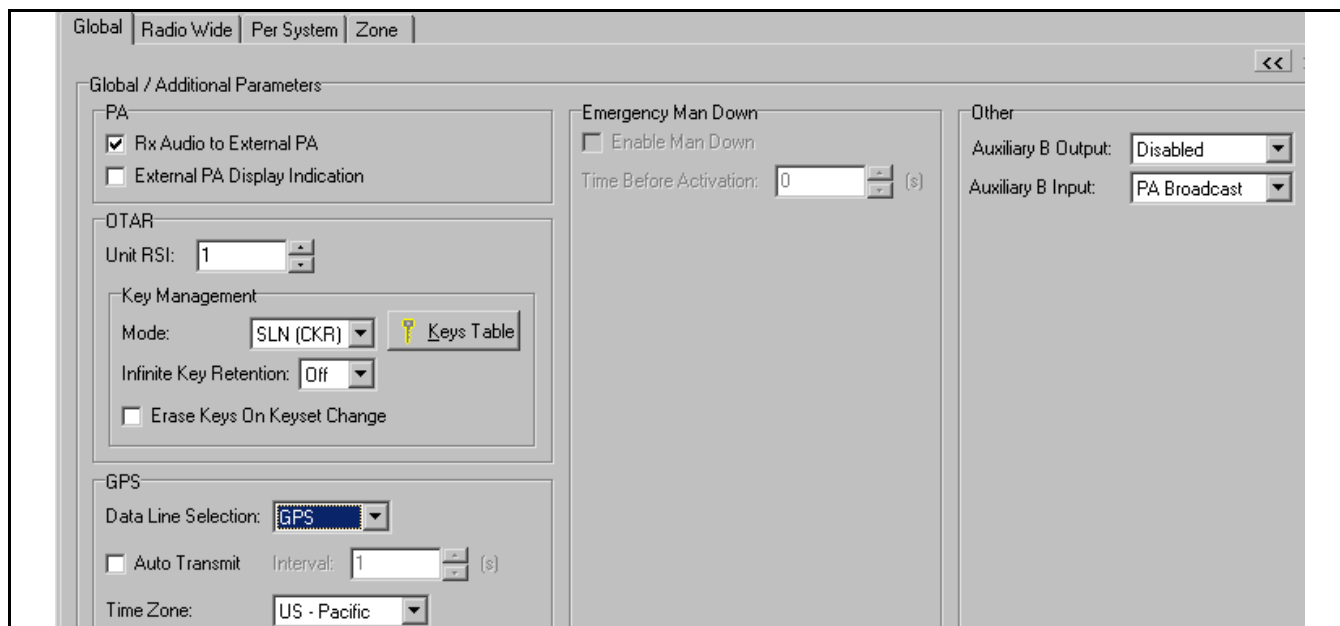


Figure 4-2 Global Screen (Page 2)

Backlight Level (53xx/Ascend Mobile Only) - Selects the backlight brightness as Off, Mid, or High whenever power is on. This setting can be overridden by the Backlight option switch if it is programmed.

Controller Type (53xx/Ascend Mobile Only) - Selects the type of control head being used. “Normal” is selected with the standard front or remote mount control head, and “Handheld” is selected with the Handheld Control Unit.

Volume Ticks (51xx Only) - When a Volume Up/Down button is programmed on the Radio Wide screen for a particular system type, the volume control is disabled when a channel programmed for that system type is selected. This then selects the number of button presses (ticks) required to change from minimum to maximum volume. From 1-50 steps can be programmed. See also preceding “Lock Volume Knob” parameter.

Menu Enabled (51xx/Ascend Portables Only) - Enables the menu mode with these portables. The F1 and F2 keys then become menu exit and select keys instead of programmable option keys. If this parameter is not selected, the menu mode is not available and F1 and F2 are programmable option keys.

Channel Selector Enabled (51xx/Ascend Portable Only) - Enables the channel select knob in the top

panel. If this is not checked, the channel select knob is disabled and channels can be selected only by the Channel Select option button or menu parameter.

Ignore Clear/Secure Switch When Strapped - This applies to encryption switching which is currently not available with Multi-Net operation.

Surveillance Mode - Disables the transmit/receive LED indicator, display and keypad backlight, and all alert tones. This provides a quick way of totally disabling these functions in all operating modes. It overrides any other programming of these functions such as a Tone or Backlight option switch. This does not disable the transmit icon in the display (available only with 51xx, firmware Version 2.5 or later).

LED Disabled w/Backlight Off (5300/Ascend Mobile Only) - When selected, the front panel transmit indicator is disabled whenever the display backlight is off. If it is not checked, this indicator operates normally regardless of the backlight state (except when the surveillance mode is selected).

4.3 PAGE 2 GLOBAL SCREEN DESCRIPTION

A second Global screen shown in Figure 4-2 is opened/closed by clicking the << >> buttons in the upper right corner of the screen. These additional parameters are then displayed:

PA (53xx/Ascend Mobile Only)

Rx Audio to External PA - Microphone audio is always routed to the Ext PA line of the accessory cable. If this parameter is selected, receive audio signal is also routed to this line.

External PA Display Indication - If this is selected, “Ext PA On” is indicated continuously in the display when the external PA function is enabled by the Ext PA option button. If it is not selected, “Ext PA On/Off” is flashed in the display when a button is pressed.

OTAR/Key Management

Selects the OTAR unit RSI and also the method used to load and manage encryption keys. Since encryption is currently not available with Multi-Net operation, this section does not apply to Multi-Net channels.

Emergency Man Down (51xx/Ascend Portable Only)

The Emergency Man Down feature automatically 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 emergency button had been pressed. An optional man-down device must be attached to the accessory port of the radio, and this feature must be selected.

The timer can be programmed for 0-63 seconds, and it resets if the radio is moved back to a horizontal position. The emergency mode can be canceled by pressing the emergency button. This feature is available only with Version 2.5.13 or later firmware.

GPS (53xx/Ascend Mobile Only)

This feature is currently not available. It programs a GPS feature that can be used with other equipment to determine the geographical location of the subscriber unit.

Other (53xx/Ascend Mobile Only)

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

Backlight - When the Siren option is used, 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 P25 trunked operation.

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 public address function to be selected by an external switch.

Ext Emergency - Selected if an external emergency switch, such as a foot activated type, is used to activate an emergency condition.

Disabled - The input is nonfunctional.

SECTION 5 RADIO WIDE SCREEN

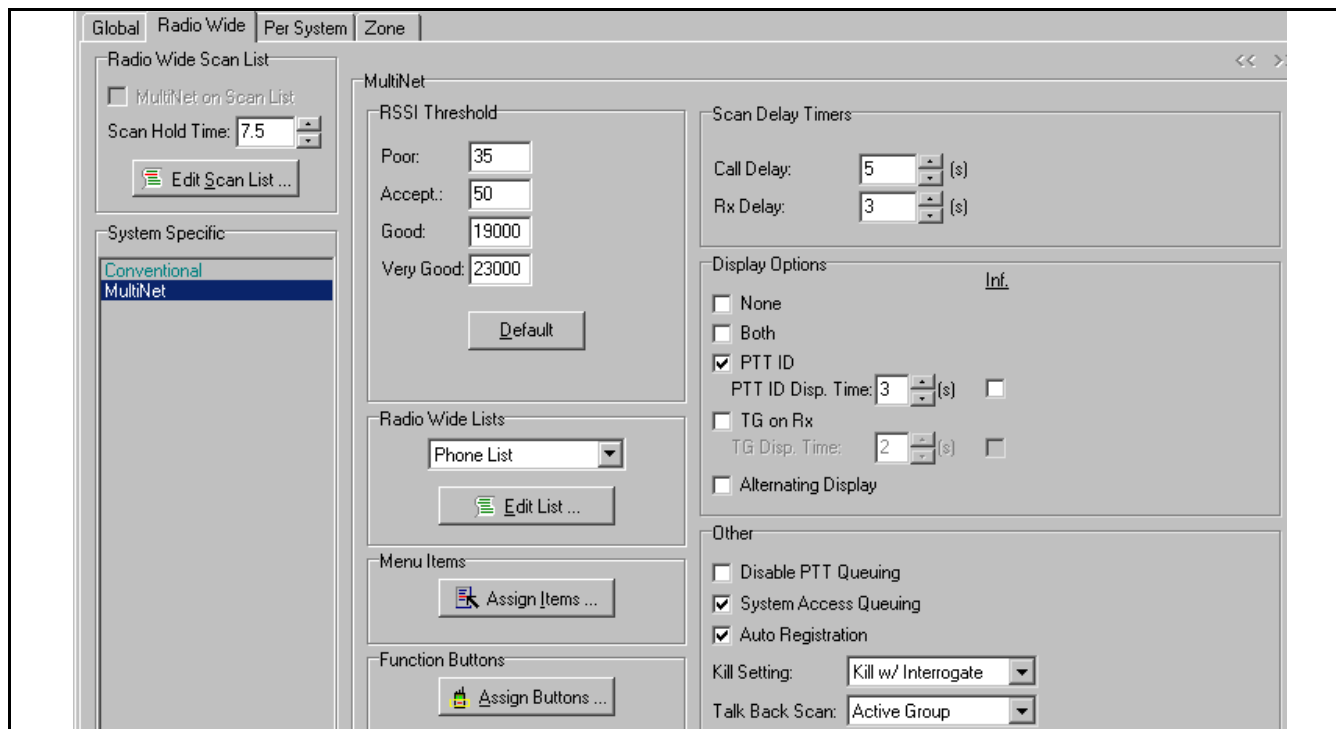



Figure 5-1 Radio Wide Multi-Net Screen

5.1 INTRODUCTION

The Radio Wide screen programs parameters that are the same for all Multi-Net systems. The Multi-Net screen is shown in Figure 5-1.

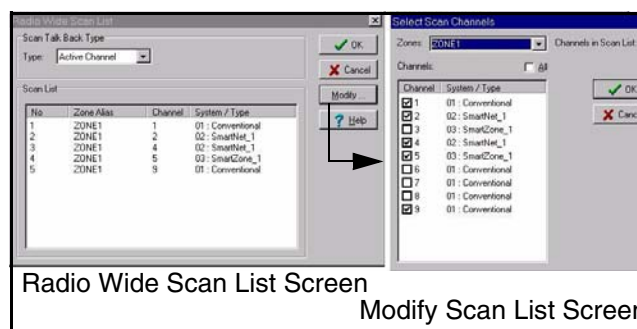
5.2 RADIO-WIDE SCAN LIST PROGRAMMING

NOTE: The radio-wide scan list cannot be programmed until all channels to be included in it have been set up in the Zone screens (see Section 6).

The Radio Wide scan list is the same for all system types and can include up to sixteen channels from any system. This scan list is programmed by clicking the **Edit Scan List ...** button on this screen or  in the toolbar. The following Radio Wide Scan List screen is then displayed.

To select the channels that are in the radio wide scan list, click the **Modify ...** button to display the Modify Scan List screen. Select the desired zones

from the drop-down list and then check the channels to be included from each zone in the list.



Radio-Wide Scan List Screens

Scan Talk Back Type

When a call is received while radio wide scanning, this determines if a response occurs on the Selected Channel or the channel of the call (Active Channel) when they are not the same.

Scan Hold Time

When Radio Wide scanning is occurring, this programs the delay that occurs after a message is no longer being received or transmitted before scanning resumes. Times of 0 - 7.5 seconds can be programmed.

5.3 RADIO WIDE MULTI-NET PARAMETERS

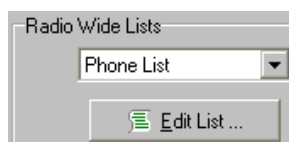
Clicking “Multi-Net” in the “System Specific” box displays the screen shown in Figure 5-1. This screen programs the functions that are the same for all Multi-Net systems.

RSSI Threshold

This sets the RSSI (Receive Signal Strength Indicator) levels. Currently, only the “Acceptable” level is used. The RSSI of a site must exceed this level for it to be considered as a candidate for a new site by the site search procedure. Clicking the “Restore Defaults” button restores these levels to the default setting. If the “Hex” box is checked, the RSSI levels are displayed in the hexadecimal instead of decimal notation.

NOTE: The default RSSI levels should not be changed unless you are familiar with how these levels affect radio operation.

Radio Wide Lists



The various Multi-Net radio wide lists are programmed by selecting them in the Radio Wide Lists drop-down list shown above and then clicking the Edit List button. Descriptions of the various lists and the information they program follow.

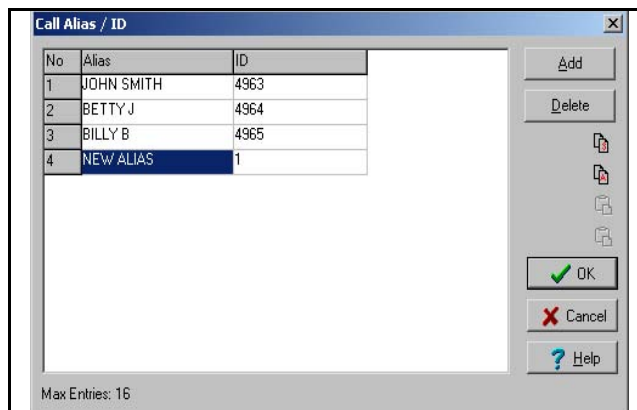
Phone List

The Phone List screen which follows programs the list of phone numbers that can be recalled for Multi-Net Telephone calls. Up to 16 numbers can be stored, and each number can be up to 16 digits. The * and # characters cannot be stored. To store a pause,



enter a “p” or “P”. Numbers up to the pause are sent, a short delay occurs, and the remaining numbers (or the numbers to the next pause) are sent. A pause counts as one character. The alias can be up to 10 alphanumeric characters.

Unit Call List

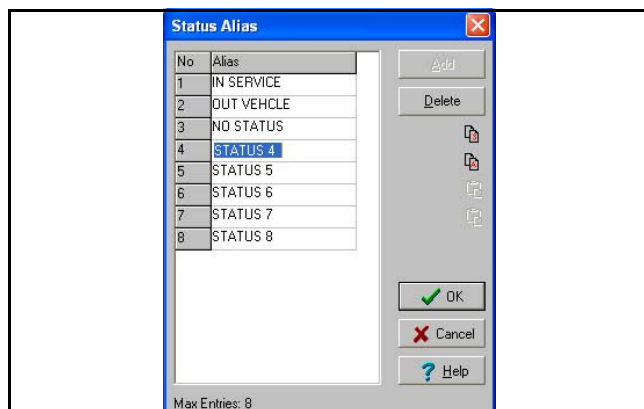


The Unit Call List screen shown above programs the list of numbers that can be recalled for Multi-Net Unit/Unique ID and Directed Group calls. Up to 16 numbers can be stored. Individual (Unique) IDs for Unit calls are 4 or 7 digits in length, and Directed Group call numbers are 5 or 8 digits in length. The longer number is required if the call is to another site and the site ID must be specified. The alias can be up to 10 alphanumeric characters. Refer to the operating manual for more information on these numbers.

Status Message List


The Status Message List screen which follows programs the up to eight status messages that can be selected. The message assigned to each number should

be the same as that programmed in the dispatcher console. Each message can be up to 10 alphanumeric characters.

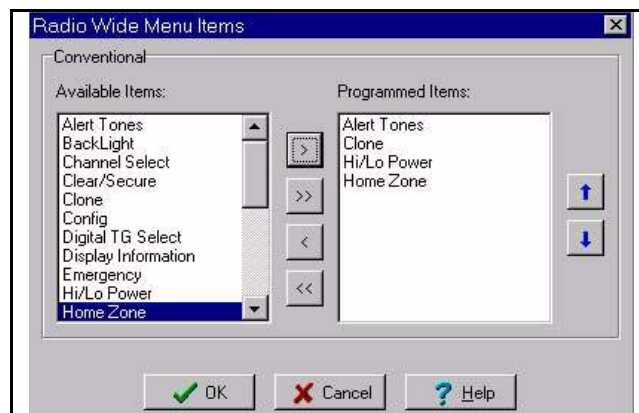


Status Message List Screen

Menu Items Programming

The menu function is available with 51xx/Ascend portables only. The menu mode can be user selected if the “Menu Enable” box on the Global screen is checked. Clicking the  button displays the following screen which is used to select the functions that are selectable in the menu mode. To move a function to the other list, double click it or select it and click one of the single arrow buttons. Clicking a double arrow button move all items to the other list.


A separate set of menu parameters can be programmed for each system type similar to the



Menu Programming Screen

function buttons described in the next section. The system type being programmed is selected in the “System Specific” box of the Radio Wide screen. Functions can be controlled by both the menu and a function button if desired. The available menu functions are shown in Table 5-1.

Function Button Programming

Clicking  in the Radio Wide screen displays a screen similar to the one shown in Figure 5-2 that programs the function buttons for the radio selected by Radio > Series.

Each button can be programmed with a function for Multi-Net channels, and others for Conventional, SMARTNET/SmartZone, and Project 25 Trunked systems. The system type is selected in the “System

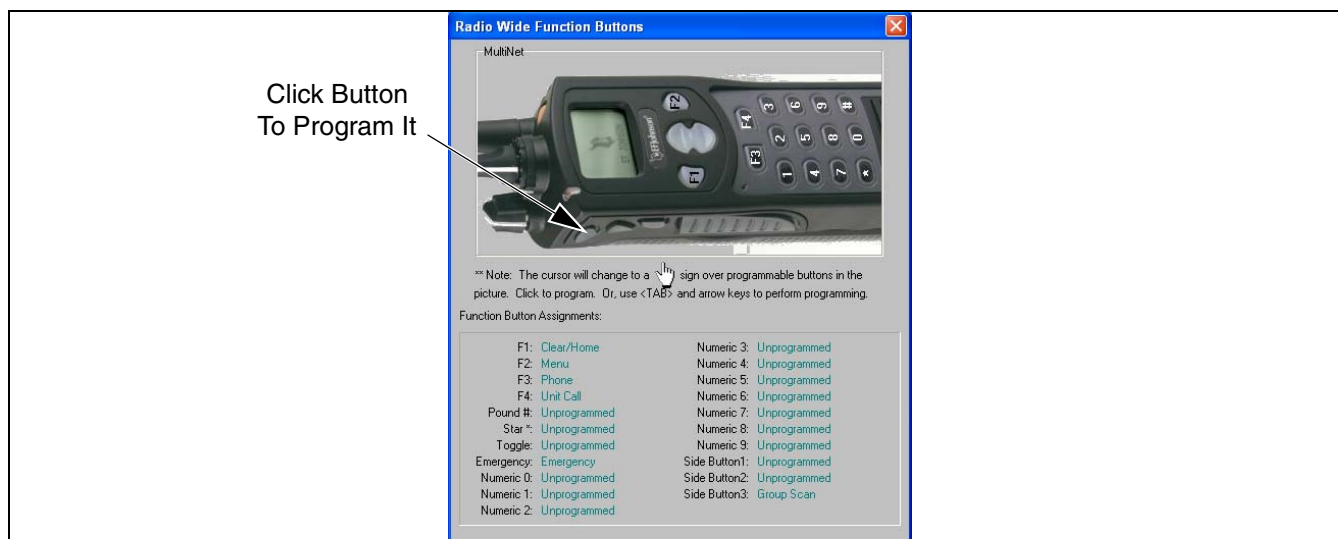


Figure 5-2 Assign Function Buttons Screen

Specific” box of the Radio Wide screen. The available option button functions are shown in Table 5-1.

NOTE: To view the functions programmed for each button in the various modes, select Radio > View Programmed Radio Wide Functions (see Section 3.2).

Program the function buttons as follows:

1. Click the white “Fx” button being programmed in the photo and a drop-down list is displayed showing the functions that can be assigned (with the 51xx portable, almost all buttons are programmable).
2. To select a function, double click it in the drop-down list. The functions that have been assigned to each button are displayed in the bottom part of the screen.
3. Repeat for all function buttons that are to be programmed. Then click OK to exit and save the changes or Cancel to exit without saving the changes. Then select the other system type if applicable and repeat this procedure.

Scan Delay Timers

These timers program various setting for Multi-Net group scanning. Radio wide scan settings are programmed on the Radio Wide screen.

Call Delay - Programs the delay before scanning resumes after responding to a message.

Receive Delay - Programs the delay before scanning resume after receiving a message.

Display Options

These functions select what is displayed when a group call is received. It does not affect the information displayed when a special call is received.

None - Only the talk group alias of the call or the selected talk group alias is displayed, depending on the call type.

Both - Both of the following are displayed.

PTT ID - The individual (unique) ID of the mobile placing the call is displayed. The time this ID is displayed is programmable for 0.5-7.0 seconds or

Table 5-1 Multi-Net Mode Option Switch and Menu Functions

Function	Menu Display	Option Switch
Backlight On-Off	Backlight	X
Call Response	Call Rsp	X
Channel Select	Chan Selct	X
Emergency Select	Emergency	X
Group Scan Select	Grp Scan	X
High/Low Power Sel	Tx Power	X
Home Zone Select	Home Zone	X
Keypad Lockout Sel	(Opt sw only)	X
Phone Call Select	Phone	X
Radio Wide Scan Sel	RW Scan	X
RWS List Edit	RWS Edit	X
Scan Edit	Scan Edit	X
Set User Password	Set Pswd	X
Site Lock	Site Lock	X
Site Search Select	Site Srch	X
Status Select	Status	X
Surveillance Mode Sel	Surv Mode	X
Tone Volume Edit	Tone Vol	X
Unit Call Select	Priv Call	X
Unprogrammed	-	-
Volume Down (portable only)	(Opt sw only)	X
Volume Up (portable only)	(Opt sw only)	X

infinite. When “infinite” is selected, this ID is displayed for the entire call and none of the other parameters are displayed. The channel (group) alias is then displayed continuously.

Talk Group on Rx - The group ID on which the call is received is displayed. The same times are programmable as with the preceding PTT ID.

Alternating Display - If checked, the PTT ID and channel alias are alternately displayed when the call is active. They alternate at the time set by the PTT ID.

Other

Disable PTT Queuing (Camp-On) - When selected, the PTT switch cannot be held down while a message is being received in order to immediately access the system when it is finished.

System Access (Busy) Queuing - When selected, Telephone and Unit calls are placed in a queue if the radio system is busy when the PTT switch is pressed. An alert tone then sounds when the call can be placed. This tone may not sound with early units.

Auto-Registration - When selected, auto-registration is enabled which causes the radio to automatically register on the current Multi-Net site with the strongest signal. If this is not selected, registration does not occur until the PTT switch is manually pressed.

Kill Setting - This selects if the radio can be disabled if it becomes lost or stolen. If disabling is allowed, the ability to interrogate the radio can also be enabled or disabled.

Talkback Scan - When the PTT switch is pressed to respond to a message in the group scan mode, selects if the transmission always occurs on the Selected, Active, or Last Received group. When not scanning or if no message is being received, transmissions always occur on the selected group.

SECTION 6 SETTING UP ZONES AND CHANNELS

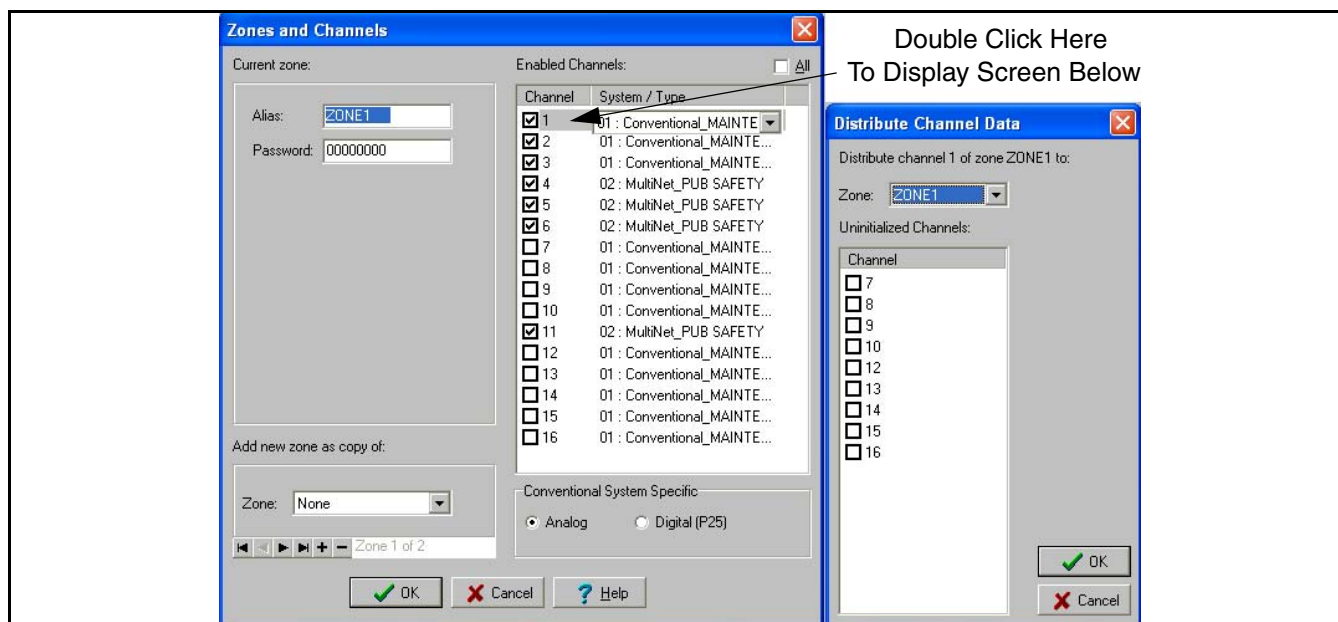


Figure 6-1 Edit Zones and Channels Screen



6.1 INTRODUCTION







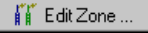

The following information describes how to set up zones and assign channels to each zone. A zone can include up to 16 channels of any type (Multi-Net, conventional analog, Project 25 conventional, SMARTNET/SmartZone, or Project 25 Trunked).

Up to 16 zones can be programmed for up to 256 channels. However, if the 51xx portable has the 512

channel option (see page 14), up to 32 zones or up to 512 channels can be programmed.

6.2 SETTING UP ZONES

1. Select the Zone screen (see Figure 6-1). Then click  to display the Edit Zones and Channels screen shown in Figure 6-1. Alternatively, click  in the toolbar.

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 briefly displayed when the zone is selected by entering up to 10 characters in the Alias box.
5. The zone password does not apply to Multi-Net operation. It is used for keypad programming which is available with conventional operation only.
1. If necessary, select the Zone screen (see Figure 6-1) and then click  to display the Edit Zones and Channels screen shown in Figure 6-1. Alternatively, 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 de-select 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.

6.3 SETTING UP CHANNELS

NOTE: When channels are assigned to zones, the system of the channel is also selected. Therefore, before assigning channels to zones, all necessary systems must be set up as described in Section 1.12.

Channels are set up by assigning them to a zone in the Edit Zones and Channels screen shown in Figure 6-1. Proceed as follows to set up Multi-Net channels.

5. 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 is then displayed to select the desired channels.
6. Repeat the preceding steps until the desired channels are set up in each zone.
7. To program individual Multi-Net system and channel information, refer to Section 7.

SECTION 7 MULTI-NET SYSTEMS AND CHANNELS

Figure 7-1 Individual Multi-Net System Screen

7.1 INDIVIDUAL MULTI-NET SYSTEM PARAMETERS

Individual system parameters are programmed by 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 1.12.

There are also radio wide parameters that are programmed by the Radio Wide screen as described in Section 5.3. The parameters in the individual Multi-Net System screen are as follows:

System

Individual (Unique) ID - Programs the individual ID of the radio when the system is accessed.

Home Repeater - Programs the home repeater number of the system. This number plus the channel group ID determine the mobile or group of mobiles that receive a group call.

Alias - Programs the alias of the system. This alias is used as an identification aid for programming and is not displayed by the radio.

RSSI

Site Scan Dropout Criteria - Programs the percentage of good data messages that must be received to stay on the site when roaming. The higher this setting, the sooner roaming occurs because fewer bad messages are permitted. The default is 25%.

Response Time - This is sampling period for determining Dropout Criteria. This parameter is not currently used and is fixed at 10 seconds.

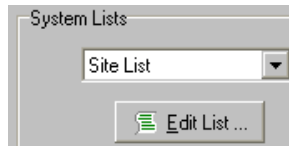
Emergency

Zone/Channel - Selects the Zone and Channel on which an emergency is transmitted when a channel linked to that system is selected. Any type of programmed channel can be selected and the emer-

gency responds according to that channel type (such as Multi-Net, Conventional, SMARTNET). If a global emergency zone/channel is programmed on the Global screen, a system emergency zone/channel is not programmable.

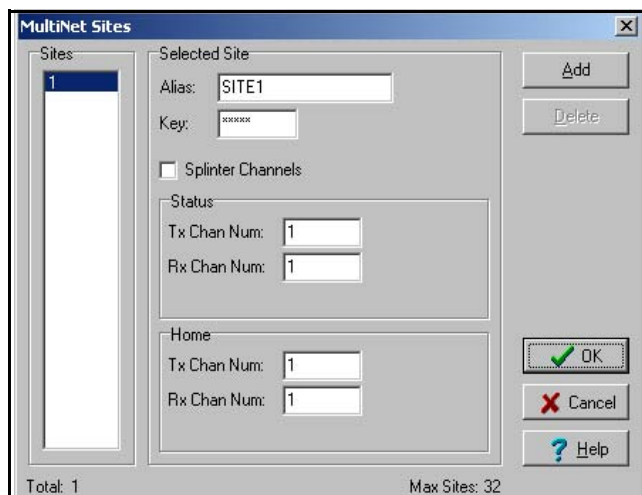
Auto Tx - When selected, emergency messages are automatically transmitted, and when not selected, they must be manually transmitted. If the global or system emergency zone/channel is a Multi-Net channel assigned to the system, this determines the auto/manual mode of that emergency zone/channel. Otherwise, this parameter is ignored.

System Lists





The various Multi-Net system lists are programmed by selecting them in the System Lists drop-down list shown above and then clicking the Edit List button. Descriptions of the various lists and the information they program follow.

Site List



The Site List screen shown above programs the sites that are linked to the system. Up to 32 sites can be

linked to each Multi-Net system. To display this screen, on the Multi-Net Per System screen, select Site List in the drop-down list and then click the  Edit List ... button (see Figure 7-1).

To add a site, click the  Add button, and to delete an site, simply select it and click the Delete button. To edit an site, select it and change it as desired. The following site information is programmed:

Alias - Up to 10 characters can be entered that identify the site. This identification is displayed when the site is selected or displayed using the Site Search feature.

Key - This is the unique site key that is programmed in both the radio and site repeaters to prevent unauthorized use of the system. This key is provided by the EFJohnson Company. For security purposes, the actual key is never displayed and is represented by asterisks (*****).

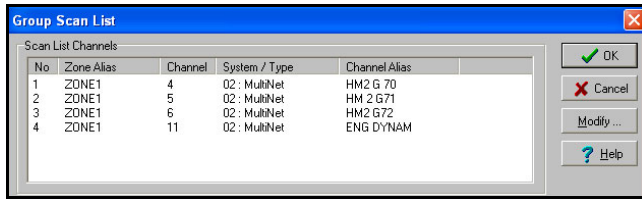
Splinter Channels - Selects if channels are offset 12.5 kHz on the low side. This channel offset is required for 800 MHz channels 1-600 in some border areas.


Status Channel Tx/Rx Channel Number - Programs the channel number or frequency of the status repeater for the site. The system Channel Designation parameter determines if this is entered as a frequency or EFJ Channel number (see description which follows).

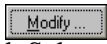
If EFJ channel numbers are used, *be sure to use the EFJ Programming Channel Number, not the FCC Channel Number*. The FCC channel numbering scheme skips some channels above 600, so a different scheme must be used. The 800 MHz EFJ Programming Channels are listed in a table at the back of this manual.

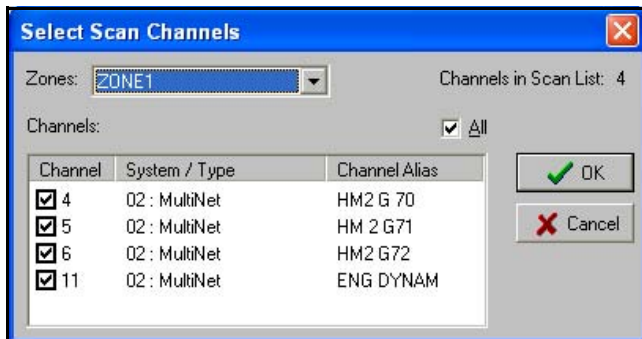
Home Channel Tx/Rx Channel Number - Programs the channel number of the home repeater for the site similar to the status channel just described.

Group Scan List



The Group Scan List screen shown above programs the channels in the group scan list for that system. A different list can be programmed for each Multi-Net system. Only Multi-Net channels linked to the system can be added. To display this screen, on the Multi-Net Per System screen, select Group Scan List in the drop-down list and then click the  button (see Figure 7-1).

To edit this list, click the Modify  button and the following screen is displayed. Select the applicable zone in the drop-down list and the Multi-Net channels in that zone that are linked to the current system are displayed. Click the All box to select all displayed channels or click the box in the Channel column to select individual channels.



Fixed Priority 1 and 2

Programs the fixed priority 1 and 2 channels on which calls are received regardless of what system channel is selected. The call indicator function is currently not available.

Transmit Inhibit IDs

Programs the Transmit Inhibit ID block of IDs which can include up to all 225 IDs. When an ID within this block is detected up to 5 seconds before the PTT switch is pressed, the transmitter does not key.

Block Decode IDs

Programs a block of ID codes up to all 225 on which calls are received regardless of what system channel is selected.

Timers

Transmit Time-Out - Programs the time-out timer for 15-225 seconds. Programming “0” disables this timer.

Penalty - Programs the penalty timer for 15-225 seconds. Programming “0” disables this timer. This timer disables the transmitter for the programmed time after it is disabled by the time-out timer.

Dynamic Group Assignment

Programs the Multi-Net Zone/Channel that is reprogrammable over the air by the Dynamic Reassignment command. Any of the available 16 channels per zone can be selected even channels that are not enabled. With this radio, the System number transmitted by the dispatcher is the System Index number of the system from this screen.

Other

Frequency Designation - Selects if the Status and Home repeater channel numbers programmed in the Site List are entered as Channel Numbers from the Programming Channel List at the end of this manual or as the actual channel frequencies in megahertz. See preceding “Site List” for more information.

Unit Call - Programs the permission for placing and receiving Unit calls on the system. These calls can be Disabled, Response Only, or Send/Receive. This also applies to placing Directed Group calls because they are placed as Unit calls and received as Group calls.

Phone Interconnect - Programs the permission for Telephone calls similar to Unit calls just described.

Interconnect Priority/Preemption

Tx Priority - Sets the access priority for Interconnect (Telephone) calls on the system for 2-5 (“2” programs the highest priority). Priority “1” is reserved for emergency calls.

Rx Preemption - Selects which calls Interconnect calls can interrupt. The priority of calls is as follows. This selects the highest priority call that can be interrupted. For example, if Group Scan is selected, only Group Scan and Block calls are interrupted.

1. Fixed Priority 2
2. Selected
3. Group Scan
4. Block

Unit Call Priority/Preemption - Sets the Transmit Priority and Preemptions for Unit calls similar to Interconnect calls just described.

Transmit Power - Fixes the transmit power for the system for the high or low level or makes it selectable (the High/Low Power switch is then required).

The screenshot displays the 'Multi-Net Channel Screen' with the following sections:

- Global / Radio Wide / Per System / Zone** tabs at the top.
- Zones** section: A dropdown menu for 'Alias' set to 'ZONE1' and an 'Edit Zone ...' button.
- Channels** section: A table with 8 channels. Channel 4 is selected.

No	System
1	01 : Conventional_MAIN
2	01 : Conventional_MAIN
3	01 : Conventional_MAIN
4	02 : MultiNet_PUB SAFE
5	02 : MultiNet_PUB SAFE
6	02 : MultiNet_PUB SAFE
7	04 : SmartNet_D14
11	02 : MultiNet_PUB SAFE
- Channel Parameters** section:
 - Channel Type**: MultiNet
 - Channel Alias**: HM2 G 70
 - Transmit**:
 - Group ID**: 70 (with a 'Disabled' checkbox)
 - Priority**: 5 (with up/down arrows)
 - Receive**:
 - Group ID**: 70
- Other** section:
 - ☐ Call Indicator
 - ☐ Horn Indicator
 - ☐ Data Group
 - ☐ Encryption
 - ☐ PTT Tone Delay
 - ☒ Talk Permit Tone

Figure 7-2 Multi-Net Channel Screen

7.2 MULTI-NET CHANNEL PARAMETERS

After the desired channels have been set up as described in Section 6.3, individual channel parameters can be programmed. Select the Zone screen shown in Figure 6-1 and then select the desired Zone using the drop-down list in the “Zones” box. The screen which programs individual channel parameters are selected by clicking the channel in the “Channels” box.

Channel Type

Indicates the type of channel (Multi-Net) that is currently selected in the “Channels” box.

Channel Alias

Programs the alias (identification) that is displayed when the channel is selected. Up to 10 alphanumeric characters can be entered.

Transmit

Group ID - Programs the encode ID from 1-225.

Disabled - When selected, transmitting is disabled on the group so it is monitor only.

Priority - Selects the access priority of the group from 2-5 ("2" is the highest priority). Priority "1" is reserved for emergency calls.

Receive

Group ID - Programs the decode ID from 1-225. The receive and transmit IDs can be different if desired.

Other

Call Indicator - The Call indicator feature is not currently available. This selects if the Call Indication is displayed when a call is received on the channel.

Horn Indicator (53xx/Ascend Mobile Only) - When selected, the horn alert activates when a call is received on the channel.

PTT Tone Delay - Not currently used because encryption is not available on Multi-Net channels. This delays the following Talk Permit Tone for a short time when encryption is used to ensure the receiving radio has time to detect the call.

Talk Permit (Proceed) Tone - When selected, the Talk Permit Tone sounds when the radio system is successfully accessed and speaking can begin. If this is not selected, no tone sounds when this occurs.

SECTION 8 PASSWORD DESCRIPTION

8.1 NEW PASSWORD ENHANCEMENTS

8.1.1 INTRODUCTION

A new enhanced password feature is now available for 51xx/Ascend portables and 53xx/Ascend mobiles. The single Power-On password has been replaced by the following passwords:

- **Four Power-On (User x) Passwords**
- **Download and Upload Passwords**
- **Master Password**

8.1.2 SOFTWARE VERSIONS REQUIRED

The following revised PCConfigure and radio software is required for these new enhanced password features:

PCConfigure - Version 1.21.8 or later

Ascend Portable and Ascend Mobile - All Ascend versions of these radios have the new password features.

8.2 PROGRAMMING PASSWORDS

8.2.1 GENERAL

With later versions of PCConfigure, passwords are programmed using a password management screen

displayed by the Tools > Password Management menu (see Section 3.4). The applicable radio must be connected to the computer to display this screen.

Password data is transferred and stored in an encrypted format for security purposes. In addition, actual passwords are never displayed. They are always indicated by eight asterisks (*****). Therefore, it is not possible to determine what passwords are in a radio using the PCConfigure software.

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 initially programming a password, no entry is required in the "Original/Master Password" box.

8.2.2 LOST PASSWORDS

If a password is lost, it can be changed using PCConfigure by entering the Master password (see following). If even the Master password is lost or was not used, all passwords (and other radio programming) can be erased using the PCTune software as follows:

1. With PCTune, Version 1.1.1.0 or later, simply select Radio > Reset Passwords.
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 not selectable). Then select Radio > Erase EEPROM > Params Only. **NOTE: *DO NOT SELECT “COMPLETE” because that erases all information and the radio must then be sent back to the factory to make it usable again.***

8.2.3 CHANGING PASSWORD

An assigned password can be changed by the user if the “Set User Password” option button or menu parameter (51xx/Ascend portable only) is programmed. Selecting this function displays prompts for entering and confirming a new password.

NOTE: With the 51xx/Ascend portable and 53xx/Ascend Handheld Control Unit, it is recommended that a number key not be used for this function because the password mode is exited if that key is pressed to enter a number.

8.2.4 PASSWORD ENTRY PROCEDURE

Whenever a password is requested, it is entered as follows:

Mobiles - Rotate and press the Select switch.

Portables - With DTMF keypad models, enter each number using the keypad and press the F2 (Enter) key after the last digit is entered. With limited keypad models, enter each number by pressing the Up/Down switch and press the F2 key after each digit.

8.3 PASSWORD DESCRIPTION

8.3.1 USER (POWER-ON) PASSWORDS

When a User Password is enabled, it must be entered each time radio power is turned on. Up to four

different User Passwords (User 1/User 2/User 3/User 4) can be programmed. Currently, the same radio features are enabled for each. Entering any User Password at power up enables normal radio operation.

8.3.2 DOWNLOAD/UPLOAD PASSWORDS

Separate Download (write) and Upload (read) passwords can be programmed to prevent unauthorized downloading or uploading of radio programming parameters (see Section 3.3). When one or both of these passwords are used, the proper password must be entered to perform the operation. A “User” password is not required to upload or download parameters.

8.3.3 MASTER PASSWORD

The Master Password overrides all the preceding passwords. It can be used by a system administrator as a “pass key” to a password controlled function or to change a lost or inadvertently changed password. Master passwords are set up and changed the same as the other passwords. It does not override the following Zone Password.

8.3.4 ZONE PASSWORD

This password is not used with Multi-Net operation. It is used only to Federal users on conventional systems only. It prevents unauthorized reprogramming of zone using keypad programming.

SECTION 9 ANTI-CLONING SAFEGUARDS

NOTE: The information which follows refers to copying of parameters from one radio to another using the PCConfigure software. It is not referring to cloning using two radios.

9.1 INTRODUCTION

All Ascend radios and PCConfigure software include safeguards to prevent unauthorized cloning of radios programmed for SMARTNET, SmartZone, and P25 trunked operation using the PCConfigure software. With Multi-Net files, the only restriction is when saving a file to disk. Refer to the following for more information.

9.2 MULTI-NET FILE RESTRICTIONS

9.2.1 SAVING A MULTI-NET FILE TO DISK

NOTE: To save any type of new programming file to disk, a radio must be connected to the computer.

All files saved to disk must be associated with a specific radio. Therefore, when saving a new file for

the first time, the radio must be connected to the computer so the ESN and other information can be read and stored with the file. However, a previously saved disk file can be opened and edited and then re-saved to disk without a radio connected.

9.2.2 OTHER MULTI-NET FILE RESTRICTIONS

A file uploaded from a radio can be saved to a disk without restrictions since it contains ESN and other information on the radio.

Multi-Net files not containing restricted SMARTNET, SmartZone, or P25 trunked information can be edited and written to a radio without any restrictions. However, a download password may be required if one is programmed (see Section 8).

800 MHz CHANNEL TABLE

Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq
1	1	851.0125	806.0125	54	54	852.3375	807.3375
2	2	851.0375	806.0375	55	55	852.3625	807.3625
3	3	851.0625	806.0625	56	56	852.3875	807.3875
4	4	851.0875	806.0875	57	57	852.4125	807.4125
5	5	851.1125	806.1125	58	58	852.4375	807.4375
6	6	851.1375	806.1375	59	59	852.4625	807.4625
7	7	851.1625	806.1625	60	60	852.4875	807.4875
8	8	851.1875	806.1875	61	61	852.5125	807.5125
9	9	851.2125	806.2125	62	62	852.5375	807.5375
10	10	851.2375	806.2375	63	63	852.5625	807.5625
11	11	851.2625	806.2625	64	64	852.5875	807.5875
12	12	851.2875	806.2875	65	65	852.6125	807.6125
13	13	851.3125	806.3125	66	66	852.6375	807.6375
14	14	851.3375	806.3375	67	67	852.6625	807.6625
15	15	851.3625	806.3625	68	68	852.6875	807.6875
16	16	851.3875	806.3875	69	69	852.7125	807.7125
17	17	851.4125	806.4125	70	70	852.7375	807.7375
18	18	851.4375	806.4375	71	71	852.7625	807.7625
19	19	851.4625	806.4625	72	72	852.7875	807.7875
20	20	851.4875	806.4875	73	73	852.8125	807.8125
21	21	851.5125	806.5125	74	74	852.8375	807.8375
22	22	851.5375	806.5375	75	75	852.8625	807.8625
23	23	851.5625	806.5625	76	76	852.8875	807.8875
24	24	851.5875	806.5875	77	77	852.9125	807.9125
25	25	851.6125	806.6125	78	78	852.9375	807.9375
26	26	851.6375	806.6375	79	79	852.9625	807.9625
27	27	851.6625	806.6625	80	80	852.9875	807.9875
28	28	851.6875	806.6875	81	81	853.0125	808.0125
29	29	851.7125	806.7125	82	82	853.0375	808.0375
30	30	851.7375	806.7375	83	83	853.0625	808.0625
31	31	851.7625	806.7625	84	84	853.0875	808.0875
32	32	851.7875	806.7875	85	85	853.1125	808.1125
33	33	851.8125	806.8125	86	86	853.1375	808.1375
34	34	851.8375	806.8375	87	87	853.1625	808.1625
35	35	851.8625	806.8625	88	88	853.1875	808.1875
36	36	851.8875	806.8875	89	89	853.2125	808.2125
37	37	851.9125	806.9125	90	90	853.2375	808.2375
38	38	851.9375	806.9375	91	91	853.2625	808.2625
39	39	851.9625	806.9625	92	92	853.2875	808.2875
40	40	851.9875	806.9875	93	93	853.3125	808.3125
41	41	852.0125	807.0125	94	94	853.3375	808.3375
42	42	852.0375	807.0375	95	95	853.3625	808.3625
43	43	852.0625	807.0625	96	96	853.3875	808.3875
44	44	852.0875	807.0875	97	97	853.4125	808.4125
45	45	852.1125	807.1125	98	98	853.4375	808.4375
46	46	852.1375	807.1375	99	99	853.4625	808.4625
47	47	852.1625	807.1625	100	100	853.4875	808.4875
48	48	852.1875	807.1875	101	101	853.5125	808.5125
49	49	852.2125	807.2125	102	102	853.5375	808.5375
50	50	852.2375	807.2375	103	103	853.5625	808.5625
51	51	852.2625	807.2625	104	104	853.5875	808.5875
52	52	852.2875	807.2875	105	105	853.6125	808.6125
53	53	852.3125	807.3125	106	106	853.6375	808.6375

800 MHz CHANNEL TABLE

Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq
107	107	853.6625	808.6625	160	160	854.9875	809.9875
108	108	853.6875	808.6875	161	161	855.0125	810.0125
109	109	853.7125	808.7125	162	162	855.0375	810.0375
110	110	853.7375	808.7375	163	163	855.0625	810.0625
111	111	853.7625	808.7625	164	164	855.0875	810.0875
112	112	853.7875	808.7875	165	165	855.1125	810.1125
113	113	853.8125	808.8125	166	166	855.1375	810.1375
114	114	853.8375	808.8375	167	167	855.1625	810.1625
115	115	853.8625	808.8625	168	168	855.1875	810.1875
116	116	853.8875	808.8875	169	169	855.2125	810.2125
117	117	853.9125	808.9125	170	170	855.2375	810.2375
118	118	853.9375	808.9375	171	171	855.2625	810.2625
119	119	853.9625	808.9625	172	172	855.2875	810.2875
120	120	853.9875	808.9875	173	173	855.3125	810.3125
121	121	854.0125	809.0125	174	174	855.3375	810.3375
122	122	854.0375	809.0375	175	175	855.3625	810.3625
123	123	854.0625	809.0625	176	176	855.3875	810.3875
124	124	854.0875	809.0875	177	177	855.4125	810.4125
125	125	854.1125	809.1125	178	178	855.4375	810.4375
126	126	854.1375	809.1375	179	179	855.4625	810.4625
127	127	854.1625	809.1625	180	180	855.4875	810.4875
128	128	854.1875	809.1875	181	181	855.5125	810.5125
129	129	854.2125	809.2125	182	182	855.5375	810.5375
130	130	854.2375	809.2375	183	183	855.5625	810.5625
131	131	854.2625	809.2625	184	184	855.5875	810.5875
132	132	854.2875	809.2875	185	185	855.6125	810.6125
133	133	854.3125	809.3125	186	186	855.6375	810.6375
134	134	854.3375	809.3375	187	187	855.6625	810.6625
135	135	854.3625	809.3625	188	188	855.6875	810.6875
136	136	854.3875	809.3875	189	189	855.7125	810.7125
137	137	854.4125	809.4125	190	190	855.7375	810.7375
138	138	854.4375	809.4375	191	191	855.7625	810.7625
139	139	854.4625	809.4625	192	192	855.7875	810.7875
140	140	854.4875	809.4875	193	193	855.8125	810.8125
141	141	854.5125	809.5125	194	194	855.8375	810.8375
142	142	854.5375	809.5375	195	195	855.8625	810.8625
143	143	854.5625	809.5625	196	196	855.8875	810.8875
144	144	854.5875	809.5875	197	197	855.9125	810.9125
145	145	854.6125	809.6125	198	198	855.9375	810.9375
146	146	854.6375	809.6375	199	199	855.9625	810.9625
147	147	854.6625	809.6625	200	200	855.9875	810.9875
148	148	854.6875	809.6875	201	201	856.0125	811.0125
149	149	854.7125	809.7125	202	202	856.0375	811.0375
150	150	854.7375	809.7375	203	203	856.0625	811.0625
151	151	854.7625	809.7625	204	204	856.0875	811.0875
152	152	854.7875	809.7875	205	205	856.1125	811.1125
153	153	854.8125	809.8125	206	206	856.1375	811.1375
154	154	854.8375	809.8375	207	207	856.1625	811.1625
155	155	854.8625	809.8625	208	208	856.1875	811.1875
156	156	854.8875	809.8875	209	209	856.2125	811.2125
157	157	854.9125	809.9125	210	210	856.2375	811.2375
158	158	854.9375	809.9375	211	211	856.2625	811.2625
159	159	854.9625	809.9625	212	212	856.2875	811.2875

800 MHz CHANNEL TABLE

Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq
213	213	856.3125	811.3125	266	266	857.6375	812.6375
214	214	856.3375	811.3375	267	267	857.6625	812.6625
215	215	856.3625	811.3625	268	268	857.6875	812.6875
216	216	856.3875	811.3875	269	269	857.7125	812.7125
217	217	856.4125	811.4125	270	270	857.7375	812.7375
218	218	856.4375	811.4375	271	271	857.7625	812.7625
219	219	856.4625	811.4625	272	272	857.7875	812.7875
220	220	856.4875	811.4875	273	273	857.8125	812.8125
221	221	856.5125	811.5125	274	274	857.8375	812.8375
222	222	856.5375	811.5375	275	275	857.8625	812.8625
223	223	856.5625	811.5625	276	276	857.8875	812.8875
224	224	856.5875	811.5875	277	277	857.9125	812.9125
225	225	856.6125	811.6125	278	278	857.9375	812.9375
226	226	856.6375	811.6375	279	279	857.9625	812.9625
227	227	856.6625	811.6625	280	280	857.9875	812.9875
228	228	856.6875	811.6875	281	281	858.0125	813.0125
229	229	856.7125	811.7125	282	282	858.0375	813.0375
230	230	856.7375	811.7375	283	283	858.0625	813.0625
231	231	856.7625	811.7625	284	284	858.0875	813.0875
232	232	856.7875	811.7875	285	285	858.1125	813.1125
233	233	856.8125	811.8125	286	286	858.1375	813.1375
234	234	856.8375	811.8375	287	287	858.1625	813.1625
235	235	856.8625	811.8625	288	288	858.1875	813.1875
236	236	856.8875	811.8875	289	289	858.2125	813.2125
237	237	856.9125	811.9125	290	290	858.2375	813.2375
238	238	856.9375	811.9375	291	291	858.2625	813.2625
239	239	856.9625	811.9625	292	292	858.2875	813.2875
240	240	856.9875	811.9875	293	293	858.3125	813.3125
241	241	857.0125	812.0125	294	294	858.3375	813.3375
242	242	857.0375	812.0375	295	295	858.3625	813.3625
243	243	857.0625	812.0625	296	296	858.3875	813.3875
244	244	857.0875	812.0875	297	297	858.4125	813.4125
245	245	857.1125	812.1125	298	298	858.4375	813.4375
246	246	857.1375	812.1375	299	299	858.4625	813.4625
247	247	857.1625	812.1625	300	300	858.4875	813.4875
248	248	857.1875	812.1875	301	301	858.5125	813.5125
249	249	857.2125	812.2125	302	302	858.5375	813.5375
250	250	857.2375	812.2375	303	303	858.5625	813.5625
251	251	857.2625	812.2625	304	304	858.5875	813.5875
252	252	857.2875	812.2875	305	305	858.6125	813.6125
253	253	857.3125	812.3125	306	306	858.6375	813.6375
254	254	857.3375	812.3375	307	307	858.6625	813.6625
255	255	857.3625	812.3625	308	308	858.6875	813.6875
256	256	857.3875	812.3875	309	309	858.7125	813.7125
257	257	857.4125	812.4125	310	310	858.7375	813.7375
258	258	857.4375	812.4375	311	311	858.7625	813.7625
259	259	857.4625	812.4625	312	312	858.7875	813.7875
260	260	857.4875	812.4875	313	313	858.8125	813.8125
261	261	857.5125	812.5125	314	314	858.8375	813.8375
262	262	857.5375	812.5375	315	315	858.8625	813.8625
263	263	857.5625	812.5625	316	316	858.8875	813.8875
264	264	857.5875	812.5875	317	317	858.9125	813.9125
265	265	857.6125	812.6125	318	318	858.9375	813.9375

800 MHz CHANNEL TABLE

Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq
319	319	858.9625	813.9625	372	372	860.2875	815.2875
320	320	858.9875	813.9875	373	373	860.3125	815.3125
321	321	859.0125	814.0125	374	374	860.3375	815.3375
322	322	859.0375	814.0375	375	375	860.3625	815.3625
323	323	859.0625	814.0625	376	376	860.3875	815.3875
324	324	859.0875	814.0875	377	377	860.4125	815.4125
325	325	859.1125	814.1125	378	378	860.4375	815.4375
326	326	859.1375	814.1375	379	379	860.4625	815.4625
327	327	859.1625	814.1625	380	380	860.4875	815.4875
328	328	859.1875	814.1875	381	381	860.5125	815.5125
329	329	859.2125	814.2125	382	382	860.5375	815.5375
330	330	859.2375	814.2375	383	383	860.5625	815.5625
331	331	859.2625	814.2625	384	384	860.5875	815.5875
332	332	859.2875	814.2875	385	385	860.6125	815.6125
333	333	859.3125	814.3125	386	386	860.6375	815.6375
334	334	859.3375	814.3375	387	387	860.6625	815.6625
335	335	859.3625	814.3625	388	388	860.6875	815.6875
336	336	859.3875	814.3875	389	389	860.7125	815.7125
337	337	859.4125	814.4125	390	390	860.7375	815.7375
338	338	859.4375	814.4375	391	391	860.7625	815.7625
339	339	859.4625	814.4625	392	392	860.7875	815.7875
340	340	859.4875	814.4875	393	393	860.8125	815.8125
341	341	859.5125	814.5125	394	394	860.8375	815.8375
342	342	859.5375	814.5375	395	395	860.8625	815.8625
343	343	859.5625	814.5625	396	396	860.8875	815.8875
344	344	859.5875	814.5875	397	397	860.9125	815.9125
345	345	859.6125	814.6125	398	398	860.9375	815.9375
346	346	859.6375	814.6375	399	399	860.9625	815.9625
347	347	859.6625	814.6625	400	400	860.9875	815.9875
348	348	859.6875	814.6875	401	401	861.0125	816.0125
349	349	859.7125	814.7125	402	402	861.0375	816.0375
350	350	859.7375	814.7375	403	403	861.0625	816.0625
351	351	859.7625	814.7625	404	404	861.0875	816.0875
352	352	859.7875	814.7875	405	405	861.1125	816.1125
353	353	859.8125	814.8125	406	406	861.1375	816.1375
354	354	859.8375	814.8375	407	407	861.1625	816.1625
355	355	859.8625	814.8625	408	408	861.1875	816.1875
356	356	859.8875	814.8875	409	409	861.2125	816.2125
357	357	859.9125	814.9125	410	410	861.2375	816.2375
358	358	859.9375	814.9375	411	411	861.2625	816.2625
359	359	859.9625	814.9625	412	412	861.2875	816.2875
360	360	859.9875	814.9875	413	413	861.3125	816.3125
361	361	860.0125	815.0125	414	414	861.3375	816.3375
362	362	860.0375	815.0375	415	415	861.3625	816.3625
363	363	860.0625	815.0625	416	416	861.3875	816.3875
364	364	860.0875	815.0875	417	417	861.4125	816.4125
365	365	860.1125	815.1125	418	418	861.4375	816.4375
366	366	860.1375	815.1375	419	419	861.4625	816.4625
367	367	860.1625	815.1625	420	420	861.4875	816.4875
368	368	860.1875	815.1875	421	421	861.5125	816.5125
369	369	860.2125	815.2125	422	422	861.5375	816.5375
370	370	860.2375	815.2375	423	423	861.5625	816.5625
371	371	860.2625	815.2625	424	424	861.5875	816.5875

800 MHz CHANNEL TABLE

Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq
425	425	861.6125	816.6125	478	478	862.9375	817.9375
426	426	861.6375	816.6375	479	479	862.9625	817.9625
427	427	861.6625	816.6625	480	480	862.9875	817.9875
428	428	861.6875	816.6875	481	481	863.0125	818.0125
429	429	861.7125	816.7125	482	482	863.0375	818.0375
430	430	861.7375	816.7375	483	483	863.0625	818.0625
431	431	861.7625	816.7625	484	484	863.0875	818.0875
432	432	861.7875	816.7875	485	485	863.1125	818.1125
433	433	861.8125	816.8125	486	486	863.1375	818.1375
434	434	861.8375	816.8375	487	487	863.1625	818.1625
435	435	861.8625	816.8625	488	488	863.1875	818.1875
436	436	861.8875	816.8875	489	489	863.2125	818.2125
437	437	861.9125	816.9125	490	490	863.2375	818.2375
438	438	861.9375	816.9375	491	491	863.2625	818.2625
439	439	861.9625	816.9625	492	492	863.2875	818.2875
440	440	861.9875	816.9875	493	493	863.3125	818.3125
441	441	862.0125	817.0125	494	494	863.3375	818.3375
442	442	862.0375	817.0375	495	495	863.3625	818.3625
443	443	862.0625	817.0625	496	496	863.3875	818.3875
444	444	862.0875	817.0875	497	497	863.4125	818.4125
445	445	862.1125	817.1125	498	498	863.4375	818.4375
446	446	862.1375	817.1375	499	499	863.4625	818.4625
447	447	862.1625	817.1625	500	500	863.4875	818.4875
448	448	862.1875	817.1875	501	501	863.5125	818.5125
449	449	862.2125	817.2125	502	502	863.5375	818.5375
450	450	862.2375	817.2375	503	503	863.5625	818.5625
451	451	862.2625	817.2625	504	504	863.5875	818.5875
452	452	862.2875	817.2875	505	505	863.6125	818.6125
453	453	862.3125	817.3125	506	506	863.6375	818.6375
454	454	862.3375	817.3375	507	507	863.6625	818.6625
455	455	862.3625	817.3625	508	508	863.6875	818.6875
456	456	862.3875	817.3875	509	509	863.7125	818.7125
457	457	862.4125	817.4125	510	510	863.7375	818.7375
458	458	862.4375	817.4375	511	511	863.7625	818.7625
459	459	862.4625	817.4625	512	512	863.7875	818.7875
460	460	862.4875	817.4875	513	513	863.8125	818.8125
461	461	862.5125	817.5125	514	514	863.8375	818.8375
462	462	862.5375	817.5375	515	515	863.8625	818.8625
463	463	862.5625	817.5625	516	516	863.8875	818.8875
464	464	862.5875	817.5875	517	517	863.9125	818.9125
465	465	862.6125	817.6125	518	518	863.9375	818.9375
466	466	862.6375	817.6375	519	519	863.9625	818.9625
467	467	862.6625	817.6625	520	520	863.9875	818.9875
468	468	862.6875	817.6875	521	521	864.0125	819.0125
469	469	862.7125	817.7125	522	522	864.0375	819.0375
470	470	862.7375	817.7375	523	523	864.0625	819.0625
471	471	862.7625	817.7625	524	524	864.0875	819.0875
472	472	862.7875	817.7875	525	525	864.1125	819.1125
473	473	862.8125	817.8125	526	526	864.1375	819.1375
474	474	862.8375	817.8375	527	527	864.1625	819.1625
475	475	862.8625	817.8625	528	528	864.1875	819.1875
476	476	862.8875	817.8875	529	529	864.2125	819.2125
477	477	862.9125	817.9125	530	530	864.2375	819.2375

800 MHz CHANNEL TABLE

Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq
531	531	864.2625	819.2625	584	584	865.5875	820.5875
532	532	864.2875	819.2875	585	585	865.6125	820.6125
533	533	864.3125	819.3125	586	586	865.6375	820.6375
534	534	864.3375	819.3375	587	587	865.6625	820.6625
535	535	864.3625	819.3625	588	588	865.6875	820.6875
536	536	864.3875	819.3875	589	589	865.7125	820.7125
537	537	864.4125	819.4125	590	590	865.7375	820.7375
538	538	864.4375	819.4375	591	591	865.7625	820.7625
539	539	864.4625	819.4625	592	592	865.7875	820.7875
540	540	864.4875	819.4875	593	593	865.8125	820.8125
541	541	864.5125	819.5125	594	594	865.8375	820.8375
542	542	864.5375	819.5375	595	595	865.8625	820.8625
543	543	864.5625	819.5625	596	596	865.8875	820.8875
544	544	864.5875	819.5875	597	597	865.9125	820.9125
545	545	864.6125	819.6125	598	598	865.9375	820.9375
546	546	864.6375	819.6375	599	599	865.9625	820.9625
547	547	864.6625	819.6625	600	600	865.9875	820.9875
548	548	864.6875	819.6875	601	-	866.0000	821.0000
549	549	864.7125	819.7125	602	601	866.0125	821.0125
550	550	864.7375	819.7375	603	-	866.0250	821.0250
551	551	864.7625	819.7625	604	602	866.0375	821.0375
552	552	864.7875	819.7875	605	603	866.0500	821.0500
553	553	864.8125	819.8125	606	604	866.0625	821.0625
554	554	864.8375	819.8375	607	605	866.0750	821.0750
555	555	864.8625	819.8625	608	606	866.0875	821.0875
556	556	864.8875	819.8875	609	607	866.1000	821.1000
557	557	864.9125	819.9125	610	608	866.1125	821.1125
558	558	864.9375	819.9375	611	609	866.1250	821.1250
559	559	864.9625	819.9625	612	610	866.1375	821.1375
560	560	864.9875	819.9875	613	611	866.1500	821.1500
561	561	865.0125	820.0125	614	612	866.1625	821.1625
562	562	865.0375	820.0375	615	613	866.1750	821.1750
563	563	865.0625	820.0625	616	614	866.1875	821.1875
564	564	865.0875	820.0875	617	615	866.2000	821.2000
565	565	865.1125	820.1125	618	616	866.2125	821.2125
566	566	865.1375	820.1375	619	617	866.2250	821.2250
567	567	865.1625	820.1625	620	618	866.2375	821.2375
568	568	865.1875	820.1875	621	619	866.2500	821.2500
569	569	865.2125	820.2125	622	620	866.2625	821.2625
570	570	865.2375	820.2375	623	621	866.2750	821.2750
571	571	865.2625	820.2625	624	622	866.2875	821.2875
572	572	865.2875	820.2875	625	623	866.3000	821.3000
573	573	865.3125	820.3125	626	624	866.3125	821.3125
574	574	865.3375	820.3375	627	625	866.3250	821.3250
575	575	865.3625	820.3625	628	626	866.3375	821.3375
576	576	865.3875	820.3875	629	627	866.3500	821.3500
577	577	865.4125	820.4125	630	628	866.3625	821.3625
578	578	865.4375	820.4375	631	629	866.3750	821.3750
579	579	865.4625	820.4625	632	630	866.3875	821.3875
580	580	865.4875	820.4875	633	631	866.4000	821.4000
581	581	865.5125	820.5125	634	632	866.4125	821.4125
582	582	865.5375	820.5375	635	633	866.4250	821.4250
583	583	865.5625	820.5625	636	634	866.4375	821.4375

800 MHz CHANNEL TABLE

Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq
637	635	866.4500	821.4500	690	684	867.1125	822.1125
638	636	866.4625	821.4625	691	685	867.1250	822.1250
639	637	866.4750	821.4750	692	686	867.1375	822.1375
640	638	866.4875	821.4875	693	687	867.1500	822.1500
641	-	866.5000	821.5000	694	688	867.1625	822.1625
642	639	866.5125	821.5125	695	689	867.1750	822.1750
643	-	866.5250	821.5250	696	690	867.1875	822.1875
644	640	866.5375	821.5375	697	691	867.2000	822.2000
645	641	866.5500	821.5500	698	692	867.2125	822.2125
646	642	866.5625	821.5625	699	693	867.2250	822.2250
647	643	866.5750	821.5750	700	694	867.2375	822.2375
648	644	866.5875	821.5875	701	695	867.2500	822.2500
649	645	866.6000	821.6000	702	696	867.2625	822.2625
650	646	866.6125	821.6125	703	697	867.2750	822.2750
651	647	866.6250	821.6250	704	698	867.2875	822.2875
652	648	866.6375	821.6375	705	699	867.3000	822.3000
653	649	866.6500	821.6500	706	700	867.3125	822.3125
654	650	866.6625	821.6625	707	701	867.3250	822.3250
655	651	866.6750	821.6750	708	702	867.3375	822.3375
656	652	866.6875	821.6875	709	703	867.3500	822.3500
657	653	866.7000	821.7000	710	704	867.3625	822.3625
658	654	866.7125	821.7125	711	705	867.3750	822.3750
659	655	866.7250	821.7250	712	706	867.3875	822.3875
660	656	866.7375	821.7375	713	707	867.4000	822.4000
661	657	866.7500	821.7500	714	708	867.4125	822.4125
662	658	866.7625	821.7625	715	709	867.4250	822.4250
663	659	866.7750	821.7750	716	710	867.4375	822.4375
664	660	866.7875	821.7875	717	711	867.4500	822.4500
665	661	866.8000	821.8000	718	712	867.4625	822.4625
666	662	866.8125	821.8125	719	713	867.4750	822.4750
667	663	866.8250	821.8250	720	714	867.4875	822.4875
668	664	866.8375	821.8375	721	-	867.5000	822.5000
669	665	866.8500	821.8500	722	715	867.5125	822.5125
670	666	866.8625	821.8625	723	-	867.5250	822.5250
671	667	866.8750	821.8750	724	716	867.5375	822.5375
672	668	866.8875	821.8875	725	717	867.5500	822.5500
673	669	866.9000	821.9000	726	718	867.5625	822.5625
674	670	866.9125	821.9125	727	719	867.5750	822.5750
675	671	866.9250	821.9250	728	720	867.5875	822.5875
676	672	866.9375	821.9375	729	721	867.6000	822.6000
677	673	866.9500	821.9500	730	722	867.6125	822.6125
678	674	866.9625	821.9625	731	723	867.6250	822.6250
679	675	866.9750	821.9750	732	724	867.6375	822.6375
680	676	866.9875	821.9875	733	725	867.6500	822.6500
681	-	867.0000	822.0000	734	726	867.6625	822.6625
682	677	867.0125	822.0125	735	727	867.6750	822.6750
683	-	867.0250	822.0250	736	728	867.6875	822.6875
684	678	867.0375	822.0375	737	729	867.7000	822.7000
685	679	867.0500	822.0500	738	730	867.7125	822.7125
686	680	867.0625	822.0625	739	731	867.7250	822.7250
687	681	867.0750	822.0750	740	732	867.7375	822.7375
688	682	867.0875	822.0875	741	733	867.7500	822.7500
689	683	867.1000	822.1000	742	734	867.7625	822.7625

800 MHz CHANNEL TABLE

Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq
743	735	867.7750	822.7750	796	786	868.4375	823.4375
744	736	867.7875	822.7875	797	787	868.4500	823.4500
745	737	867.8000	822.8000	798	788	868.4625	823.4625
746	738	867.8125	822.8125	799	789	868.4750	823.4750
747	739	867.8250	822.8250	800	790	868.4875	823.4875
748	740	867.8375	822.8375	801	791	868.5000	823.5000
749	741	867.8500	822.8500	802	792	868.5125	823.5125
750	742	867.8625	822.8625	803	793	868.5250	823.5250
751	743	867.8750	822.8750	804	794	868.5375	823.5375
752	744	867.8875	822.8875	805	795	868.5500	823.5500
753	745	867.9000	822.9000	806	796	868.5625	823.5625
754	746	867.9125	822.9125	807	797	868.5750	823.5750
755	747	867.9250	822.9250	808	798	868.5875	823.5875
756	748	867.9375	822.9375	809	799	868.6000	823.6000
757	749	867.9500	822.9500	810	800	868.6125	823.6125
758	750	867.9625	822.9625	811	801	868.6250	823.6250
759	751	867.9750	822.9750	812	802	868.6375	823.6375
760	752	867.9875	822.9875	813	803	868.6500	823.6500
761	-	868.0000	823.0000	814	804	868.6625	823.6625
762	753	868.0125	823.0125	815	805	868.6750	823.6750
763	-	868.0250	823.0250	816	806	868.6875	823.6875
764	754	868.0375	823.0375	817	807	868.7000	823.7000
765	755	868.0500	823.0500	818	808	868.7125	823.7125
766	756	868.0625	823.0625	819	809	868.7250	823.7250
767	757	868.0750	823.0750	820	810	868.7375	823.7375
768	758	868.0875	823.0875	821	811	868.7500	823.7500
769	759	868.1000	823.1000	822	812	868.7625	823.7625
770	760	868.1125	823.1125	823	813	868.7750	823.7750
771	761	868.1250	823.1250	824	814	868.7875	823.7875
772	762	868.1375	823.1375	825	815	868.8000	823.8000
773	763	868.1500	823.1500	826	816	868.8125	823.8125
774	764	868.1625	823.1625	827	817	868.8250	823.8250
775	765	868.1750	823.1750	828	818	868.8375	823.8375
776	766	868.1875	823.1875	829	819	868.8500	823.8500
777	767	868.2000	823.2000	830	820	868.8625	823.8625
778	768	868.2125	823.2125	831	821	868.8750	823.8750
779	769	868.2250	823.2250	832	822	868.8875	823.8875
780	770	868.2375	823.2375	833	823	868.9000	823.9000
781	771	868.2500	823.2500	834	824	868.9125	823.9125
782	772	868.2625	823.2625	835	825	868.9250	823.9250
783	773	868.2750	823.2750	836	826	868.9375	823.9375
784	774	868.2875	823.2875	837	827	868.9500	823.9500
785	775	868.3000	823.3000	838	828	868.9625	823.9625
786	776	868.3125	823.3125	839	829	868.9750	823.9750
787	777	868.3250	823.3250	840	830	868.9875	823.9875
788	778	868.3375	823.3375	841	-	869.0000	824.0000
789	779	868.3500	823.3500	842	-	869.0125	824.0125
790	780	868.3625	823.3625	843	-	869.0250	824.0250
791	781	868.3750	823.3750	844	-	869.0375	824.0375
792	782	868.3875	823.3875	845	-	869.0500	824.0500
793	783	868.4000	823.4000	846	-	869.0625	824.0625
794	784	868.4125	823.4125	847	-	869.0750	824.0750
795	785	868.4250	823.4250	848	-	869.0875	824.0875

800 MHz CHANNEL TABLE

Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	Prog Chan. No.	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq
849	-	869.1000	824.1000	885	-	869.5500	824.5500
850	-	869.1125	824.1125	886	-	869.5625	824.5625
851	-	869.1250	824.1250	887	-	869.5750	824.5750
852	-	869.1375	824.1375	888	-	869.5875	824.5875
853	-	869.1500	824.1500	889	-	869.6000	824.6000
854	-	869.1625	824.1625	890	-	869.6125	824.6125
855	-	869.1750	824.1750	891	-	869.6250	824.6250
856	-	869.1875	824.1875	892	-	869.6375	824.6375
857	-	869.2000	824.2000	893	-	869.6500	824.6500
858	-	869.2125	824.2125	894	-	869.6625	824.6625
859	-	869.2250	824.2250	895	-	869.6750	824.6750
860	-	869.2375	824.2375	896	-	869.6875	824.6875
861	-	869.2500	824.2500	897	-	869.7000	824.7000
862	-	869.2625	824.2625	898	-	869.7125	824.7125
863	-	869.2750	824.2750	899	-	869.7250	824.7250
864	-	869.2875	824.2875	900	-	869.7375	824.7375
865	-	869.3000	824.3000	901	-	869.7500	824.7500
866	-	869.3125	824.3125	902	-	869.7625	824.7625
867	-	869.3250	824.3250	903	-	869.7750	824.7750
868	-	869.3375	824.3375	904	-	869.7875	824.7875
869	-	869.3500	824.3500	905	-	869.8000	824.8000
870	-	869.3625	824.3625	906	-	869.8125	824.8125
871	-	869.3750	824.3750	907	-	869.8250	824.8250
872	-	869.3875	824.3875	908	-	869.8375	824.8375
873	-	869.4000	824.4000	909	-	869.8500	824.8500
874	-	869.4125	824.4125	910	-	869.8625	824.8625
875	-	869.4250	824.4250	911	-	869.8750	824.8750
876	-	869.4375	824.4375	912	-	869.8875	824.8875
877	-	869.4500	824.4500	913	-	869.9000	824.9000
878	-	869.4625	824.4625	914	-	869.9125	824.9125
879	-	869.4750	824.4750	915	-	869.9250	824.9250
880	-	869.4875	824.4875	916	-	869.9375	824.9375
881	-	869.5000	824.5000	917	-	869.9500	824.9500
882	-	869.5125	824.5125	918	-	869.9625	824.9625
883	-	869.5250	824.5250	919	-	869.9750	824.9750
884	-	869.5375	824.5375	920	-	869.9875	824.9875

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