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# TM8000 mobile Programming Application Online Help

## Getting Started

Refer to the [Getting started](#) section for information on how to read and program your radio, and how to use the programming application.

## Getting and Using Help

Refer to the section on [Getting and using help](#) for information on context sensitive help, how to use the help file, and where to find information on the Internet.

## Programming Conventional Features

Refer to the section on [Programming conventional features](#) for information on conventional settings and fields, and how to set up or change the features of conventional mobile radios.

## Contact us

For further help or information, you can contact Tait Electronics Ltd by [email](#) or via the customer support [feedback form](#).

## *Help Version*

Build 0.3.0

 [Contact us](#)





# Part A Getting started

Topics in this section are designed to help new users get started with the programming application.

Before you can begin reading and programming radios, you must install the required software and connect a radio to your PC. Refer to the TM8000 Service Manual and installation CD for more information.

A common workflow in the programming application is to:

1. [read](#) a radio, or [open](#) a radio programming database file
2. [change](#) settings using the various forms, then
3. [program](#) one or more radios.



# Reading and programming your radio

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## Topics

- [Reading a radio](#)
- [Opening a database file](#)
- [Creating a new database file](#)
- [Saving a database file](#)
- [Programming a radio](#)

## Reading a radio

When you read a radio, the radio's database is displayed in the programming application. You can then alter and save the radio's database to file.

### To read a radio

1. Connect a radio to your PC.
2. Connect the radio to a power source and turn the power on.
3. Switch the radio on.
4. Select the Radio > Read menu option, or click the Read button  on the toolbar.


As the programming database is read from the radio, the application indicates the radio model, product code, and the software and database version numbers.

### Related Topics

- [Changing data](#)
- [Saving a database file](#)
- [Programming a radio](#)

## Opening a database file

To open a radio programming database file saved to disk, either:

- select File > Open
- select the Open button  from the toolbar, or
- drag a file from an open window outside the application onto the [forms tree](#) (left pane) of the application.

### Related Topics

- [Reading a radio](#)
- [Changing data](#)
- [Programming a radio](#)

## Creating a new database file

To create a new database when you first launch the application, start changing the default data in the various forms. See [Navigating between forms](#) for more information.


To begin a new database from an existing database, select File > Reset To Defaults.

### Related Topics

[Reading a radio](#)  
[Changing data](#)  
[Programming a radio](#)

## Saving a database file

To save a radio programming database to disk, either:

- select File > Save, or
- select the Save button  from the toolbar.

### Related Topics

[Reading a radio](#)  
[Changing data](#)  
[Programming a radio](#)

## Programming a radio

When you program a radio, the database that is currently displayed in the programming application is sent to the radio. The database is validated before being sent, so if the incorrect radio band is displayed for example, the Program Radio command will fail and a message will display.


### To program a radio

1. Connect a radio to the PC.
2. Connect the radio to a power source and turn the power on.
3. Switch the radio on.

**Tip:** Select Radio > Read, and then File > Save to backup the radio's current data.

4. Make sure the correct data that you want to program is showing in the programming application.

**Important:** Do not program the application's default data into the radio.

5. Select the Radio > Program menu option, or select the Program button  from the toolbar.

As the programming database is programmed to the radio, the application indicates the radio model, product code, and the software and database version numbers.

### Related Topics

[Reading a radio](#)  
[Changing data](#)

# Using the programming application

---

## Topics

[Navigating between forms](#)

[Changing access levels](#)

[Changing the application language](#)

[Shortcut keys](#)

## Navigating between forms

The forms tree on the left side of the main window contains a hyperlinked list of all the forms available.

To navigate using a mouse, click on the name of a form to open it and begin changing data.

If a form has a green indicator next to it, there is unsaved data on that form. Select File > Save if you want to keep the changes you have made.

### Related Topics

[Reading and programming your radio](#)

## Changing access levels

Access levels allow you to control access to various fields in the programming application.

- To provide access to all fields, select Options > Access Level > High.
- To prevent access to everything, select Options > Access Level > ID and Personalisation.

**Tip:** You can change the default access level when the application is first started by selecting Tools > Options.

### Related Topics

[Reading and programming your radio](#)

## Changing the application language

Menu items, field and form labels, and messages can be displayed in either English, Simplified Chinese, French or Spanish.

### To select another application language

1. Select the Tools > Options menu command.
2. Select one of the languages in the Language drop-down box.

**Note:** For Simplified Chinese to display correctly, your operating system must be a Chinese version, or for Windows 2000, the default System Locale set to Chinese (PRC).

3. Click OK to exit the Options dialog.

## Changing application start-up options

There are various options that you can select that will change the appearance of the programming application on start-up, including the communications (COM) port used for connecting the radio to a PC, window position and default access level.

### To change start-up options


1. Select the Tools > Options menu command.
2. The following options are available:
  - Communication Port: the port used for communicating with the radio.
  - Caption Position: select Left to align captions to the left, or Centre to place captions and check boxes to the centre of each group box.
  - Show General Dialogs: select this check box to display general warnings, such as confirmations when starting or closing the application. Clear this check box to hide these dialogs.
  - Default Access Level: defines the access level when the application is started. See [Changing access levels](#) for more information.
  - start-up Position: the state of the window when the application is started. Select Maximise to start the application window in a maximised state, Centre to start the application window reduced in the centre of the screen, or Previous to remember a custom window size when closing and restarting the application.
  - Web Address: the address used when the Help > Internet > Taitworld command is selected.
3. Click OK to exit the Options dialog.

## Shortcut keys

Command	Shortcut Key
Reset data to default	Ctrl+D
Open saved file	Ctrl+O
Save to file	Ctrl+S
Print current data	Ctrl+P
Undo last change	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Delete	Del
Select All	Ctrl+A
Validate form	Ctrl+Y
Revert form	Ctrl+T
Read radio	Ctrl+R
Program radio	Ctrl+M
Interrogate radio	Ctrl+I
Show online help	F1
What's this? help	Shift+F1

# Changing data

---

If a field's data is greyed out, then that data is displayed for information only and cannot be changed. For information on how to enable a field that is disabled, select the Help > What's This? menu command , then click on the field label you want information on. See [Using What's This? Help](#) for more information.

Where a range of possible numeric values is available for a field, then that range is shown on the Status bar at the bottom of each form.



How you change and add data for each field depends on how that data is displayed. There are four types of fields:

- [Text box](#)
- [Drop-down box](#)
- [Check box](#)
- [Grids](#)

## Text box

A text box is used for numeric and alphanumeric data.

### To change data in a text box

- Keyboard: select a text box using the Tab key. Enter the required data.
- Mouse: select a text box by clicking on it with the mouse. Enter the required data.

### Related Topics

- [Drop-down box](#)
- [Check box](#)
- [Grids](#)

## Drop-down box

A drop-down box is used for fields that have a range of possible values and appears as a box with an arrow at the right side.

### To change data in a drop-down box

- Keyboard: select a drop-down box using the Tab key. You can then display the options available by pressing the Alt key and the down arrow key at the same time. Use the up and down arrow keys to scroll through the options until the required value is displayed, then press the Enter key. You can also press a letter to cycle through entries starting with that letter.
- Mouse: select a drop-down box by clicking on it, which displays the list of values. Select the required value from the drop-down list.

### Related Topics

- [Text box](#)
- [Check box](#)
- [Grids](#)

## Check box

A check box is used for fields that are either enabled or disabled. If the check box is selected, the field is enabled. If the box is cleared, the field is disabled.

### To change data in a check box

Keyboard: select a check box using the Tab key. Use the space bar to enable and disable the field.

Mouse: select a check box and change its value by clicking on it with the mouse.

### Related Topics

[Text box](#)

[Drop-down box](#)

[Grids](#)

## Grids

A grid is used where many lines of data are required, each containing the same type of information. The data in a grid is displayed in text boxes and drop-down boxes. Drop-down boxes in a grid appear to be text boxes until they are selected, when an arrow appears on the right side.

**Tip:** You can sort information in a grid by clicking on the various column headers.

Forms that contain grids also contain additional buttons:

- Add: adds a new row for data entry.
- Insert (Channels form): inserts a new row using the next available ID.
- Repeat: duplicates the data from the selected row, giving it a new name.
- Delete: removes the currently selected row of data.

### To change data within a grid

- Keyboard: select the different fields in a grid using the Tab key or the right and left arrow keys. Pressing the up or down arrow keys moves up or down a row of data. Start typing in a cell to replace the existing data, or press F2 to edit a cell's contents without deleting existing data.
- Mouse: click on the required field and begin typing to replace existing data. Double-click twice on the required field to edit a cell's contents without replacing the existing data.

### Related Topics

[Text box](#)

[Drop-down box](#)

[Check box](#)



# Transferring data

---

You can copy and paste (or drag and drop) single cells or rows to a grid from a Microsoft® Excel spreadsheet. You can also copy rows within a grid, and drag and drop single fields.

## Topics

- [Creating templates](#)
- [Copying data to grids](#)
- [Copying rows within a grid](#)
- [Copying individual fields](#)

## Creating templates

It is useful to create a template when there is common information to share between radios in a fleet. Examples include Selcall systems or channels.

### To create a template

1. Enter the information into the fields that are common.
2. Select File > Save.
3. Enter a descriptive name for the template, for example, "Selcall\_Settings".

You can now open the file and use it as a basis for defining a fleet of radios where only one or two fields are different.

### Related Topics

- [Copying data to grids](#)
- [Copying rows within a grid](#)
- [Copying individual fields](#)

## Copying data to grids

You can enter data into a Microsoft® Excel spreadsheet, and then copy or drag and drop that data into a grid. This can be useful when there are a large number of records to configure, such as a large number of channels.

### To copy data into a grid from Excel

1. In Excel, type the information exactly as it will appear in the grid.

For the Channels form, columns such as 'ID' and 'Channel' should appear as a unique cell, sharing the same row.

For each column under the header name, enter data that you want to import.

	A	B	C	D	E	F	G	H	I
1	ID	Rx Frequency	Tx Frequency	Rx Sig	Tx Sig	Power	Network	Bandwidth	Squelch
2	1	418.275	428.825	None	C67.0	Low	0	12.5	Country
3	2	418.3	428.85	None	C67.0	Low	0	12.5	City
4	3	418.375	428.875	None	C67.0	Low	0	12.5	City

2. In Excel, select the block of data you have entered, either using Shift and the cursor keys on the keyboard or left click and drag using the mouse.
3. Select Edit > Copy to copy the information to the clipboard.
4. Open the Configuration Software, and navigate to the grid where you want to paste the data (for example, the Channels form).
5. Bring focus to the grid as follows:

- To overwrite existing records, select the entire grid (Edit > Select All menu command, or click on the top left corner of a grid).
  - To append records to the end of the grid, click on a single cell.
6. Select Edit > Paste.

If the information on the clipboard is valid it will appear in the grid.

**Tip:** You can also drag and drop data from Microsoft® Excel to the various grids.

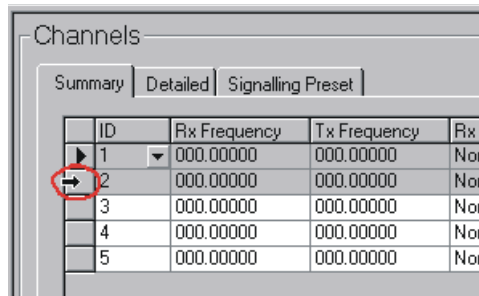
**Related Topics**

- [Channels](#)
- [Copying individual fields](#)
- [Copying rows within a grid](#)

## Copying rows within a grid

You can copy and paste one or more rows of data in a grid. When rows are pasted, they will appear at the end of the grid with the next available unique ID.

1. Move the cursor to the left a row. The cursor will change to a right-pointing arrow.
2. Hold Shift or Ctrl while clicking the box to the left of the rows you want to copy. Selected rows will turn grey.



3. Select the Edit > Copy command.
4. Select the Edit > Paste command.

**Related Topics**

- [Copying data to grids](#)
- [Copying individual fields](#)

## Copying individual fields

**To copy and paste a field**

1. Right-click on the field label of the field that you want to copy.
2. While still holding the right mouse button, drag the field to another field label.
3. Release the mouse button.

**Note:** You can only copy text boxes to text boxes, drop-down boxes to drop-down boxes, and check boxes to check boxes. Data will be validated, with error messages if necessary, when the mouse button is released.

**To copy and paste a field in a grid**

1. Click on the grid cell of the field you want to copy.

2. While still holding the mouse button, drag the field to another grid cell.
3. Release the mouse button.

**Related Topics**

[Grids](#)

[Copying data to grids](#)

[Copying rows within a grid](#)

# Menu commands

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The bar along the top of the main window shows the following menus:




- File menu
- Edit menu
- Radio menu
- Network menu
- Tools menu
- Help menu


These menus show various commands, some of which also appear as an icon on the toolbar.

## File menu

The commands available from the File menu are:

- Reset To Defaults
- Open
- Revert to Saved
- Save
- Save As
- Printer Settings
- Print
- Recent Files List
- Exit

Reset To Defaults	<p>Selecting the File &gt; Reset To Defaults command loads the application's default data for the current radio model.</p> <ul style="list-style-type: none"><li>■ Shortcut key: Ctrl+D</li><li>■ Toolbar icon: </li></ul>
Open	<p>Selecting the File &gt; Open command opens an existing file.</p> <p>If a file was saved with comments, the comments will be displayed in the Comments window and the radio information will be displayed in the Radio Information window.</p> <ul style="list-style-type: none"><li>■ Shortcut key: Ctrl+O</li><li>■ Toolbar icon: </li></ul>
Revert to Saved	<p>Selecting the File &gt; Revert to Saved command returns to the last saved version of the current file.</p>
Save	<p>Selecting the File &gt; Save command saves all data to the current file. If no file has been saved for the current data, the Save As dialog will display, prompting for a file name and location.</p> <ul style="list-style-type: none"><li>■ Shortcut key: Ctrl+S</li><li>■ Toolbar icon: </li></ul>



Save As	Selecting the File > Save As command opens the Save As dialog, which prompts for a file name and location. Any comments you enter in the Comments window will be saved with the file, together with the information displayed in the Radio Information window.
Save As Squirt File	Factory Only Selecting the File > Save As Squirt File command saves the current file as a squirt file for factory use.
Printer Settings	Selecting the File > Printer Settings command opens the Print Setup dialog in which you can select and configure the printer you wish to print to.
Print	Selecting the File > Print command opens the Print Selection window. You can then select one or more forms, and print data in those forms using the Print button. <ul style="list-style-type: none"> <li>■ Shortcut key: Ctrl+P</li> <li>■ Toolbar icon: </li> </ul>
Recent Files List	The list of recent files displays the names of files you have most recently opened in the application. To open a file, select File > [filename].
Exit	Selecting the File > Exit command exits the application.

## Edit menu

The commands available from the Edit menu are:

- Undo
- Cut
- Copy
- Paste
- Delete
- Select All
- Validate Form
- Revert Form




Undo	Selecting the Edit > Undo command reverses the last command or deletes the last entry typed. This is greyed out if there is no action to undo. <ul style="list-style-type: none"> <li>■ Shortcut key: Ctrl+Z</li> </ul>
Cut	Selecting the Edit > Cut command places the text in a field on the clipboard, and deletes it from the field. This is greyed out if there is no text to cut. <ul style="list-style-type: none"> <li>■ Shortcut key: Ctrl+X</li> </ul>
Copy	Selecting the Edit > Copy command places a copy of the selected grid data onto the clipboard. It will also copy the text in a field. This is greyed out if there is no text to copy. <ul style="list-style-type: none"> <li>■ Shortcut key: Ctrl+C</li> </ul>
Paste	Selecting the Edit > Paste command enters data into a grid from the clipboard. The data will be validated before it is entered. It will also paste text from the clipboard into a text field. This is greyed out if there is no text or data to paste.

	<ul style="list-style-type: none"> <li>■ Shortcut key: Ctrl+V</li> </ul>
Delete	<p>Selecting the Edit &gt; Delete command clears the currently selected data, or the next character in a text field.</p> <ul style="list-style-type: none"> <li>■ Shortcut key: Del</li> </ul>
Select All	<p>Selecting the Edit &gt; Select All command highlights all the text in the current field, or all the data in a grid.</p> <ul style="list-style-type: none"> <li>■ Shortcut key: Ctrl+A</li> </ul>
Validate Form	<p>Selecting the Edit &gt; Validate Form command checks the data in the current form for validity. This option will only appear if there are changes to validate, and will cause a green indicator to appear next to the form name in the forms tree. This indicates that there are changes to the form which need to be saved. Select File &gt; Save or Ctrl+S to save the database and reset all green indicators to their original state.</p> <p>Shortcut key: Ctrl+Y</p> <p>Toolbar icon: </p>
Revert Form	<p>Selecting the Edit &gt; Revert Form command discards any changes made to the current form.</p> <p>Shortcut key: Ctrl+T</p> <p>Toolbar icon: </p>

## Radio menu

The commands available from the Radio menu are:

- [Read](#)
- [Program](#)
- [Interrogate](#)
- [Model](#)





Read	<p>Selecting the Radio &gt; Read command reads the radio's programming database and loads the relevant information into the application's forms.</p> <p>Shortcut key: Ctrl+R</p> <p>Toolbar icon: </p>
Program	<p>Selecting the Radio &gt; Program command programs the radio's programming database with the settings in the application's forms.</p> <p>Shortcut key: Ctrl+M</p> <p>Toolbar icon: </p>
Interrogate	<p>Selecting the Radio Interrogate command displays the radio model, software version and database version, without loading the database into the application.</p> <p>Shortcut key: Ctrl+I</p> <p>Toolbar icon: </p>
Model	<p>The Radio &gt; Model options switch between the various radio models. Currently there is only one radio model, the TM8100.</p>

## Network menu

The commands available from the Network menu are:

- [Add](#)
- [Delete](#)
- [Previous](#)
- [Next](#)

For more information, see [Networks](#).

Add	<p>Selecting the Network &gt; Add command creates a new network. You must be on a form under Networks in the forms tree to add a network.</p> <p>See <a href="#">About networks</a> and <a href="#">Adding a new network</a> for more information.</p> <p>Toolbar icon: </p>
Delete	<p>Selecting the Network &gt; Delete command deletes the currently selected network. You must be on a form under Networks in the forms tree to delete a network.</p> <p>See <a href="#">About networks</a> for more information.</p> <p>Toolbar icon: </p>
Previous	<p>Selecting the Network &gt; Previous Network command switches to the previous network. This is only available if two or more networks have been defined, and you are on a form under Networks in the forms tree.</p> <p>See <a href="#">About networks</a> and <a href="#">Selecting a network</a> for more information.</p> <p>Shortcut key: Ctrl+J</p> <p>Toolbar icon: </p>
Next	<p>Selecting the Network &gt; Next Network command switches to the next network. This is only available if two or more networks have been defined, and you are on a form under Networks in the forms tree.</p> <p>See <a href="#">About networks</a> and <a href="#">Selecting a network</a> for more information.</p> <p>Shortcut key: Ctrl+K</p> <p>Toolbar icon: </p>

## Tools menu

The commands available from the Tools menu are:

- [Access Level](#)
- [Download](#)
- [Options](#)

Access Level	<p>Selecting one of the options under Tools &gt; Access Level will restrict or add access to certain fields in the application. See <a href="#">Changing access levels</a> for more information.</p>
Download	<p>Selecting the Tools &gt; Download command enables you to upgrade the radio firmware. See <a href="#">Downloading new radio firmware</a> for more information.</p>

Options                      Selecting the Tools > Options command opens the Options window, where you can change the application language, and set other start-up options. See [Changing application start-up options](#) for more information.

## Help menu

The commands available from the Help menu are:

- [Contents and Index](#)
- [What's This?](#)
- [Internet](#)
- [About](#)

Contents and Index                      Selecting the Help > Contents and Index command launches Online Help for the application, open at the Contents tab.

Shortcut Key: F1

Toolbar Icon: 

What's This?                      Selecting the Help > What's This? command changes the cursor to an arrow with a question mark. Left click on a field to get popup help for that field. See [Using What's This? Help](#) for more information.

Shortcut Key: Shift+F1

Toolbar Icon: 

Internet                      Selecting the Internet > Customer Support Form command launches your default browser and displays the Tait customer feedback form. Selecting the Internet > Taitworld command launches the Tait home page (<http://www.taitworld.com>).

About                      Selecting the Help > About command displays information about the application, such as version, access and copyright information.



# Part B Getting and using help

There are several different ways of accessing help in the programming application.

- You can get a popup description of any field using What's This? help. See [Using What's This? Help](#) for more information.
- You can get more detailed information using online help. See [Accessing information in the help file](#).
- You can also get technical or late-breaking information on the Web. See [Getting help on the Internet](#) for more information.





# Using What's This? Help

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Every field in the programming application contains a brief description of what the field is for, and implications for the radio being programmed.

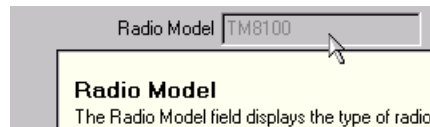
## To access What's This? Help

1. From configuration software, either:
  - Press Shift+F1
  - Click the What's This? button  on the toolbar, or
  - Select Help > What's This?.

The cursor will change to an arrow with a question mark .

2. Move the cursor to the field you want help on.
3. Click once on the field or the field label.

A popup definition of the field will appear.



4. Click again anywhere on the screen to make the popup disappear.


## What's This? Help features:

- To jump to related information in the [Online Help](#) file, click blue underlined text.
- You can print or copy the information in a pop-up window by right-clicking inside the pop-up window, and then clicking Print Topic or Copy.

# Accessing information in the help file

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From the configuration software, either:

- Press F1
- Click the Help button  on the toolbar, or
- Select Help > Contents and Index

To:	Click:
View the table of contents	The Contents tab
Select a topic from a list of keywords	The Index tab
Search for a topic	The Search tab
Save the current topic for future reference	The Favorites tab, then the Add button
Jump to another topic	Blue underlined text
Display a popup glossary or field definition	Green underlined text
Hide or display the navigation pane	The Hide or Show button
Display the previous topic	The Back button
Display the introductory topic	The Home button
Print one or more topics	The Print button

# Getting help on the Internet

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The mobiles section of the support website allows you to access support material such as operator's manuals and user guides. If you have password access, you can also search through Technical Support documentation, and gain access to product updates.

- To get help on the Internet, select Help > Internet > Taitworld and click the Support link.
- To provide feedback, raise issues or ask questions, select Help > Internet > Customer Service Form.



# Part C Programming conventional features

The following sections explain various features of conventional radios, and how to change or enable those features on a TM8100 radio.

- [Basic radio settings](#)
- [Transmit, receive and monitor](#)
- [Channels](#)
- [Scan groups](#)
- [Networks](#)
- [Selcall](#)
- [Subaudible signalling](#)

There is also a reference section which lists all the fields available in the programming software, and what each field means.





# Basic radio settings

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This sections contains information on setting indicators, backlighting, low power, how the radio starts and basic PTT settings.

## Topics

[About audible indicators](#)

[Configuring the LCD backlight](#)

[Setting low power conditions](#)

[Setting how the radio starts](#)

[About PTT Inhibit](#)

[Setting what happens when the PTT is keyed](#)

## About audible indicators

The term audible indicators refers to all the tones that the radio gives to provide feedback to the user.

Audible indicators are classified as follows:

- Incoming call tones: the ringing tones given to indicate that a call is being received.
- Warning tones: the tones given to indicate that an error has occurred or that the radio is operating outside design limits.
- Confirmation tones: the tones given to indicate function activation and deactivation and that an operation is invalid. This includes all feedback tones other than keypress confidence tones, call alerts, warnings and sidetones.
- Keypress confidence tones: a type of confirmation tone given each time the user presses a key to confirm that the action selected is valid.
- Sidetones: the DTMF or Selcall tones sounded to confirm to a user that transmission is taking place.

When two or more functions require the activation of an audible tone at the same time, the highest priority tone will be activated before lower priority tones. Priority, from highest to lowest, is as follows:

1. Incoming call tones.
2. Warning tones.
3. Confirmation tones.
4. Keypress tones.

## Related Topics

[Enabling all audible indicators](#)

[Setting the volume of audible indicators](#)

[Permanently disabling individual audible indicators](#)

## Enabling all audible indicators

Incoming call tones and sidetones are always enabled unless the radio is in silent mode. You can configure whether warning, confirmation and keypress confidence tones are enabled at start-up, or can be toggled by the radio user.

- To enable keypress confidence tones, select the [Confidence Tones](#) check box (UI Preferences form).

- To enable the radio user to turn keypress confidence on or off, add the [Keypress Tones Toggle](#) option to a function key in the Key Settings form. You can also set the radio to start in silent mode (all indicators off) or quiet mode (all indicators off except incoming call and warning tones).
- To start the radio in silent mode, select the [Silent Mode](#) check box (UI Preferences form).
- To enable the radio user to toggle silent mode, add the [Silent Operation](#) option to a function key in the Key Settings form.
- To start the radio in quiet mode, select the [Quiet Mode](#) check box (UI Preferences form).
- To enable the radio user to toggle quiet mode, add the [Quiet Operation](#) option to a function key in the Key Settings form.

## Setting the volume of audible indicators

The volume control adjusts the output volume of channel traffic and all audible indicators.

### To set the volume of audible indicators

1. Enter a [Minimum Volume Level](#) (UI Preferences form).
2. Select a volume level of High or Low in the [Level](#) field, UI Preferences form.
3. If confidence tones are enabled, select either High or Low for the [Confidence Tones Level](#) (UI Preferences form), which will affect the volume of keypress confidence tones.

**Note:** To enable the radio user to toggle volume settings from the front panel, add either the [Audible Indicators Volume](#) or [Keypress Tones Volume](#) option to a function key in the Key Settings form.

## Permanently disabling individual audible indicators

You can customise individual indicators by permanently enabling or disabling them.

### To disable an audible indicator

1. Locate the indicator that you want to permanently turn on or off in the Audible Indicators grid > [Indicators](#) field (UI Preferences form).
2. Next to that indicator, select Disabled to turn the indicator off, or Enabled to turn the indicator on.

## Configuring the LCD backlight

Backlighting is the lighting up of the radio's LCD. The radio user can toggle the backlight, or it can light automatically such as when valid activity is detected on a channel, when a key is pressed or when a call is received. The backlight can stay on permanently, or be set to turn off after a specified period.

### To give the radio user the option to turn the backlight on and off

1. Set the initial state of the backlight to Off or Continuous in the [Backlight Mode](#) field (UI Preferences form).
2. Add the [Backlighting Toggle](#) option to a function key in the Key Settings form.

### **To set the backlight to light automatically whenever a key is pressed or a call is received**

1. Set the Backlight Mode to With Activity (UI Preferences form). See [About the backlight mode: With Activity](#).
2. Enter a time for the backlight to stay on in the [Backlight Duration](#) field.
3. Assign one of the following options to a key in the Key Settings form (optional):
  - [Backlighting Toggle](#)
  - [Backlighting Timer](#)
  - [Backlighting Timer / Toggle](#).

#### *About the backlight mode: With Activity*

- The backlight will stay on for the duration of a call alert or when the radio user holds a channel selection key.
- Auto acknowledgements will activate backlighting when received if the [Indicate Acknowledgement Received](#) check box (Networks > Features form) is selected.
- RMR calls and Appended C Monitor Reset calls will activate backlighting if the [Alert When Received](#) check box (Networks > Features form) is selected.
- Backlighting will not activate based on monitor opening or closing. Backlighting will only respond to the monitor activation method, such as a call received, a function key press, or a channel captured.
- Backlighting will be activated when there is a state change with the hookswitch.
- Inputs from external devices linked to the radio will not cause the radio's backlighting to activate.

## **Setting low power conditions**

Power level settings should be set within the limits permitted for the region in which the radio operates. If a channel is to be used in high signal-strength areas, it can be set to transmit on low power to conserve power usage.

To set an individual channel to transmit at low power, set the [Power](#) field (Channel Setup > Channels form > Summary tab) to Low.

### **To set all channels to temporarily transmit at low power**

1. Enable the radio user to toggle low power by adding the [Low Power Transmit](#) option to a function key in the Key Settings form.
2. Set the radio to initially transmit in low power by selecting On in the [Startup In Low Power Mode](#) field (UI Preferences form).
3. Define what level low power means, by selecting Very Low (1 Watt) or Low (5 Watts) in the [Front Panel Low Power Control](#) (Start-up form).

## **Setting how the radio starts**

You can program the radio so each time it powers up, a combination of three function keys must be pressed in the correct order to unlock the radio.

### To start the radio with a security PIN

1. Select the [Security Lock On Power Up](#) check box (Personality Options form).
2. Define the combination of function keys that must be pressed to unlock the radio. Select function keys (F1 to F4) for the first, second and third boxes after the [Security PIN](#) field.

You can set what happens when the power on/off button is pressed, using the [Power On Mode](#) field (Start-up form).

## About PTT Inhibit

There are two levels of PTT inhibit, set in the PTT form:

1. Prevent total PTT operation, including monitor activation, call setup, and voice or data transmission. This can be programmed in emergency mode ([Inhibit PTT When Emergency Active](#)) or when an external PTT is active ([Inhibit PTT When External PTT Inhibit Active](#)).
2. Prevent voice or data PTT transmission only. This can be programmed for outside a call ([Inhibit PTT Transmission When Call Not Set Up](#)), or when the mic is on the hook ([Inhibit PTT Transmission When Mic On Hook](#)). See [Setting what happens when the PTT is keyed](#).

## Setting what happens when the PTT is keyed

### To configure the PTT

1. Set inhibit conditions for the PTT, using the [Inhibit PTT Transmission When Mic On Hook](#) and [Inhibit PTT Transmission When Call Not Set Up](#) check boxes (PTT form). See the following table, that outlines the various combinations of these two check boxes.

Inhibit PTT Transmission When Mic On Hook	Inhibit PTT Transmission When Call Not Set Up	Action when PTT keyed
Cleared	Cleared	Transmit on the current channel
Selected	Cleared	Transmit on the current channel if the microphone is off the hook
Cleared	Selected	Transmit on the current channel if a call has been set up and monitor is open
Selected	Selected	Transmit on the current channel if the microphone is off the hook and a call has been set up and monitor is open

2. For the radio to emit an invalid tone when the PTT is pressed and inhibited, select the [PTT Inhibit Is Indicated To User](#) check box.

**Note:** The PTT can also activate monitor (see [Opening monitor via a press of the PTT](#)) or send the current channel's fixed selcall sequence (see [Adding a fixed call sequence to one or more channels](#)).

## Setting an external alert

### To add up to two external alerts

1. Define a pin that is wired to an external device such as vehicle lights or a horn (Programmable I/O form > Digital tab).
  - a. Set the **Direction** as Output.
  - b. Set the **Action** as External Alert 1.
2. Set a **Delay** time for Alert 1 before the alert starts (Networks > Alerts form > External Alert tab).
3. Set the **Duration** for Alert 1.
4. Set whether alert 1 is pulsed or steady in the **Mode** field.
5. Select 1 in one or more of the following fields:
  - Rx Decode **External Alert** (Networks > Alerts form > General tab).
  - Group Call **External Alert**.
  - Priority Call **External Alert**.
  - Emergency Call **External Alert** (Networks > Alerts form > Emergency tab).
6. If necessary, add the **External Alert** option to a function key in the Key Settings form.
7. If you want to add another external alert type to assign to different calls, repeat steps 1 to 5 for External Alert 2.



# Transmit, receive and monitor

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This section covers transmitter and receiver setup, setting the different mutes available and setting up monitor.

## Topics

[About mutes](#)

[Restricting the transmit time and setting a lockout](#)

[Setting when the radio can transmit \(Transmit Inhibit\)](#)

[Bypassing repeaters \(repeater talkaround\)](#)

[About monitor](#)

[Using monitor with subaudible signalling](#)

[Using monitor with a closed selective system](#)

[Setting how monitor is opened](#)

[Setting how monitor is closed](#)

[Setting the squelch mute and squelch override](#)

## About mutes

A mute controls the circumstances under which a received signal is passed to the radio's speaker. When a mute is closed, the radio's speaker only opens under certain conditions, such as when a valid signal is received, or when a function key option is pressed.

The **squelch (carrier) mute** silences the inherent background noise so that only signals that appear above this background will be heard. The squelch mute opens when a threshold is reached based on signal strength or noise, or by the Squelch Override function key option. The squelch threshold is set on a per channel-basis ([Squelch](#) field), and can either be set to Hard (strong signals and closer distances), City or Country (weak signals and greater distances).

The **selective call mute** prevents the radio user from hearing private conversations not intended for them on a selective system. The mute opens whenever monitor is opened (such as when a transmission containing the receiving radio's identity is received, or by the Monitor function key option). The selective call mute is set using the [Selective Call Mute](#) field.

The **subaudible signalling mute** prevents the radio user from hearing transmissions that contain invalid subaudible signalling. The mute opens when the radio receives a transmission containing matching subaudible signalling, or when monitor is opened and is set to All Mutes ([Monitor Overrides](#) or [Hookswitch Monitor Overrides](#)). The mute is automatically set whenever subaudible signalling is added to a channel.

## Restricting the transmit time and setting a lockout

Restricting the transmit time is recommended as frequent lengthy transmissions, whether intentional or accidental, could damage the radio's transmitter and can be a nuisance to others. Once the duration time has expired, a lockout time can also be programmed.

### To set a duration and lockout time

1. Select an existing network, or add a new network.

2. Enter a time in the [Tx Timer Duration](#) box (Networks > Basic Settings form > Basic Network Settings tab).
3. To force a time where the radio cannot transmit after the duration time has expired, enter a time in the [Tx Lockout Duration](#) box.
4. Add the network to one or more channels.

## Setting when the radio can transmit (Transmit Inhibit)

Transmit inhibit prevents two radios on the same channel transmitting at the same time. This has two benefits:

- When a transmission is prevented from going out, the radio emits a warning tone. If transmit has been inhibited because the channel is busy, the radio will sound 3 short beeps once the channel is clear and able to be communicated on.
- It prevents private selective calls being cleared down.

Radio transmit conditions are set on a per-channel basis in the Channel Setup > Channels form > Detailed tab > [Tx Inhibit](#) field.

- Select None to always transmit when requested.
- If there is no subaudible signalling or selective signalling on the channel, select Busy. This will always prevent transmission when there is activity on the channel.
- If there is selective signalling or subaudible signalling on the channel, select Mute. This will prevent the radio transmitting on a channel when the selective call mute or subaudible signalling mute is active.

## Bypassing repeaters (repeater talkaround)

Repeater talkaround allows the radio user to bypass repeater operation and so communicate directly with other radios. While repeater talkaround is active, all transmissions are made on the receive frequency programmed for the channel.

Repeater talkaround may be required if the radio is operating outside the range of the repeater. Repeater talkaround may not be permitted in some countries.

To enable the radio user to activate repeater talkaround, add the [Repeater Talkaround](#) option to a function key in the Key Settings form.

## About monitor

Monitor allows the radio user to override the selective call or subaudible signalling mutes and hear all traffic on a channel (including invalid traffic). You only need to set monitor in the following situations:

- if using subaudible signalling. See [Using monitor with subaudible signalling](#).
- if using a closed selective system (you have selected the [Selective Call Mute](#) check box). See [Using monitor with a closed selective system](#).

### Related Topics

[About mutes](#)

## Using monitor with subaudible signalling

When using subaudible signalling to segregate users on a system, it can be a legal requirement to monitor a channel before transmitting.



### To set monitor to open the subaudible signalling mute

1. Set the [Monitor Overrides](#) field (Networks > Basic Settings form > Basic Network Settings tab) to All Mutes.
2. If opening monitor using the hookswitch, also set the [Hookswitch Monitor Overrides](#) field to All Mutes.
3. Set how monitor is opened. See [Setting how monitor is opened](#).
4. Set how monitor is closed. See [Setting how monitor is closed](#).

**Tip:** As an addition or alternative to monitor, you can prevent the radio from transmitting when there is invalid activity on the channel. See [Setting when the radio can transmit \(Transmit Inhibit\)](#).

## Using monitor with a closed selective system

In an open system, all users hear all traffic. In a closed system, calls remain private to the radio transmitting and the intended recipient.

The following information assumes you have set up a Selcall system, and added the system to a network. See [Setting up a basic Selcall system on one or more radios](#) for more information.

### To set up monitor on a closed selective system

1. Select the [Selective Call Mute](#) check box (Networks > Basic Settings form > Basic Network Settings tab).
2. If using selective calling and subaudible signalling on a channel, set what monitor will open.
  - to open the selective call mute and subaudible signalling mute, set the [Monitor Overrides](#) field (Networks > Basic Network Settings form > Receiver Monitoring tab) to All Mutes.
  - to open the selective call mute only, set the Monitor Overrides field to Call Mutes.
  - If opening and closing monitor via the hookswitch, select Call Mutes or All Mutes for the [Hookswitch Monitor Overrides](#) (Networks > Basic Network Settings form > Receiver Monitoring tab) field.
3. Set how monitor is opened. See [Setting how monitor is opened](#).
4. Set how monitor is closed. See [Setting how monitor is closed](#).
5. Set TX Inhibit conditions. See [Setting when the radio can transmit \(Transmit Inhibit\)](#).

## Setting how monitor is opened

### To set how monitor is opened

1. Set the [Monitor State at Power Up](#) field (Receiver Monitoring form) to Closed (recommended) or Open.
2. If you wish to give the radio user the option of manually open monitor, assign a monitor option to a function key. See [Opening and closing monitor via a keypress](#).
3. If the radio user cannot easily access the control head:
  - Set monitor to open when the microphone is taken off the hook. See [Opening and closing monitor via the hookswitch](#).

- Set the PTT to open monitor. See [Opening monitor via a press of the PTT](#).
4. If using a selective system:
    - a. Set monitor to open when sending a call. See [Opening monitor when sending a selective call](#).
    - b. Set monitor to open when receiving a call. See [Opening monitor when receiving a selective call](#).

## Opening and closing monitor via a keypress

### To open or close monitor when a function key is pressed

- For toggling monitor only (short or long press), add the [Monitor](#) option to a function key in the Key Settings form.
- For toggling monitor (short press) and squelch override (long press), add the [Monitor / Squelch Override](#) option to a function key in the Key Settings form.
- To close monitor only, add the Reset Monitor option to a function key in the Key Settings form. This is so users on fully quiet systems can turn monitor off, but not on. \*\*\*TBD – to be implemented.

## Opening and closing monitor via the hookswitch

To open monitor when the microphone is removed from the hook, select the [Hookswitch Monitor](#) check box (Networks > Basic Settings form > Receiver Monitoring tab). Monitor will close again when the microphone is placed back on the hook.

**Note:** The auto quiet timer does not apply when monitor has been opened using the hookswitch.

## Opening monitor via a press of the PTT

### To open monitor on a short press of the PTT

1. Set the [PTT Monitor](#) field (PTT form) to Always.
2. Select the [De-key After PTT Monitor](#) check box. The radio user will need to release then press the PTT again to talk.
3. [Inhibit PTT Transmission When Call Not Set Up](#)

## Opening monitor when sending a selective call

If the selective call mute is closed, monitor must be opened before talking to the receiving radio.

### To open monitor when sending a selective call

1. For free-format sequences, select the Open Monitor check box next to [Preset Call 1 to Preset Call 4](#) (Selcall > Free Format Bursts form).

**Note:** Fixed call sequences will always open monitor when sending a selective call.

2. Set when monitor activates using [Monitor On \(Tx\)](#) field (Networks > Basic Settings form > Receiver Monitoring tab).

## Opening monitor when receiving a selective call

When receiving a call, you must open monitor to be able to respond using the PTT.

### To open monitor when receiving a selective call

1. Select the [Open Monitor](#) check box for Sequence 1 and/or Sequence 2 (Networks > Alerts form > General tab).
2. Set when monitor will activate using the using the [Monitor On \(Rx\)](#) field (Networks > Basic Settings form > Receiver Monitoring tab). Select either Call Answered or Call Received.

## Setting how monitor is closed

You can set monitor to close using the following methods:

- When a function key is pressed. See [Opening and closing monitor via a keypress](#).
- When the microphone is placed back on the hook. See [Opening and closing monitor via the hookswitch](#).
- After a period of inactivity. See [Closing monitor via the auto quiet timer](#)
- When a Selcall call is sent to another radio, or via a remote monitor reset. See [Closing monitor using Selcall](#).

### Closing monitor via the auto quiet timer

The auto quiet timer will close monitor automatically after being activated. The timer will be suspended when making or receiving a transmission (including selective call transmissions). When using a closed selective system, an auto quiet time should be set to allow for pauses in a conversation.

**Note:** The auto quiet timer does not apply when monitor has been opened using the hookswitch.

### To close monitor via the auto quiet timer

1. Enter a time in the [Auto Quiet Time](#) field (Networks form > Receiver Monitoring tab).
2. Set whether the auto quiet time continues or is restarted when suspended, using the [Auto Quiet Timer Countdown](#) field (Networks form > Receiver Monitoring tab). If using a closed selective system, select Reset.

### Closing monitor using Selcall

Monitor must be closed again to ensure subsequent private calls are not heard. In addition to the auto quiet timer (see [Closing monitor via the auto quiet timer](#)) you can use a third tone or invalid call reset for all users in the fleet, or a remote monitor reset for a dispatcher radio.

### To close monitor using Selcall

For all users in the fleet:

- To reset the radio's monitor when a sequence is received that matches the Rx Format and contains the first 3 digits of one of the radio's Rx decode sequences, select the [Third Tone Monitor Reset](#) check box (Selcall > Selcall Identity form > Options tab). The group or fleet of radios must share the first three or more digits in one of the Rx decode sequences. See [Selcall system examples](#) > Third tone reset example.

- To reset a radio's monitor when an [invalid call](#) is received:
  - a. Select the [Invalid Call Monitor Reset](#) check box (Selcall > Selcall Identity form > Options tab).
  - b. Add the Call Cleardown option to a function key in the Key Settings form (\*\*TBD - to be implemented).

See [Selcall system examples](#) > Invalid call reset example.

Set monitor to be reset remotely. This will also reset emergency calls.

- To give a dispatcher radio the ability to remotely reset another radio's monitor in the fleet, set an appended C tone monitor reset (see [Defining an appended C tone monitor reset for a fleet](#)), or an RMR sequence (see [Defining an RMR sequence for a fleet](#)).

### ***Defining an appended C tone monitor reset for a fleet***

#### **To define an appended C tone monitor reset**

For all users in the fleet:

1. Select the [Appended C Tone Monitor Reset](#) check box (Selcall > Selcall Identity form > Options tab).
2. To indicate to the receiving radio that their monitor has been reset, select the [Alert When Received](#) check box (Networks > Features form).
3. To clear down any existing calls, select the [Call Clear](#) check box.
4. To send an auto acknowledge after receiving an appended C tone in a sequence, select the [Acknowledge When Received](#) check box.

For the dispatcher radio only:

Enter a preset call with a C tone appended after the Caller ID (C) burst or Receiver (R) burst. See [Defining up to 4 free-form preset calls per-system](#) and [Defining fixed call sequences per-channel](#). See [Selcall system examples](#) > Appended C monitor reset example for an example of how the sequence will look.

### ***Defining an RMR sequence for a fleet***

To define an RMR sequence

For all users in the fleet:

1. Enter a decode sequence in the [RMR Sequence](#) box (Selcall > Selcall Identity form > Selcall Identity tab). This sequence must match the length of the R-burst in the RX Format.
  - To reset all radios in the fleet with one call, enter the same RMR decode sequence.
  - To reset individual radio's monitor, their RMR decode will need to be unique.
  - Enter a V in the sequence as a wildcard character.
2. To indicate to the receiving radio that their monitor has been reset, select the [Alert When Received](#) check box (Networks > Features form).
3. To clear down any existing calls, select the [Call Clear](#) check box.
4. To send an auto acknowledge after receiving a the RMR sequence, select the [Acknowledge When Received](#) check box.

For the dispatcher radio only:

Enter preset calls that contain an appropriate RMR sequence in the R-burst. See [Defining up to 4 free-form preset calls per-system](#) and [Defining fixed call sequences per-channel](#). See [Selcall system examples](#) > Appended C monitor reset example for an example of how the sequence will look.

## Setting the squelch mute and squelch override

Squelch override lets the radio user override the squelch (carrier) mute and hear all noise on a channel, including weak signals that are below the programmed squelch threshold.

### To configure the radio's squelch mute

1. Select Noise Level or Signal Strength for the [Squelch Detect Type](#) field (Networks > Basic Settings form > Basic Network Settings tab). See [About the squelch type - signal strength or noise level?](#)
2. Set the [Squelch](#) level as City, Country or Hard (Channel Setup > Channels form > Summary tab). See [Default squelch levels](#) for more information.
3. To give the radio user the option of hearing all noise on a channel, add the squelch override option to a function key in the Key Settings form.
  - For toggling squelch override only (short or long press), select [Squelch Override](#).
  - For toggling monitor (short press) and squelch override (long press), select [Monitor / Squelch Override](#).

### About the squelch type - signal strength or noise level?

The squelch (carrier) mute is selectable between a traditional noise mute (opening points between 8 and 20dB Sinad), and a signal strength (RSSI) mute (opening points greater than -110dBm). Select the type of squelch on a per network basis, in the [Squelch Detect Type](#) field (Networks > Basic Settings form > Basic Network Settings tab).

Select Noise Level when you want the best range (sensitivity) at response times close to 20 ms. This should be selected when receiving voice transmissions (particularly scan groups).

Select Signal Strength for fast responses close to 1ms, where the radio will be operating in consistent, high signal-strength conditions (greater than -100dBm). This option can be useful for receiving data, where there is a need for fast response times.



# Channels

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## Topics

- [About channels](#)
- [Adding channels](#)
- [Defining subaudible signalling on a channel](#)
- [Adding a network to a channel](#)
- [Setting channel features](#)

## About channels

A channel is the receive and transmit frequency pair that the radio transmits on. More accurately, a channel is the configuration (known by the channel ID) which contains signalling, power level, squelch settings, transmit conditions, and a preset Selcall TX call sequence. The channel ID can be assigned to scan groups, and selected using the front panel channel increment/decrement keys. [Networks](#) (containing conventional features such as Selcall, monitor and subaudible signalling) are also assigned to a channel.

Most channel-related information is added in the Channels form:

- The Summary tab lists all channels defined for the radio. The first column is the Channel ID. Use this tab to add and delete channels, import channel data, or define transmit and receive frequencies.
- The Detailed tab is a detailed view of a single channel and channel ID. It contains fields not on the Summary tab, including Tx Inhibit, data and birdie options, and other audio enhancement options.
- The Signalling Preset tab contains Selcall specific information, such as the Selcall Call assigned to the channel, and is only relevant if the Channel Network ID is a Selcall network.

## Adding channels

### To add one or more channels

1. Navigate to the Channel Setup > Channels form > Summary tab.
2. Click the Add button.
3. Change the Channel ID if the default is not suitable.
4. Enter a transmit and receive frequency that is within the radio's frequency band, using [Rx Frequency](#) and [Tx Frequency](#).
5. Set the channel's transmit power level using the [Power](#) field. See also [Setting low power conditions](#).
6. Set the channel's [Bandwidth](#).

**Tip:** Control what happens after the last channel and before the first channel in the list using the [List Operation Wrap Around](#) field (Start-up form).

7. Set how the channel will be accessed. Channels can be accessed using the channel increment/decrement buttons by default. Additionally:
  - Add the [Preset Channel](#) option to a function key in the Key Settings form, and select a channel in the Setting 1 field.

- If scanning, select the [Hidden Channels](#) check box (Channel Setup > Scan Groups form > Basic Group Settings tab) to hide the member channels in channel selection mode.
- Add the Decrement Channel, Increment Channel, Preset Channel, Go To Home Channel actions to an input pin (Programmable I/O form > Digital tab).
- Add external BCD control using the BCD Pin 0-4 actions for input pins (Programmable I/O form > Digital tab) and the options on the Programmable I/O form > BCD tab.

Once a basic channel has been added, you can define other channel-related features. See [Defining subaudible signalling on a channel](#), [Adding a network to a channel](#) and [Setting channel features](#).

## Defining subaudible signalling on a channel

### To define subaudible signalling on a channel

1. Select a value in the [Rx Sig](#) field (Channels form > Summary tab). When the radio receives this DCS code or CTCSS tone, the subaudible signalling mute will become inactive. This setting must be the same for the radio transmitting the call.
2. Select a value in the [Tx Sig](#) field (Channels form > Summary tab). This is the DCS code or CTCSS tone that will be sent on the channel. This setting must be the same for the radio intending to receive valid activity on the channel, and is typically the same as Rx Sig for that channel.

**Note:** You can mix DCS and CTCSS on a channel.

3. Set [Tx Inhibit](#) (Channels form > Detailed tab) for the channel to Mute (optional).

Other subaudible settings are defined in the Subaudible Signalling tab for a network (see [Subaudible signalling](#) for more information).

## Adding a network to a channel

### To add a network to a channel

1. Add a network, or make sure there is an existing network with the desired settings. See [About networks](#) for more information.
2. Navigate to the Channel Setup > Channels form > Summary tab.
3. Select the network ID defined in step 1 using the [Network](#) field.

## Setting channel features

Once a basic channel has been added (see [Adding channels](#)), there are a number of other features that can be defined.

- Set the [Squelch](#) level for the channel. see [Setting the squelch mute and squelch override](#).
- Set [Tx Inhibit](#) for the channel. See [Setting when the radio can transmit \(Transmit Inhibit\)](#).
- To reduce external interference such as noise from a vehicle engine for radios with a [Band](#): A4, B1 or C1, select the [Noise Blanker](#) check box (Channel Setup > Channels form > Detailed tab).



- If there is internal interference on the channel, select the [Activate Birdie Killer](#) check box.
- To reduce noise on the channel, select both the [Tx Compression](#) and [Reception Expansion](#) check boxes.
- To use the radio's voice scrambler select both the [Sw Decryption Enabled](#) and [Sw Encryption Enabled](#) check boxes.
- Add a Selcall TX call sequence in the Signalling Preset tab. See [Adding a fixed call sequence to one or more channels](#).



# Scan groups

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This section covers scanning operation on TM8100 radios. TM8100 radios support one scanning group.

## Topics

- [About scanning](#)
- [About transmitting while scanning](#)
- [About the group hold time](#)
- [Defining a basic group](#)
- [Setting how the scan group is initiated](#)
- [Setting the group hold time](#)

## About scanning

In scanning, a group of channels is systematically sampled for activity. The member channels are scanned in the order in which they are assigned to the Group Membership grid (ID/Membership tab).

The main benefit of scanning is that all channels of interest can be sampled for activity in a regular sequence. However, scanning takes a finite time to sample each member channel (longer if the channel has subaudible signalling), and so a short call could be missed within a large multi-member group.

The types of scanning are:

- **Standard scanning:** the radio scans all member channels to find a channel that is busy and has valid signalling. When valid activity is found, the radio remains on that channel until there is no longer valid activity and the group hold time has expired.
- **Priority scanning:** the group's priority channel is scanned more frequently than other channels. If valid activity is found on another channel, the radio continues to scan the priority channel at regular intervals.
- **Dual priority scanning:** the radio behaves as for priority scanning, but there are two channels that are given higher priority. If valid activity is found on the first priority channel, no further scanning takes place. If valid activity is found on the second priority channel, the first channel continues to be scanned at regular intervals. If valid activity is found on a non-priority channel, the two priority channels are scanned periodically.
- **Background (Flexi) scan:** the group operates in the background with very little group activity being indicated to the user. The group is normally activated via a function key, and the current channel that the radio was on at time of activation is included as a group member. This current channel is usually displayed on the LCD and becomes the default transmit channel. It can be changed at any time by the user without having to deactivate and reactivate the group.

## About transmitting while scanning

There are several options that determine what happens when the radio is in scan mode and the radio user attempts to transmit.

If [Scanning Tx Channel Selection \(Scan Talkback\)](#) is Captured (default for standard scanning), and a channel is held, then the radio will respond on the captured channel. A channel is held as long as the group hold time is active. If the radio user presses the PTT after scanning resumes, then the Scanning Tx Channel will be used.

If scan talkback is not selected (the field is set to Default), then the radio will always transmit on the [Scanning Default Tx Channel](#).

The options for Scanning Default Tx Channel are:

- [Preset Channel](#)
- [Last Captured Channel](#)
- [Last Free Channel](#)
- [Last Selected Channel](#)

You can also determine what happens at the end of a transmission to a scan group. Select the [Suspend Scanning On PTT](#) check box to resume scanning after the PTT is released, clear the check box to return to channel selection mode.

#### *Preset Channel*

The radio will use the [Preset Tx Channel](#) to transmit on. This is the default option for a standard scan group.

A preset channel is useful if you want a greater chance of the transmission being heard (for example, it is a broadcast call from a dispatcher).

**Tip:** You can select a priority channel as the preset.

#### *Last Captured Channel*

The radio will use the channel that was last captured to transmit on. If no channel has been captured since the scan group was initiated, the first priority channel will be used. If no priority channels are programmed then the first channel in the group member list will be used.

Last captured is useful if the radio user is not able to respond immediately before scanning resumes – and is an alternative to a long group hold time.

#### *Last Free Channel*

The radio will select the last channel scanned that was determined to be free. A channel is free when there is no activity on the channel. If there is activity, the definition of free is dependant on the channel's [Tx Inhibit](#) setting (Channel Setup > Channels form > Detailed tab).

- If Tx Inhibit is None, then the channel will be free.
- If Tx Inhibit is Busy, then the channel will not be free.
- If Tx Inhibit is Mute, the [Validate DCS/CTCSS](#) check box (Channel Setup > Scan Groups form > Scan tab) is selected, and there is invalid activity on the channel, then the channel will not be free. If the Validate DCS/CTCSS check box is cleared, or there is valid activity on the channel, then the channel will be free.

If no channel is free, the first priority channel will be used. If no priority channels are programmed then the first channel in the group member list will be used.

Last free is useful if you want a random channel to transmit on. It might be used in situations where there are a large number of users of a scan group, and there is a high chance of multiple transmissions happening at once.

**Note:** If you select Last Free, and Default for [Scanning Tx Channel Selection \(Scan Talkback\)](#), then calls to the group will be broadcasts only (the radio user shouldn't expect a response on the captured channel).

### *Last Selected Channel*

The radio will select the last channel selected before group activity was started. This is only available (and is the default option) for a background scan group.

Last selected is convenient for users that always want to transmit on the channel that is currently selected, and do not want the transmit channel to be constantly changed by other channel traffic.

## About the group hold time

A group hold time determines how long a channel continues to be captured after activity has ended. When the time expires, scanning will resume. When the group hold time is active, the orange LED will flash. TM8100 radios support two group hold times: one before the radio has transmitted ([Group Hold Time](#)) and one after the radio has transmitted ([Transmit Group Hold Time](#)).

The transmit group hold time is useful if you have responded to activity, and want to hold a channel for longer than if you hadn't transmitted. The transmit group hold time only applies after making a transmission since a channel has been captured. The transmission can be of any type, such as PTT, Selcall setup, Selcall auto-acknowledge or a data burst.

As an example, Radio A has the group hold time set to 5 seconds, and the transmit group hold time set to 10 seconds.

1. A channel is captured through activity (Radio B is transmitting).
2. Activity ends.
3. The channel is held for 5 seconds (group hold time).
4. Radio A responds within 5 seconds and releases the PTT.
5. The channel is now held for 10 seconds (transmit group hold time).
6. Any subsequent activity will be based on a 10 second hold time as long as the channel is still captured.
7. If the hold time expires, then it will reset back to a group hold time of 5 seconds for any future activity, until Radio A transmits again.

**Note:** An alternative to using a high transmit group hold time is to set the Default TX Channel to Last Captured. See [About transmitting while scanning](#).

## Defining a basic group

### **To define a basic group**

1. Define the channels (using the Channels form) that you want to add to the scan group. See [Adding channels](#) for more information.
2. Select a group identity from the [Group ID](#) field (Scan Groups form > ID/Membership tab).

3. Select a [Channel ID](#) for the first membership channel using the Group Membership grid.
4. Click the Add button.
5. Define another membership channel. The selected Channel ID should not be the same as another member channel.
6. Repeat steps 5 and 6 to add up to 24 member channels. A standard scan group should have at least two member channels. A flexi scan scan group can include 1 member channel if the [Include Current Channel in Scan Regime](#) check box is selected.

## Setting up a scan group

### To set up a scan group

1. Set up a basic group and add member channels. See [Defining a basic group](#).
2. Set how the group is initiated. See [Setting how the scan group is initiated](#).
3. Set the group hold time. See [Setting the group hold time](#).
4. Set standard or background options. See [Setting standard scanning options](#) or [Setting background scanning options](#).
5. Set priority scanning. See [Setting up priority scanning](#).

## Setting how the scan group is initiated

### To set how the scan group is initiated

- Hookswitch:
  - Clear the [Allow Scan When Off Hook](#) check box to stop scanning when the microphone is taken off the hook. For the hookswitch to have no effect on scanning, select the Allow Scan When Off Hook check box.
  - If the Allow Scan When Off Hook check box is cleared, set what happens when the microphone is placed back on the hook. To start scanning again, select the [Resume Scanning When Placed On Hook](#) check box.
- Function key: add the Group Scanning Activity option to a function key in the Key Settings form. The group ID will appear in the Setting 1 drop-down box.
- On power up: to begin scanning or voting when the radio is first turned on after programming, select the [Group Active on Power Up](#) check box (Membership/ID tab).
- CCDI command.

## Setting the group hold time

For information about the group hold time, see [About the group hold time](#).

### To set the group hold time

1. Set the time before the radio has transmitted. Enter a time in the [Group Hold Time](#) field.
2. Set the time after the radio initiated a call, or has made at least one transmission since a channel was captured. Enter a time in the [Transmit Group Hold Time](#) field.

## Setting standard scanning options

Compare with [Setting background scanning options](#).

### To set options for a standard-type scan group

1. Select Scan in the [Group Type](#) field (Channel Setup > Scan Groups form > ID/Membership tab).
2. Select Standard in the [Scan Type](#) field (Channel Setup > Scan Groups form > Scan tab).
3. Define the channel that the radio uses when responding to group activity.
  - To use the channel that the valid activity was detected on, select Captured in the [Scanning Tx Channel Selection \(Scan Talkback\)](#) field (recommended).
  - To use a preset, last captured or last free channel, select Default in the Scanning Tx Channel Selection field, and select one of the options in the Scanning Default Tx Channel field.
4. Define the channel that the radio uses when a call is initiated.
  - To pre-define a channel, select Preset in the [Scanning Default Tx Channel](#) field, and select a channel in the [Preset Tx Channel](#) field.
  - To use the last captured channel, select Last Captured in the Scanning Default Tx Channel field.
  - To use the last free channel, select Last Selected in the Scanning Default Tx Channel field.See [About transmitting while scanning](#) for more information.
5. Set whether scanning resumes when the PTT is released, using the [Suspend Scanning On PTT](#) check box.
6. If necessary, add the [Nuisance Delete](#) option to a function key in the Key Settings form.
7. Define one or two priority channels. See [Setting up priority scanning](#).

### Related Topics

[Setting background scanning options](#)

## Setting background scanning options

Compare with [Setting standard scanning options](#).

### To set options for a background-type scan group

1. Select Scan in the [Group Type](#) field (Channel Setup > Scan Groups form > ID/Membership tab).
2. Select Background in the [Scan Type](#) field (Channel Setup > Scan Groups form > Scan tab).
3. Set the [Scan Group Display Indicator](#) to Tx Channel.
4. Define the transmit channel that the radio uses when responding to group activity. The main benefit of background scanning is to retain channel selection functionality. Therefore:
  - a. Clear the [Scanning Tx Channel Selection \(Scan Talkback\)](#) check box.
  - b. Select Last Selected in the [Scanning Default Tx Channel](#) field. This will transmit on the channel selected using the channel selection keys.
5. Select the [Include Current Channel in Scan Regime](#) check box.

6. Define one or two priority channels. See [Setting up priority scanning](#).

## Setting up priority scanning

### To set priority scanning

1. Define basic scan settings (see [Defining a basic group](#)), and either a standard (see [Setting standard scanning options](#)) or Background (see [Setting background scanning options](#)) group.
2. Enable priority scanning.
  - To select a channel to be used as the priority channel, select Fixed in the [Priority Scan](#) field (Priority Scan tab).
  - If the Scan Type is Background, and the Include Current Channel in Scan Regime check box is selected, select Selected in the Priority Scan field. This will make the current channel a priority channel.
3. Set the time that the priority channel is scanned.
  - When a channel has been captured. Enter a time in the [Captured Channel Priority Sample Timer](#) field.
  - When a channel is not captured. Enter a time in the [Non-Captured Channel Priority Sample Timer](#) field.
4. To add another priority channel (only when Priority Scan is Fixed):
  - a. Select the [Dual Priority Scan](#) check box.
  - b. Select a channel in the [Priority Two Channel](#) field.

### Related Topics

[About scanning](#)

[Subaudible signalling with scanning](#)



# Networks

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This section covers networks, and the various features that are network dependant.

## Topics

[About networks](#)

[About selective signalling](#)

[Fields on a per-channel and per-network basis](#)

[Adding a new network](#)

[Selecting a network](#)

[Adding a selective system to a network](#)

[Entering network information](#)

[About emergency operation](#)

[Setting up emergency operation](#)

## About networks

A network is a set of information that is added to a channel. Four networks are available for TM8100 mobile radios, meaning you can have up to four different sets of network-related information assigned to channels. The radio user can access those sets of features by changing to a channel with a different network assigned.

The information you can define for a network includes:

- Emergency setup
- Selective system ([Selcall](#), [DTMF](#) or [Two-tone](#)).
- Transmitter setup
- Subaudible signalling
- Monitor settings

For the information defined on a network to be valid, the relevant network ID must be assigned to one or more channels. The default network ID per channel is 0. See [Adding a network to a channel](#) for more information.

## About selective signalling

Selective Signalling is a means of individually calling and alerting another radio or group of radios. You must define at least one signalling system before adding that [Signalling Type](#) to a network. The network must also be added to one or more channels for the signalling to be valid.

TM8100 radios support [Selcall](#) signalling, [DTMF](#) encode signalling, and [Two-tone](#) signalling.

## Fields on a per-channel and per-network basis

There are three types of fields in the programming application:

- Per-network fields can be set differently for each network (for example, the transmit timer). For the radio user to access per-network settings, you must assign the network to a channel. See [Adding a network to a channel](#) for more information.

- Per-channel fields can be set differently for each channel (for example, TX Inhibit).
- Global fields are only set once, and are the same for all channels and networks (for example, function key settings).

## Adding a new network

### To add a new network

1. Using the forms tree, navigate to a form under Networks (for example, the Basic Settings form).
2. Click the Append a new network icon on the Network toolbar, or select the Network > [Add](#) menu command.

The Network: drop-down box will change to display the new network ID.

You can now enter details for the new network in network-related forms.

## Selecting a network

### To select a different network

1. Using the forms tree, navigate to a form under Networks (for example, the Basic Settings form).
2. Select a different network using the Network: drop-down box on the Network toolbar, or select the Network > [Previous](#) (Ctrl+J) or Network > [Next](#) (Ctrl+K) menu commands.

**Note:** The Network: combo will display the relevant network or networks when on any form in the forms tree.

## Adding a selective system to a network

You must add and define a selective system before you can add that system to a network.

### To add a selective system to a network

1. Navigate to the Networks > Basic Settings form.
2. Use the Networks toolbar to add a new network or select an existing network.
3. Select the [Signalling Type](#) as Selcall, DTMF or Type 99 (Basic Network Settings tab).
4. Select the [Signalling ID](#) that has been defined for the selective system.

**Note:** For the radio user to access the selective system, you must assign the network to a channel. See [Adding a network to a channel](#) for more information.

## Entering network information

You can set the following on a per-network basis:

- Define a transmit timer and lockout time in the Basic Settings tab. See [Restricting the transmit time and setting a lockout](#).
- Define DCS and CTCSS in the Subaudible Signalling tab. See [About CTCSS and DCS](#).

- Define different monitor and mute settings in the Receiver Monitoring tab. See [Using monitor with subaudible signalling](#) and [Using monitor with a closed selective system](#).
- Define emergency settings in the Emergency form. See [About emergency operation](#) for more information.

## About emergency operation

Emergency operation provides an automated way of making a call and transmitting when the radio user is unable to use the radio. Emergency operation consists of five phases, listed below in order.

1. **Activation:** emergency mode is initiated by a function key or a programmable input pin (such as a hidden footswitch). The radio changes to a dedicated channel (optional).
2. **Callout:** the radio sends an emergency call to a preset number once, or multiple times until acknowledged (Selcall/DTMF only).
3. **Cycling:** the radio cycles between receive and transmit states so that the called party can hear activity near the radio and decide how to respond.
4. **Quiet state:** once cycling ends, the radio enters a quiet state (stealth only).
5. **Exit:** emergency mode ends when cycling ends if set to a fixed number of cycles (non-stealth only), when another radio resets emergency (by sending an appended C tone reset or remote monitor reset call), or the radio user turns the radio off then on again.

### Related Topics

[Stealth and non-stealth emergency](#)

[Setting up emergency operation](#)

## Stealth and non-stealth emergency

There are 2 kinds of emergency: stealth and non-stealth.

- A **stealth** emergency is the default when initiated by a programmable input pin (for example, a hidden footswitch). Stealth emergencies are for attack situations. The radio will not show any indication of the call being made (such as selcall sidetones, backlighting, or a change of channel), and the radio's mute will close for all received audio. The radio will enter a quiet state after emergency cycling ends through a fixed number of cycles, or after receiving a [monitor-reset call](#) (optional).

In the quiet state, the radio will receive for an indefinite period. The radio will appear the same as it was before exiting emergency mode (for example, powered up with indicators frozen or in a false power down state). Emergency mode will end when a monitor-reset call is received (with the Toggle Cycling/Quiet State check box cleared), or the radio user turns the radio off then on again.

A stealth emergency also has an option of a false power down. If this option is selected and someone presses the on/off button, the radio will appear to power down, but will actually continue to operate in emergency mode (callout and/or cycling) until emergency mode ends.

- A **non-stealth** emergency is the default when initiated by a function key. Non stealth emergencies are for alarm/accident situations. The radio will show the function key LED, sound any call or side tones, and display the new channel (if applicable). Emergency mode will end after emergency cycling ends through a fixed number of cycles, when a monitor-reset call is received, or after the radio user turns the radio of then on again. There is no option of a false power down.

## Setting up emergency operation

### To set up emergency operation

1. Select a network or add a new network. See [Selecting a network](#) or [Adding a new network](#). You must add a selective system to the network (see [Adding a selective system to a network](#)) for Selcall or DTMF emergency features to be available.
2. Select the [Emergency Enabled](#) check box (Networks > Emergency form > Activation tab).
3. Set what happens after an emergency call is initiated, and whether a selective call is made. See [Setting activation and callout options](#).
4. Set emergency behaviour and cycling options. See [Setting emergency cycling and radio behaviour](#).
5. Set how the emergency will be triggered:
  - add the [Emergency Call](#) option to a function key in the Key Settings form. This will be a non-stealth emergency by default.
  - Add the Send Emergency Call option to a digital input in the Programmable I/O form. This will be a stealth emergency by default.
  - Emergency calls can also be sent by a CCDI serial command.
6. Add the network to a channel. See [Adding a network to a channel](#).
7. Repeat the steps above for all networks that have been assigned to one or more channels.
8. Set up an Appended C sequence (see [Defining an appended C tone monitor reset for a fleet](#)) or an RMR sequence (see [Defining an RMR sequence for a fleet](#)) for the fleet so emergency mode can be reset (Selcall only).
9. Set the emergency alert pattern for the radios receiving an emergency call. See [Setting a Selcall emergency sequence alert](#).

## Setting activation and callout options

### To set activation and callout options

(Networks > Emergency form > Activation tab).

1. Select the [Channel Type](#) as Current, or to switch to another channel before the callout and/or cycling begins, select Dedicated and a [Channel](#). This is useful if a specific channel is intended for emergency calls, or you want to use a channel that is unlikely to be busy.
2. Set whether to transmit on high power using the [Tx On High Power](#) check box.
3. Set callout (Selcall only).

- a. Define the emergency free-form sequence that will be used for the callout, using the [Emergency Sequence](#) field (Selcall > Free Format Bursts form). This will usually contain the identity (Rx Decode 1 or 2) of the dispatcher radio.
- b. Set the [Callout Type](#) as Fixed and enter a [Number Of Callouts](#).

**Note:** Only use Continuous if there are specific requirements. If the emergency sequence is not acknowledged then the radio will transmit the sequence indefinitely, blocking the channel. Consider using Fixed and a high Number of Callouts instead.

- c. Enter a [Callout Repeat Interval](#).
- d. Add a status burst to the Tx and Rx formats, and add a control status with [Control Status Type - Emergency](#). This is so emergency calls and emergency mode can be identified and alerted. See [About status calls](#) for more information.

## Setting emergency cycling and radio behaviour

### To set cycling and radio behaviour in emergency mode

1. Set emergency cycling in the Networks > Emergency form > Cycling tab.
  - a. Set the [Emergency Cycling Type](#) as continuous, or fixed and a [Number Of Cycles](#)
  - b. Enter a time for the radio to spend receiving ([Rx Time](#) field) and transmitting ([Tx Time](#) field) within each cycle. The radio would typically be set up to transmit more than receive.
  - c. Set an alert tone if necessary. Select the [Over-The-Air Alert Tone](#) check box, and enter a duration and frequency for a begin tone and end tone.
  - d. If using Selcall, select the [Emergency A.N.I.](#) check box to enable the recipient of the emergency call to identify the radio unit in trouble. An [A.N.I. Sequence](#) (Selcall > Free Formats Form) will need to be defined. See [Setting up Selcall A.N.I.](#) for more information.
2. Set the PTT to be inhibited if necessary using the [Inhibit PTT When Emergency Active](#) field for the PTT, and external PTT 1 and 2 (PTT form).
3. Set additional options (stealth only) in the (Networks > Emergency form > Stealth Options tab).
  - a. Select the [Allow False Powerdown](#) checkbox for the radio to change the behaviour of the radio when the on/off button is pressed.
  - b. Select the [Toggle Cycling/Quiet State](#) to switch between Rx/Tx cycling and the Quiet State when a [monitor-reset call](#) is received.



# Selcall

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## Topics

[About Selcall](#)

[Setting up a basic Selcall system on one or more radios](#)

[Setting up advanced Selcall](#)

[Setting up Selcall for a despatcher radio](#)

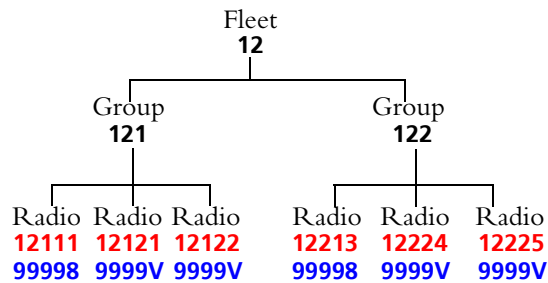
## About Selcall

Selcall (selective calling) is a signalling system that uses audible tones within the voice frequency band. It enables you to alert individual or specifically assigned groups of radio users on conventional systems. Numbers or letters in the programming software represent audio tones, which are transmitted or decoded as a Selcall sequence.

Each radio can be assigned a unique Selcall sequence (identity). This allows the radio (through the selective call mute) to ignore all calls other than those that contain this identity. Additionally, a special tone can be assigned as a 'Group Tone' which enables the whole fleet of users, or smaller designated groups to be called.

## Selcall system examples

The red sequence is each radio's [Rx Decode 1](#). The blue sequence is each radio's [RMR Sequence](#).



Entering Tx Call bursts

12GGG will place a group call to all members of the fleet

121GG will place a group call to all members of the first group

12G1G will place a group call to the first and fourth radios

12121 will place an individual call to the second radio only

Third tone reset example

All radios have the [Third Tone Monitor Reset](#) check box selected. All radios have monitor open.

Radio 4 calls radio 1.

Monitor closes on radio 2 and 3 because they share the first 3 tones (121...) as the called number. Monitor does not close on on radio 4 and 5 because their first 3 tones are different to the called number (122...).

Invalid call reset example

All radios have the [Invalid Call Monitor Reset](#) check box selected. All radios have monitor open.

1. Radio 4 calls radio 1.
2. Monitor closes on Radio 2, 3, 5 and 6.
3. Radio 2, 3, 5 and 6 open monitor via the Toggle Monitor function key option.
4. Radio 4 clears down the call using the Call Cleardown function key option. \*\*\*TBD to be implemented
5. The call is ended and monitor closes on all radios in the fleet.

Appended C monitor reset example

All radios have the [Appended C Tone Monitor Reset](#) check box selected.

12121C will close the monitor on the second radio, and clear down any call in progress and force an auto acknowledge (if programmed).

121GGC will close monitor on all radios, and clear down any call in progress (if programmed). An auto acknowledge will not be sent even if programmed.

RMR sequence monitor reset example

99999 will close monitor on the second, third, fourth and fifth radios, and clear down any call in progress and force an auto acknowledge (if programmed).

99998 will reset monitor on all radio's in the fleet, and clear down any call in progress and force an auto acknowledge (if programmed).

9999G will close monitor on all radios, and clear down any call in progress (if programmed). An auto acknowledge will not be sent even if programmed.

## Setting up a basic Selcall system on one or more radios

The following steps are the minimum required to set up Selcall on two or more radios.

### To set up a basic Selcall system

1. Add a new Selcall system (click the Add button) or select an existing Selcall system in the Selcall > Selcall Identity form > Selcall Identity tab.
2. Enter the transmit and receive formats used for the fleet in the [Tx Format](#) and [Rx Format](#) fields. See [Defining the transmit and receive formats](#).



3. Enter a unique identity for the radio (Rx Decode). See [Entering RX decode details](#).
4. Create the lists of bursts for the Selcall system (Fixed Format Bursts form). See [Defining a set of bursts for a Selcall system](#). These will be used to define per-channel fixed call presets in step 9.
5. Define any global preset calls. See [Defining up to 4 free-form preset calls per-system](#).
6. Select or define the tone set used for the fleet, using the [Tone Set](#) field (Selcall > Tone Settings form). This must conform to the requirements of your region. See [Selecting a standard tone set](#).
7. Add the Selcall system to a Network (Networks > Basic Network Settings tab). See [Adding a selective system to a network](#).
8. Enter Monitor and Mute settings that you have defined for the fleet. See [Setting Selcall muting conditions](#).
9. Add channels and define per-channel fixed call presets. See [Adding a fixed call sequence to one or more channels](#).
10. Either:
  - a. Create a template and copy across information to other radios in the fleet. You will need to change settings such as the radio's RX Decode (step 3) and possibly change any fixed or free format preset calls. See [Creating templates](#) for more information.
  - b. Enter settings manually for other radios in the fleet. Repeat steps 1 to 9.
  - c. Set up some advanced settings for the radio, such as an auto acknowledge or ANI. See [Setting up advanced Selcall](#).

## Defining the transmit and receive formats

The transmit format ([Tx Format](#) - Selcall Identity form) is the format that all outgoing fixed calls must conform to. The receive format ([Rx Format](#) - Selcall Identity form) should be the same as the transmit format, and is how all incoming calls are decoded. The transmit and receive formats must be the same for all radios in a fleet.

### Example (Tx Format)

BBBBB--RRRRR--CCC--SS

### Notes

- None of the burst types can be defined twice in the transmit sequence format, except for the gaps.

## Entering RX decode details

An RX decode is the identity for the radio in the fleet. The radio's Rx decode is the number that other radio's will call (the R-burst in preset calls).

### To enter Rx decode details

1. Enter a main identity for the radio in the [Rx Decode 1](#) field (Selcall > Selcall Identity form > Selcall Identity tab).

**Note:** This must match the length of the receive format's R-burst.

2. Enter a second identity (optional) in the [Rx Decode 2](#) field.

Part	Description
B	Repeater Identity (used for the TX Format only and optional). Used to access the repeater. Must come first. Length is 1 to 12.
R	Receiver Identity (required). The unique identity of the radio. Length is 1 to 12.
C	Caller Identity (optional). Can appear before or after the R-burst. Length is 1 to 12.
S	Status (optional). Used to send status messages or to send control commands. Must come last. Length is 1 to 2.
-	Gap (recommended). Used as a pause between gap bursts. Cannot start or end with a gap. Length is 1 to 8.

3. Select the following check boxes in the Channel Setup > Channels form > Signalling Preset tab:
  - [Rx Decode 1 Enabled](#)
  - [Rx Decode 2 Enabled](#) (if you have entered an identity in Rx Decode 2)
  - [Group Call Decode](#) (if the radio will receive group calls).

## Defining fixed call sequences per-channel

The fixed call sequence is a Selcall sequence that must conform to the Tx Format, and is transmitted by the press of a designated function key. Fixed Call presets are per-channel, meaning for the TM8100 you can have up to 20 different fixed preset calls per radio.

Setting fixed call sequences is a two step process:

1. [Define a set of bursts for a Selcall system](#) (Selcall > Fixed Format Bursts form).
2. [Add a fixed call sequence to one or more channels](#) (Channel Setup > Channels form > Signalling Preset tab).

### Related Topics

[Setting up a basic Selcall system on one or more radios](#)

## Defining a set of bursts for a Selcall system

### To define a set of bursts

1. Navigate to the Selcall > Fixed Format Bursts form.
2. Select the Selcall system ID that you want to define bursts for using the < and > buttons in the navigator at the bottom of the form.
3. Enter up to ten radio identities in boxes under [Tx Call Bursts](#) (Fixed Format Bursts form). See [Selcall system examples](#) for typical entries in these boxes. Enter G or the equivalent [Group Tone](#) (typically A) as a wild card tone to call a group of radios.
4. Enter up to five repeater identities (optional) in boxes under [Repeater Bursts](#) (Fixed Format Bursts form).
5. Enter up to two Caller ID bursts (optional) in boxes under [Caller ID Bursts](#) (Fixed Format Bursts form).

6. Enter up to 24 status bursts (optional) in boxes under [Status Bursts](#) (Fixed Format Bursts form).

You can now continue to define the Selcall system (see [Setting up a basic Selcall system on one or more radios](#)) or add a fixed call sequence to one or more channels (see [Adding a fixed call sequence to one or more channels](#)).

### ***Adding a fixed call sequence to one or more channels***

Before you can add a fixed call sequence to one or more channels:

- A Selcall system must have been added.
- The Selcall system must have a set of fixed bursts defined (see [Defining a set of bursts for a Selcall system](#)).
- The Selcall system must have been added to a network.

#### **To add a fixed call sequence to one or more channels**

1. Add channels in the Channel Setup > Channels form > Summary tab.
2. Select a Network ID using the [Network](#) field for each channel in the grid. That network must contain the Selcall system ([Signalling ID](#)) that has the set of bursts that will make up the fixed call sequence.
3. Navigate to the Channel Setup > Channels form > Signalling Preset tab.
4. Select a channel ID using the < and > buttons in the navigator at the bottom of the form.
5. Select a TX Call Sequence from the [Channel TX Call Burst](#) box (Channels form > Signalling Preset tab). If None appears, then no entries have been defined for the Selective System and Network assigned to that Channel.
6. Select entries for [Channel Repeater Burst](#), [Channel Status Burst](#) and [Channel Caller ID Burst](#) if necessary.
7. Repeat steps 3 to 6 for as many fixed call sequences (different or same) as needed.

**Tip:** You can use channels to set up an address book (a list of calls with different receiver (R) bursts) or a status list (calls to a group of radios indicating different statuses). To do this, all settings between channels will be the same, except the specific field which is the point of difference (TX Call Burst Index or Status Burst Index for example).

8. Set how the fixed call will be made.
  - To call the current channel's fixed call sequence each time the PTT is pressed, select the [PTT Press Call Setup](#) check box (PTT Form). To force the radio user to release then press the PTT again to talk, set the [De-key After PTT Call Setup](#) field to Always.
  - To call the current channel's fixed call sequence each time a function key is pressed, add the [Channel Preset Call](#) option to a function key in the Key Settings form.

### **Defining up to 4 free-form preset calls per-system**

If you are using only one Selcall system, free-format calls will be global and can be used to call a single number on any channel, for example, a dispatcher. Before you start defining free-format calls, make sure you have added a Selcall system. See [Setting up a basic Selcall system on one or more radios](#) for more information.

### To define up to 4 free-format preset calls

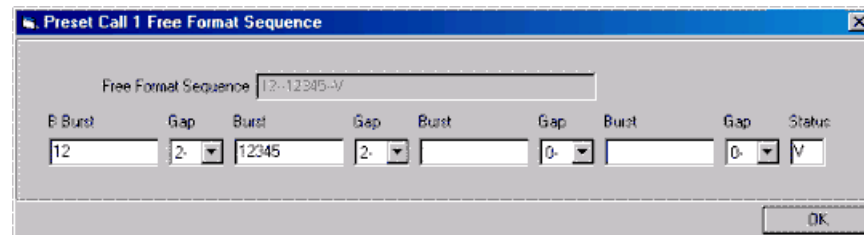
1. Select the system you want to add the preset calls to in the Selcall Identity form.
2. Navigate to the Selcall > Free Format Bursts form.
3. Click the Details button next to one of [Preset Call 1 to Preset Call 4](#).
4. Define the sequence. This must conform to the fleet's Rx Format to be decoded correctly by other radios. See [Defining free-format sequences](#).
5. Repeat steps 3 and 4 to add more than one preset call.
6. Add the [Network Preset Calls](#) option to one or more function keys in the Key Settings form, and select Freeform Preset 1 to 4 in the Setting 1 field.

### Defining free-format sequences

A free-format sequence is a Selcall sequence that does not have to conform to the Selcall system's transmit (Tx) format. However, to decode correctly the format should match how it is intended to be received. For example, if it is a preset call or auto acknowledge to another radio in the fleet, then it must match that's radio's Rx Format.

Define [Preset Call 1 to Preset Call 4](#), an [A.N.I. Sequence](#), an [Auto Acknowledge](#) sequence and an [Emergency Sequence](#) in the Free Format Bursts form.

### Example



12--12345--VV

**Note:** The total number of gaps and tones in the sequence must be equal to or less than 60.

#### Parts of the sequence

[Repeater \(B\) burst](#)

[Receiver \(R\) burst or Caller ID \(C\) burst](#)

[Status](#)

[Gap](#)

#### *Repeater (B) burst*

Used to access the repeater (optional). Always appears first. Length is 1 to 12. Allowable characters are 0 to 9, A to D and F. Enter G for the group tone, which is a wildcard to mean any tone.

[Defining free-format sequences](#)

### *Receiver (R) burst or Caller ID (C) burst*

Up to three bursts defined in the middle of the sequence (at least 1 required). Depending on the RX Format of the radio that receives the call, this may be the receiver identity (R-burst) and/or caller identity (C Burst). Typically a maximum of two bursts would be used. Length is 1 to 12. Allowable characters are 0 to 9, A to D and F. Enter G for the group tone, which is a wildcard to mean any tone.

[Defining free-format sequences](#)

### *Status*

Used to send status messages or to send control commands (optional). Always appears last. Length is 1 to 2. Allowable characters are 0 to 99, or V. If V is entered, then the current system status is transmitted (useful for an auto acknowledge).

[Defining free-format sequences](#)

### *Gap*

Used as a pause between gap bursts (recommended). Select from no gaps (0-) to eight gaps (8-) between each burst.

[Defining free-format sequences](#)

### *Free Format Sequence*

Displays the sequence that will be sent when requested. This read only field is the result of entering bursts into the various boxes under the free format sequence.

[Defining free-format sequences](#)

## **Setting Selcall muting conditions**

If you want to keep calls private to the intended recipient, select the [Selective Call Mute](#) check box (Networks > Basic Settings form > Basic Network Settings tab) for all radios in the fleet. If this check box is selected, you will also need to enable monitor and transmit inhibit settings. See [Using monitor with a closed selective system](#) for more information. If this checkbox is not selected, the Selcall system will be open – all members of the fleet will hear all traffic.

## **Setting up advanced Selcall**

Before setting up advanced features, make sure you have added a Selcall system, defined the Rx and Tx formats, added Rx decode sequences, and set up fixed and free format preset calls. See [Setting up a basic Selcall system on one or more radios](#) for more information.

**Note:** The settings below should be copied across to all radios in the fleet.

- Set whether selcall tones can be heard and redefine the default incoming call alerts. See [Defining Selcall audible tones and alerts](#).
- Set up an auto acknowledge for the fleet. See [About auto acknowledgements](#) and [Setting an auto acknowledge](#)
- Enable Selcall to be used with a repeater. See [Using a repeater with Selcall](#)
- Set a log of user's activity, or enable an identity to be sent whenever the PTT is pressed or released. See [Setting up Selcall A.N.I.](#) and [Entering a caller ID](#).

- Send a call that is decoded as a priority. See [Sending and decoding a priority call](#).
- Set a call to be sent with a status or control status attached. See [About status calls](#).
- Set up Selcall emergency. See [About emergency operation](#).

## Defining Selcall audible tones and alerts

### To set incoming call alerts

1. Set the [Alert Type](#) to Ring or Beep (Networks > Alerts form > General tab), for the following calls:
  - Sequence 1: a sequence received that matches the Rx Format, and the R-burst matches the [Rx Decode 1](#) sequence.
  - Sequence 2: a sequence received that matches the Rx Format, and the R-burst matches the [Rx Decode 2](#) sequence.
  - Group Call: a sequence received that matches the Rx Format, and the R-burst matches one of Rx Decode 1 or Rx Decode 2 and contains a [Group Tone](#).
  - Priority Call: a sequence received that matches the Rx Format, the R-burst matches one of Rx Decode 1 or Rx Decode 2, and has a [Priority Call](#) control status appended.
2. If the alert type is ring, define a unique pattern in the [Alert/Ring Pattern](#) field. For example:
  - 11110000 would sound as one long ring followed by a pause of equal length.
  - 11001100 would sound as a short ring followed by a pause, then another short ring and another pause.
3. If the alert type is ring, set how long the alert will sound using the [Internal Alert Duration](#) field.
4. Set an external alert if necessary (optional). See [Setting an external alert](#).

### To hear sidetones as they are being sent

Select the [Audible Side Tones](#) check box (Networks > Basic Settings form > Basic Network Settings tab).

### To blank out tones as they are being received

1. Select the [Enabled](#) check box (Networks > Features form).
2. Enter a number of [Tones To Receive Before Starting](#).
3. If any received selcall sequences will have gaps, enter a [Deactivation Timer](#).

## About auto acknowledgements

An auto acknowledgment is a sequence received within a programmed time after sending a call, that matches the radio's Rx Format. It is important to distinguish between the radio requesting an auto acknowledgment (Radio B below) and the radio receiving the auto acknowledgment (Radio A below).

### Example

1. Radio A presses a function key and sends a preset Selcall sequence to Radio B.

2. Radio B does not receive the call as the radio is turned off.
3. Radio A does not receive a selcall sequence within 6 seconds so sends a call to Radio B again.

Radio A Programming information: [Receive Acknowledgements](#) check box selected (Networks > Features form), [Wait For Acknowledge](#) set to 6 seconds, and [Number of 'No Acknowledge' Retries](#) 1.

4. Radio B is now switched on and receives the call from Radio A. Radio B sends an auto acknowledge sequence.

Programming information: [Auto Acknowledge Type](#) set to Sequence (Networks > Features form), an [Auto Acknowledge](#) sequence is defined (Selcall > Free Format Bursts form), RX Decode 1 [Auto Acknowledge](#) check box selected (Networks > Alerts form > General tab).

5. Radio A receives a sequence within 6 seconds, and so registers it as an auto acknowledge. The Call Received LED lights and two short tones sound.

Programming information: [Alert When Received](#) check box selected (Networks > Features form).

### ***Setting an auto acknowledge***

The settings below assume you have set up a Selcall system, and must be repeated for all radios in the fleet. See [Setting up a basic Selcall system on one or more radios](#) for more information.

#### **To transmit an auto acknowledge**

1. Set the [Auto Acknowledge Type](#) (Networks > Features form) to Sequence or Beep.

For Sequence, define an [Auto Acknowledge](#) sequence (Selcall > Free Format Bursts form). See [Defining free-format sequences](#).

**Note:** The receiver (R) burst for the sequence must match the number of 'R's in the fleet's RX Format. It is recommended that the sequence is not the actual ID of a radio in the fleet. It can be useful to enter a preset status, or a single V to send the current radio's status (such as emergency or stunned).

2. Select the [Auto Acknowledge](#) check box for Rx Decode 1 and/or 2 (Networks > Alerts > General tab).

#### **To receive an auto acknowledge**

1. Select the [Receive Acknowledgements](#) check box (Networks > Features form).
2. Set a time to wait before either the call is resent or the call is indicated as unsuccessful using the [Wait For Acknowledge](#) field.
3. Select the [Indicate Acknowledgement Received](#) check box to indicate when an auto acknowledgement is received.
4. Enter how many times to resend the Selcall call if no acknowledgement is received in the Wait For Acknowledge time, using the [Number of 'No Acknowledge' Retries](#) field.

### **Using a repeater with Selcall**

When Selcall is used with repeater equipment, the radio can optionally transmit a repeater identity (B Burst) to access a channel at the repeater site. This is always transmitted first in a transmitted Selcall sequence.

### To set repeater options for Selcall

1. Add a B Burst to the start of the [Tx Format](#) (Selcall > Selcall Identity form > Selcall Identity tab) for the fleet.
2. Enter the repeater identity (B Burst) for all preset calls.
  - For fixed format calls, enter 1 or more repeater identities in the [Repeater Bursts](#) grid (Selcall > Fixed Format Bursts form), and select an identity for each channel preset call in the [Channel Repeater Burst](#) field (Channel Setup > Channel form > Signalling Preset tab).
  - For free-format calls, enter a repeater identity into the first box in the Details window (Selcall > Free Format Bursts form > [Preset Call 1 to Preset Call 4](#) field > Details button).
3. If there is no need to access a channel on the repeater if already in use, select the [Suppress Repeater Burst When Busy](#) check box (Selcall > Selcall Identity form > Options tab).
4. Add a repeater access tone to one or more channels and send it on a function key press.
  - a. Enter one or more repeater access tones in the [Repeater Access Tones](#) grid (Selcall > Fixed Format Bursts form).
  - b. Select a repeater access tone per-channel, using the [Channel Repeater Access Tone](#) field (Channel Setup > Channel form > Signalling Preset tab).
  - c. Enter a duration for the repeater access tone in the [Repeater Access Tone Duration](#) field (Selcall > Tone Settings form).
  - d. Add the [Repeater Access Tone Tx](#) option to a function key in the Key Settings form.

**Note:** Alternatively, you can set the repeater access tone to be sent each time the PTT is pressed, so the radio automatically keys up the repeater before transmission. Set [Leading A.N.I.](#) to Suppress on Busy (Networks > Features form), and enter “Repeater Access Tone” as the [A.N.I. Sequence](#) (Selcall > Free Format Bursts form) (\*\*TBD).

5. To give the radio user the option of bypassing the repeater, add the [Repeater Talkaround](#) option to a function key in the Key Settings form.

### Entering a caller ID

A caller ID (C) burst enables the radio to be identified within a fleet. It is used:

- with A.N.I.
- when other radio models or computer equipment has automatic caller identification.
- when sending status calls so the radio sending the status can be identified.

The Caller ID is typically the radio’s own identity (Rx Decode sequence 1 or 2), with or without the initial fleet identifier.

### To enter a caller ID

1. Enter a C burst to the Tx and Rx formats. See [Defining the transmit and receive formats](#).
2. Add the radio’s identity to all fixed and/or free-form preset calls. See [Defining fixed call sequences per-channel](#) and [Defining up to 4 free-form preset calls per-system](#).



## Setting up Selcall A.N.I.

A.N.I. stands for "automatic number identification". A Selcall or DTMF system can be set so that each radio automatically transmits its identity at regular intervals throughout the duration of a call. Each radio's identity is transmitted on each exchange of transmissions (each press of the PTT) only if the A.N.I. suppression time has not expired. A.N.I. makes it possible to set up a log of a radio's channel activity, or to display the current radio's identity on another radio that can decode A.N.I.

### To set Selcall A.N.I.

1. Enter a Caller ID (C-Burst) to the middle of the Tx and Rx formats. See [Defining the transmit and receive formats](#) and [Entering a caller ID](#) for more information.
2. Enter an [A.N.I. Sequence](#) (Selcall > Free Format Bursts form).
  - The R-Burst must match the receiver identity of the radio that will decode the A.N.I.
  - The C-Burst must contain the identity (Caller ID) of the radio sending the A.N.I.
3. Set which PTT the A.N.I. will be sent on. Select one or more of:
  - [Include A.N.I. With PTT](#)
  - [Include A.N.I. With EPTT1](#)
  - [Include A.N.I. With EPTT2](#).
4. Set the type of A.N.I.
  - To send A.N.I. when the PTT is pressed, select Enabled or Suppress On Busy in the [Leading A.N.I.](#) field (Networks > Features form). Suppress On Busy will only send the A.N.I. sequence only if the channel is free.
  - To send the A.N.I. when the PTT is released, select the [Trailing A.N.I.](#) check box.
  - As an alternative to trailing A.N.I., select the [Send Beep On PTT Release](#) check box. This will send an over-the-air beep whenever the PTT is released.
5. Enable the suppression timer by entering a time in the [A.N.I. Suppression Time](#) field.

**Note:** A.N.I. can also be sent when in emergency mode, so the recipient of the emergency call can identify the unit in trouble. Select the [Emergency A.N.I.](#) check box (Networks > Emergency form > Cycling tab). See [Setting up emergency operation](#) and [Setting emergency cycling and radio behaviour](#) for more information.

## About status calls

There are 3 types of status calls:

- **Status labels:** a number that is sent, which is associated with another meaning (for example, it can help identify the radio user's current activity).
- **System status:** the radio's current system state, for example, stunned or in emergency mode. The system status is sent by sending a V, or can be returned as the result of a quiet interrogation.

- **Control status:** a status that has an action assigned. For example, you can send a priority call (see [Sending and decoding a priority call](#)), stun or revive other radios (see [Setting a radio to stun and revive another radio](#)), or quietly interrogate another radio's current system status (see [Setting a radio to interrogate another radio](#)).

### ***Setting up status calls***

#### **To set status calls for all radios in the fleet**

1. Set a Caller ID for the fleet. See [Entering a caller ID](#).
2. Enter a Status (S-Burst) to the end of the Tx and Rx formats. See [Defining the transmit and receive formats](#).

**Note:** Enter 'S' for sixteen different status numbers (0 to 15). Enter 'SS' for 99 status numbers (0 to 99).

3. Set a control status list in the Selcall > Control Status form.
4. Add a status burst to all outgoing Selcall calls. Enter a number (0 to 15 or 0 to 99), V for the current system status, or a [Control Status Value](#).
  - For fixed format preset calls, enter a status in the [Status Bursts](#) grid (Selcall > Fixed Format Bursts form), and select a status for each channel preset call in the [Channel Status Burst](#) field (Channel Setup > Channel form > Signalling Preset tab).
  - For free format bursts, enter a status into the last box in the Details window (Selcall > Free Format Bursts form).

### ***Sending and decoding a priority call***

A priority call is a Selcall sequence that has a priority control status appended. When receiving a priority call, the radio alerts the user that a priority call has been received and clears down any call in progress that is not a priority call.

#### **To send an decode priority calls**

For all radios in the fleet:

1. Enter a status (S) burst to the Tx and Rx formats (see [Defining the transmit and receive formats](#)).
2. Navigate to the Selcall > Control Status form.
3. Click the Add button.
4. Select a [Control Status Value](#).
5. Select [Priority Call](#) in the [Control Status Value](#) field.
6. Select Yes for [Rx Processing](#) and [Tx Processing](#).
7. Add the control status value (step 3) to all calls that will be designated priority.
8. Set an [Alert Type](#), [Alert/Ring Pattern](#) and [Internal Alert Duration](#) (Networks > Alerts > General tab) for calls that are decoded as priority calls.
9. To send an auto acknowledge sequence after receiving a priority call, select the [Auto Acknowledge](#) check box. See [Setting an auto acknowledge](#) for more information.

## **Setting up Selcall for a despatcher radio**

### **Topics**

[Setting a radio to stun and revive another radio](#)

[Setting a radio to interrogate another radio](#)

[Entering a remote monitor reset call](#)

[Setting a Selcall emergency sequence alert](#)

## Setting a radio to stun and revive another radio

When a radio is stunned, the radio becomes inoperable. There are two levels of stun for TM8100 radios, full stun (the radio cannot be used at all), or Tx stun (the radio cannot transmit, but can still receive). To return the radio to a useable state, a control status set to Revive must be received.

**Note:** All radios in the fleet must have the same control status values and types defined below, and [Rx Processing](#) for each set to Yes.

### To set a radio to stun and revive another radio

1. Enter a status (S) burst to the Tx and Rx formats (see [Defining the transmit and receive formats](#)).
2. Navigate to the Selcall > Control Status form.
3. Click the Add button.
4. Select a [Control Status Value](#).
5. Select [Full Stun](#) or [Tx Stun](#) in the [Control Status Type](#) field.
6. Select Yes for [Tx Processing](#).
7. Add the control status value (step 3) to the status burst of a free format call. See [Defining up to 4 free-form preset calls per-system](#).
8. Repeat steps 2 to 6 to add a [Revive](#) Control Status Type. This is important so a stunned radio can be reactivated.

## Setting a radio to interrogate another radio

Interrogating a radio will return that radio's current system state, for example, stunned, or in emergency mode.

**Note:** All radios in the fleet must have the same control status values and types defined below, and [Rx Processing](#) for each set to Yes.

### To set a radio to interrogate another radio

1. Enter a status (S) burst to the Tx and Rx formats (see [Defining the transmit and receive formats](#)).
2. Navigate to the Selcall > Control Status form.
3. Click the Add button.
4. Select a [Control Status Value](#).
5. Select [Quiet Interrogation](#) in the [Control Status Type](#) field.
6. Select Yes for [Tx Processing](#).
7. Add the control status value (step 3) to the status burst of a free format call. See [Defining up to 4 free-form preset calls per-system](#).

## Entering a remote monitor reset call

You can set monitor to be close any radio or group of radios. Sending a [monitor-reset call](#) will also reset emergency mode. See:

- [Defining an appended C tone monitor reset for a fleet.](#)

- [Defining an RMR sequence for a fleet.](#)

## Setting a Selcall emergency sequence alert

### To set an emergency sequence alert

1. Define a unique pattern in the [Alert/Ring Pattern](#) field (Networks > Alerts form > Emergency tab).
2. Set the [Alert Type](#) to Ring (recommended).
3. Set the [Internal Alert Duration](#) to a large number (for example, 60 seconds).
4. Set an external alert if necessary. See [Setting an external alert](#).

### Related Topics

[Defining Selcall audible tones and alerts](#)

## Tone sets

It is important that tone settings are set same for all radio's in the fleet.

### Topics

[Making sure Selcall sequences are decoded](#)

[Advanced tone settings](#)

[Selecting a standard tone set](#)

[Re-ordering an existing tone set](#)

[Creating your own tone set](#)

## Making sure Selcall sequences are decoded

### To make sure Selcall sequences are decoded

1. If the radio is operating in marginal conditions, select the [Rx Call Sub-Sequence Decoding](#) check box (Selcall > Selcall Identity form > Options tab). This will ensure calls are decoded even if the C, B or S-Bursts are missing or corrupted.
2. Set a lead-out delay, using the [Lead Out Delay](#) field. This will ensure the end of the sequence is received and decoded.
3. Set an extended lead-in. This is useful when the receiving radio is scanning, or when the radios are operating in marginal signal-strength conditions. For an extended lead-in, select either a lead-in tone, or set the first tone in a sequence to be extended.

### To set a lead in tone

**Note:** There will be a two-gap pause after the lead-in tone is sent.

1. Enter 1 or more lead-in tones in the [Lead In Tones](#) grid (Selcall > Fixed Format Bursts form).
2. Select a lead-in tone for each channel in the [Channel Lead In Tone](#) field (Channel Setup > Channel form > Signalling Preset tab).
3. Set a [Lead In Delay](#) (Selcall > Tone Settings form) which will determine how long the tone is transmitted.

### To set the first tone to be extended

Select a number of times to multiply the length of the first tone, using the [First Tone Period Multiplier](#) field (Selcall > Tone Settings form).

## Advanced tone settings

The following advanced settings are available:

- Set the length of each tone in a sequence using the [Tone Period](#) field (Selcall > Tone Settings form).
- Set the length of each gap using the [Gap Period](#) field.
- Enter a [Group Format](#) as Sigtec or International.
- Set the group tone or repeat tone to something other than the default if needed.
  - a. Select the [Tone Set](#) as Custom.
  - b. Select a tone for [Group Tone](#).
  - c. Select a tone for the [Repeat Tone](#).

**Note:** Any existing preset call sequences with the repeat or group tone may be changed to reflect the new settings. Review all preset call sequences before programming the radio.

## Selecting a standard tone set

### To select a standard tone set

1. Navigate to the Selcall > Tone Settings form.
2. Select a tone set in using the [Tone Set](#) field. The options are:
  - [CCIR](#)
  - [EIA](#)
  - [EEA](#)
  - [ZVEI-I](#)
  - [ZVEI-II](#)
  - [ZVEI-III](#)
  - [PZVEI](#)
  - [NATEL](#)
  - [DZVEI](#)
  - Custom. See [Re-ordering an existing tone set](#) or [Creating your own tone set](#).

## Re-ordering an existing tone set

### To re-order an existing tone set

1. Select Custom in the [Tone Set](#) field (Selcall > Tone Settings form).
2. Select an existing tone set in the [Based On](#) field.
3. Select values as required next to the tones 0 to 9 and A to F.

## Creating your own tone set

### To create your own tone set

1. Select Custom in the [Tone Set](#) field (Selcall > Tone Settings form).
2. Select All Frequencies in the [Based On](#) field.
3. Select a frequency as needed for each tone.

**Note:** Tone frequencies that are too close may not be decoded properly. If a frequency selected is within the tolerance range of another tone, then a message will display when leaving the form. For more information, see [Custom Selcall tone frequencies and tolerances](#).

# Subaudible signalling

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## Topics

[About CTCSS and DCS](#)

[Enabling the filter](#)

[Configuring the end of a CTCSS transmission](#)

[Setting the polarity of DCS](#)

[Configuring the end of a DCS transmission](#)

[Subaudible signalling with scanning](#)

[Using Subaudible Signalling with a selective system](#)

## About CTCSS and DCS

CTCSS and DCS use subaudible signalling to segregate groups of users by transmitting additional information with normal speech. For CTCSS the additional information is transmitted in the form of subaudible tones in the frequency band 67 to 254.1 Hz. For DCS the additional information is transmitted as digital data using frequencies between 10 and 134 Hz.

Subaudible signalling is assigned on a per channel basis, and each channel can have different receive and transmit signalling.

See [CTCSS tones and DCS codes](#) for the CTCSS frequencies and DCS codes TM8100 radios support.

See also [Defining subaudible signalling on a channel](#).

## Enabling the filter

The CTCSS/DCS filter removes any CTCSS or DCS tones that may be present on the received audio. The filter limits the range of frequencies the radio passes from the incoming signal to the speaker and so in some situations affects signal quality. Filtering can be automatically switched off for channels that do not have CTCSS or DCS.

The CTCSS/DCS filter is set using the [Rx CTCSS/DCS Filter Enabled for](#) field (Networks > Basic Network Settings > Subaudible Signalling tab).

## Configuring the end of a CTCSS transmission

You can set either a reverse tone burst, or a lead out delay to stop the [squelch tail](#) heard at the end of a received CTCSS transmission.

### Setting a reverse tone burst

1. Enter a time in the [Reverse Tone Burst Duration](#) field (Networks form > Basic Network Settings form > Subaudible Signalling tab). 130 ms is recommended.
2. Enter a phase shift in the [Reverse Tone Burst Phase Shift](#) field. A 180 degree shift is recommended.

### Setting a lead-out delay

Enter a time in the [Lead Out Delay \(CTCSS\)](#) field (Networks form > Basic Network Settings form > Subaudible Signalling tab). 100 ms is recommended.

### Related Topics

## Setting the polarity of DCS

DCS signals are susceptible to polarity inversion at various points in the signal path from originator to recipient. On some systems, consistent inversions can be compensated for by forcing the radio to decode the inverse of every codeword.

### To change the polarity of DCS (for all radio's using a system)

1. Set the [Tx Polarity](#) field to Inverted (Networks > Basic Network Settings form > Subaudible Signalling form).
2. Set the [Rx Polarity](#) field to Inverted.

## Configuring the end of a DCS transmission

A stop tone is always sent at the end of a DCS transmission. Set the duration of the stop tone using the [Stop Tone Duration](#) field (Networks > Basic Network Settings form > Subaudible Signalling form).

A shorter duration (150 ms) will reduce the pause and any sound associated with a DCS stop tone, but may risk the stop tone not being received and [squelch tail](#) heard instead.

Set a delay at the end of a DCS transmission using the [Lead Out Delay \(DCS\)](#) field.

## Subaudible signalling with scanning

If you are using subaudible signalling on a member channel, select the [Validate DCS/CTCSS](#) check box (Channel Setup > Scan Groups form > Scan tab). If this check box is not selected, a channel may be captured that has invalid signalling, and will be held even though the radio's mute is closed.

Similarly, if any priority channels include subaudible signalling, select the [Validate DCS/CTCSS On Priority Channels](#) check box (Channel Setup > Scan Groups form > Priority Scan tab).

Set a long time for the [Busy Priority Sample Timer](#). This is so priority channels that are not captured due to invalid subaudible signalling are sampled less often.

## Using Subaudible Signalling with a selective system

TM8100 radios support concurrent Selcall and CTCSS/DCS encode and decode.

### To set up subaudible signalling with a selective system

1. Add a selective system. See [Setting up a basic Selcall system on one or more radios](#).

**Note:** Monitor and muting conditions will need to be set correctly for transmissions to be decoded properly. See [Using monitor with a closed selective system](#) for more information.

2. Add subaudible signalling to a channel. See [Defining subaudible signalling on a channel](#). The channel with subaudible signalling must contain the network that the selective system has been added to (step 1).
3. Select the [Validate When Selective Call Received](#) check box (Networks > Basic Settings form > Subaudible Signalling tab).



4. Select the [Generate When Selective Call Transmitted](#) check box.

**Note:** If using a closed selective system, set the [Monitor Overrides](#) and [Hookswitch Monitor Overrides](#) fields (Networks > Basic Settings form > Basic Network Settings tab) to All Mutes. See [Using monitor with subaudible signalling](#) for more information.



# Form reference

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This section covers specific information related to the various forms and fields available in the programming application.

## Forms

- [Specifications form](#)
- [Receiver Monitoring form](#)
- [Data form](#)
- [Selcall - Selcall Identity form](#)
- [Selcall - Fixed Format Bursts form](#)
- [Selcall - Free Format Bursts form](#)
- [Selcall - Tone Settings form](#)
- [Selcall - Control Status form](#)
- [Networks - Basic Settings form](#)
- [Networks - Features form](#)
- [Networks - Emergency form](#)
- [Networks - Alerts form](#)
- [Channel Setup - Channels form](#)
- [Channel Setup - Scan Groups form](#)
- [Key Settings form](#)
- [UI Preferences form](#)
- [Start-up form](#)
- [PTT form](#)
- [Programmable I/O form](#)

## Specifications form

### Fields

- [Radio Model](#)
- [Band](#)
- [Serial Number](#)

#### Radio Model

The Radio Model field displays the type of radio. This is a read-only field, and is set using the radio model toolbar. Currently there is only one radio model, the TM8100.

## Band

Sets the frequency band in which the radio operates, as indicated by the sixth and seventh characters in the product code.

**TMAB1-H600**

The range indicated in parentheses is the range of frequencies (in MHz) the radio is capable of transmitting and receiving on. This impacts on the [Rx Frequency](#) and [Tx Frequency](#) fields in the Channels form.

## Serial Number

Displays the radio's serial number, which is automatically read from the radio's memory. It is used for identification only. The radio serial number has no effect on the normal operation of the radio.

# Receiver Monitoring form

## Fields

[Monitor State at Power Up](#)

[Monitor Reset On Channel Change](#)

## Monitor State at Power Up

Determines whether any valid mutes for the current channel (subaudible signalling or selective call mute) are open (monitor is active) or closed (monitor is inactive) when the radio is turned on. Set what mutes monitor will open using the [Monitor Overrides](#) and [Hookswitch Monitor Overrides](#) fields (Networks > Basic Settings form > Receiver Monitoring tab).

[About monitor](#)

[Setting how monitor is opened](#)

## Monitor Reset On Channel Change

Determines what happens when monitor is open, and the radio user changes to a channel that is on a different [Network](#). If the Monitor Reset on Channel Change check box is selected, then monitor will close. If cleared, then monitor will remain open when changing to another network.

## Data form

### Topics

[Software Flow Control group box](#)

[Hardware Flow Control Lines group box](#)

[CCDI Options group box](#)

[Data group box](#)

[SDM Options group box](#)

[Data Flow group box](#)

### ***Software Flow Control group box***

#### **Fields**

[XON Character](#)

[XOFF Character](#)

#### XON Character

Defines the character that lets the computer equipment know when to begin sending data. XON/XOFF is a means of controlling the flow of data, and is also referred to as software handshaking. Enter a hexadecimal number between 0 and FF.

#### XOFF Character

Defines the character that lets the computer equipment know when to stop sending data. XON/XOFF is a means of controlling the flow of data, and is also referred to as software handshaking. Enter a hexadecimal number between 0 and FF.

### ***Hardware Flow Control Lines group box***

#### **Fields**

[CTS](#)

[RTS](#)

#### CTS

Sets the output line (Clear to Send) for hardware flow control (handshaking). Selecting a line will automatically assign values to that pin in the Programmable I/O form.

#### RTS

Sets the input line (Request to Send) for hardware flow control (handshaking). Selecting a line will automatically assign values to that pin in the Programmable I/O form.

### ***CCDI Options group box***

#### **Fields**

[Data Transmission Enabled](#)

[CCDI Uart Port](#)

#### Data Transmission Enabled

Enables data operation via the computer controlled data interface ([CCDI](#)).

## CCDI Uart Port

Specifies the UART (Universal Asynchronous Receiver Transmitter) port to be used for CCDI transmission. Select Mic, Aux or Internal Connector.

- Mic: data will flow via the front panel serial interface (microphone connector).
- Aux: data will flow via the auxiliary serial interface (rear auxiliary connector).
- Internal Connector: data will flow via the options serial interface (internal options connector).

### ***Data group box***

#### **Fields**

[Lead In Delay](#)

[Lead Out Delay](#)

[Ignore DCS/CTCSS](#)

## Lead In Delay

Sets the delay after the transmitter has keyed up, before any message block is sent. This applies to all CCDI transmissions where the radio is not already keyed up in the transmit state. Enter a time from 0 to 1200 ms in steps of 5 ms.

## Lead Out Delay

Sets a period for the radio to continue transmitting after the message block has been sent. This applies to all CCDI transmissions, and is also known as the transmit tail time. Enter a time from 0 to 1200 ms in steps of 5 ms.

## Ignore DCS/CTCSS

Determines whether the radio requires valid subaudible signalling before processing a data transmission.

- If the check box is selected: all incoming data transmissions are processed regardless of subaudible signalling.
- If the check box is cleared: the radio only processes incoming data transmissions for which the subaudible signalling is valid.

### ***SDM Options group box***

#### **Fields**

[SDM Enabled](#)

[SDM Auto Acknowledge](#)

[SDM Auto Acknowledge Delay](#)

[SDM Wait For Acknowledgement](#)

[Unit Data Identity](#)

### SDM Enabled

Sets whether the radio can receive or send short data messages over the air, while connected to computer equipment.

### SDM Auto Acknowledge

Sets whether the radio sends an auto acknowledge when it receives a short data message (SDM). Only available if the [SDM Enabled](#) check box is selected.

### SDM Auto Acknowledge Delay

Sets the delay between receiving a short data message (SDM) and sending an auto acknowledge. Enter a value from 100 to 12,000 ms in steps of 100 ms. Only available if the [SDM Enabled](#) and [SDM Auto Acknowledge](#) check boxes are selected.

### SDM Wait For Acknowledgement

Sets how long the radio waits before indicating that the short data message transmission has failed if no acknowledgement is received. Enter a value from 1 to 20 seconds in steps of 1 second.

### Unit Data Identity

Sets the radio's identity for operation in CCDI mode. Enter an identity of 8 characters from A to Z, 0 to 9 or the wildcard character \*

## **Data Flow group box**

### **Fields**

[Powerup State](#)

[Baud Rate](#)

[Flow Control](#)

### Powerup State

Determines the data state the radio will start up in. Select C-Mode (command mode), T-Mode (transparent mode), or THSD (Tait high speed data).

### Baud Rate

Determines the data transfer rate between the radio and computer equipment. Select a baud rate for command mode, transparent mode and Tait high speed data.

## Flow Control

Sets whether there is no flow control, flow control via software (the XON and XOFF characters), or flow control via hardware (programmable I/O CTS and RTS lines). Set flow control for command mode, transparent mode and Tait high speed data.

# Selcall

## Forms

[Selcall Identity form](#)

[Fixed Format Bursts form](#)

[Free Format Bursts form](#)

[Tone Settings form](#)

## Selcall Identity form

### Tabs

[Selcall Identity tab](#)

[Options tab](#)

### *Selcall Identity tab*

#### Fields

[ID](#)

[Tx Format](#)

[Rx Format](#)

[Rx Decode 1](#)

[Rx Decode 2](#)

[RMR Sequence](#)

## ID

Sets the unique identity for the Selcall system. This field is read-only, and is selected in the [Signalling ID](#) (Networks > Basic Settings form) field to add the Selcall system to a network.

[About Selcall](#)

## Tx Format

Defines the format all outgoing Selcall sequences must follow in order to be correctly decoded by other radios using the same Selcall system (required). The transmit format should be the same for all radios using a particular Selcall system.

[Defining the transmit and receive formats](#)

[Setting up a basic Selcall system on one or more radios](#)

[About Selcall](#)



## Rx Format

Defines the format all incoming Selcall sequences must follow in order to be correctly decoded by the receiving radio (required). The transmit format should be the same for all radios using a particular Selcall system.

[Defining the transmit and receive formats](#)

[Setting up a basic Selcall system on one or more radios](#)

[About Selcall](#)

## Rx Decode 1

Sets the main identity for the radio on the Selcall system (required). The radio will respond to any call that has this sequence sent as a receiver identity (R-burst).

- The sequence must be the same length of the R-burst (receiver identity) in the Selcall system's receive format ([Rx Format](#) field).
- Define the sequence using characters 0 to 9, A to D, F and V.

**Note:** V acts as a wildcard tone and so is equivalent to all other tones.

[Entering RX decode details](#)

[Setting up a basic Selcall system on one or more radios](#)

[About Selcall](#)

## Rx Decode 2

Sets an optional, second identity for the radio on the Selcall system. The radio will respond to any call that has this sequence sent as a receiver identity (R-burst).

- The sequence must be the same length of the R-burst (receiver identity) in the Selcall system's receive format ([Rx Format](#) field).
- Define the sequence using characters 0 to 9, A to D, F and V.

**Note:** V acts as a wildcard tone and so is equivalent to all other tones.

If Rx Decode Sequence 2 is not required, set it to NONE.

[Entering RX decode details](#)

[Setting up a basic Selcall system on one or more radios](#)

[About Selcall](#)

## RMR Sequence

Sets the Selcall sequence that, when received, closes monitor and squelch.

- The sequence must be the same length as the R-burst (receiver identity) in the Selcall system's receive format ([Rx Format](#) field).
- Define the sequence using characters 0 to 9, A to D, F and V.

**Note:** V acts as a wildcard tone and so is equivalent to all other tones.

Normally the remote monitor reset sequence's R-burst should not match either of the Rx decode sequences.

[Defining an RMR sequence for a fleet](#)

[Closing monitor using Selcall](#)

### ***Options tab***

#### **Fields**

[Rx Call Sub-Sequence Decoding](#)

[Third Tone Monitor Reset](#)

[Appended C Tone Monitor Reset](#)

[Invalid Call Monitor Reset](#)

[Suppress Repeater Burst When Busy](#)

[Alert On Digital Line Control Status](#)

[Digital Line Control Status Delay](#)

## Rx Call Sub-Sequence Decoding

Sets whether the detection and validation of incoming Selcall sequences depends only on the receiver identity. If this check box is selected, and the caller identity and status are absent from the incoming sequence, the call is still detected as valid. This feature is useful in areas of marginal signal strength where some of the bursts may be missing or corrupted.

[Making sure Selcall sequences are decoded](#)

## Third Tone Monitor Reset

Sets whether monitor is closed when the first three or more tones of the receiver identity for an incoming Selcall sequence match the corresponding tones of one of the radio's Rx decode sequences (but is not a complete match). Any call in progress will be cleared down automatically (except emergency mode). The radio will not send an auto acknowledge or alert when receiving a third tone monitor reset.

[Closing monitor using Selcall](#)

## Appended C Tone Monitor Reset

Sets whether monitor is closed when an incoming Selcall sequence that contains the radio's identity has a C tone appended to the end of the Caller ID (C) or Receiver (B) burst. Emergency mode is also deactivated. [Acknowledge When Received](#), [Alert When Received](#), and [Call Clear](#) (Networks > Features form) apply to appended C tone calls as well as remote monitor reset calls.

[Defining an appended C tone monitor reset for a fleet](#)

[Closing monitor using Selcall](#)

## Invalid Call Monitor Reset

Sets whether monitor is closed when an [invalid call](#) is received. The call must match the Rx Format. If it doesn't then monitor will remain open.

[Closing monitor using Selcall](#)

## Suppress Repeater Burst When Busy

Sets whether the repeater burst (B burst) is sent if there is activity on the intended channel for transmission. If the check box is selected, the repeater burst will not be included in the transmission if the channel is busy.

[Using a repeater with Selcall](#)

## Alert On Digital Line Control Status

Sets whether an alert is generated when a Selcall call is received with a control status of type [Activate Digital Line 1 to 3](#) or [Deactivate Digital Line 1 to 3](#).

## Digital Line Control Status Delay

Sets the delay time between receiving a Selcall call with a control status of type [Activate Digital Line 1 to 3](#) or [Deactivate Digital Line 1 to 3](#), and changing the state of the output pin. Enter a time between 1 and 30 seconds in steps of 1 second, or enter 0 for no delay.

## Fixed Format Bursts form

### Fields

[Repeater Bursts](#)

[Caller ID Bursts](#)

[Status Bursts](#)

[Tx Call Bursts](#)

[Repeater Access Tones](#)

[Lead In Tones](#)

## Repeater Bursts

Sets the part of the sequence that the radio transmits to gain access to a repeater. Must be the same length as the B-burst in Tx Format. Use characters 0 to 9 and A to F.

Select one of these predefined bursts in the [Channel Repeater Burst](#) field (Channels form > Signalling Preset tab) to form part of a channel's preset fixed call sequence.

[Using a repeater with Selcall](#)

## Caller ID Bursts

Sets the part of the sequence that identifies the radio transmitting the sequence. Must be the same length as the C burst in Tx Format. Use characters 0 to 9, A to D and F.

Select one of these predefined bursts in the [Channel Caller ID Burst](#) field (Channels form > Signalling Preset tab) to form part of a channel's preset fixed call sequence.

[Entering a caller ID](#)

[Defining fixed call sequences per-channel](#)

## Status Bursts

Sets the part of the sequence that either:

- identifies the radio's current system status (enter V) \*\*\*TBD to be implemented
- sends a preset status (any status digit from 0 to 9 and A to F if there is one 'S' in the TX Format, or 0 to 99 if there are 2 'S's in the TX Format), or
- sends a control status (any value assigned to a control status type in the [Control Status form](#)).

Select one of these predefined bursts in the [Channel Status Burst](#) field (Channels form > Signalling Preset tab) to form part of a channel's preset fixed call sequence.

[Setting up status calls](#)

[About status calls](#)

[Defining fixed call sequences per-channel](#)

## Tx Call Bursts

Sets the part of the sequence that identifies the radio the sequence is intended for. The length of the sequence entered must match the length of the R (receiver identity) burst in the Tx Format field. Use characters 0 to 9, A to D and F.

Select one of these predefined bursts in the [Channel TX Call Burst](#) field (Channels form > Signalling Preset tab) to form part of a channel's preset fixed call sequence.

[Defining fixed call sequences per-channel](#)

[Setting up a basic Selcall system on one or more radios](#)

## Repeater Access Tones

Sets the repeater access tone, which can be sent before a voice or data transmission. The repeater access tone is used to key up the repeater before a transmission is sent so that no information is lost at the beginning of the transmission. Set the repeater access tone to any of the valid tones in the current tone set (0-9, A-F).

Select one of these predefined tones in the [Channel Repeater Access Tone](#) field (Channels form > Signalling Preset tab) to send on a per-channel basis from a function key.

[Using a repeater with Selcall](#)

## Lead In Tones

Sets the lead-in tone, which is sent during the lead-in delay before any Selcall sequences. It can be used to halt scanning on a called radio before critical tones are sent or to allow the called radio time to come out of economy mode. Enter up to 6 tones using the characters 0-9 and A-F.

Select one of these predefined tones in the [Channel Lead In Tone](#) field (Channels form > Signalling Preset tab) to send with any Selcall sequence on a per-channel basis.

[Making sure Selcall sequences are decoded](#)

## Free Format Bursts form

### Fields

[Preset Call 1 to Preset Call 4](#)

[A.N.I. Sequence](#)

[Auto Acknowledge](#)

[Emergency Sequence](#)

## Preset Call 1 to Preset Call 4

Displays the [free-format sequence](#) that is be assigned to the [Network Preset Calls](#) function key option. Click the Details button to define the sequence. Select the Open Monitor checkbox to open monitor when the preset call is made.

[Defining free-format sequences](#)

[Defining up to 4 free-form preset calls per-system](#)

## A.N.I. Sequence

Displays the [free-format sequence](#) that is sent whenever the PTT is pressed or released, depending on settings in the [Features form](#). Click the Details button to define the sequence. The R-burst of this sequence must match the Rx Format of the radio receiving and decoding the A.N.I..

[Defining free-format sequences](#)

[Setting up Selcall A.N.I.](#)

## Auto Acknowledge

Displays the [free-format sequence](#) that is sent whenever a call is made and [Auto Acknowledge Type](#) (Networks > Features form) is set to Sequence. Click the Details button to define the sequence.

[Defining free-format sequences](#)

[Setting an auto acknowledge](#)

[About auto acknowledgements](#)

## Emergency Sequence

Displays the [free-format sequence](#) that is sent whenever an emergency call is made, via a programmable input pin, or the [Emergency Call](#) function key option. Click the Details button to define the sequence.

[Defining free-format sequences](#)

[Setting activation and callout options](#)

[About emergency operation](#)

## Tone Settings form

### Fields

[Tone Set](#)

[Tone Period](#)

[Gap Period](#)

[Lead In Delay](#)

[Lead Out Delay](#)

[First Tone Period Multiplier](#)

[Repeater Access Tone Duration](#)

## [Group Format](#)

### **Topics**

#### [Custom Toneset group box](#)

## Tone Set

Specifies the tone set the Selcall system operates on. The radio can operate with any of the tone sets supported by the radio software, and a different tone set can be assigned for each Selcall system. The available tone sets are: CCIR, EIA, EEA, ZVEI-I, ZVEI-II, ZVEI-III, PZVEI, NATEL and DZVEI. You can create your own tone set or reorder an existing tone set by selecting Custom.

[Selecting a standard tone set](#)

[Setting up a basic Selcall system on one or more radios](#)

## Tone Period

Sets the duration of each tone in a Selcall sequence. Set the tone period to 20, 33, 40, 50, 60, 70 or 100 ms.

[Advanced tone settings](#)

## Gap Period

Sets the duration of each gap in a Selcall sequence. Set the gap period from 1 to 150 ms in steps of 1 ms. If a gap is defined in the [Rx Format](#), (Selcall Identity form), ensure that the total gap period is equal to or longer than one [Tone Period](#). Otherwise Selcall sequences may not be decoded properly.

[Advanced tone settings](#)

## Lead In Delay

Sets a period for the radio to transmit before the first tone in a Selcall sequence is sent. This also becomes the duration of the [Channel Lead In Tone](#). The purpose of a Lead In Delay is to ensure the first part of a sequence is not distorted or lost due to delays in establishing the link.

Set the lead in delay from 20 to 5100 ms in steps of 20 ms, or enter 0 to send the Selcall sequence immediately when requested. Enter a time based on the following:

- Economy mode: set to at least 100 ms longer than the economy duty cycle.
- Scanning: add the time it takes to complete one scan of all the channels.
- Repeater: add an additional 200 ms.

[Making sure Selcall sequences are decoded](#)

## Lead Out Delay

Sets a period for the radio to continue transmitting after the last tone in a Selcall sequence is sent (also known as the Tx Tolerance Factor). The purpose of the lead out delay is so the called radio is able to decode the selcall sequence correctly.

Set the lead out delay from 10 to 2550 ms in steps of 10 ms, or enter 0 to end transmission immediately after sending the sequence. A delay at least one [Tone Period](#) in length is recommended.

[Making sure Selcall sequences are decoded](#)

## First Tone Period Multiplier

Extends the duration of the first tone in a Selcall sequence. The tone-period multiplier is applied to the first burst of the transmitted sequence, unless the first burst is a repeater burst. In this case, the tone-period multiplier is applied to the first tone of the second burst. The first tone can be multiplied to ensure the first part of a sequence is not distorted or lost due to delays in establishing the link.

[Making sure Selcall sequences are decoded](#)

## Repeater Access Tone Duration

Sets the length of time the repeater access tone is transmitted, when required. Select a value from 0 to 5100 ms in steps of 20 ms. The repeater access tone is transmitted when a function key is pressed to which the [Repeater Access Tone Tx](#) option has been assigned.

[Using a repeater with Selcall](#)

## Group Format

Sets the format used for group calling. The format selected depends on the system in use. Select International or Sigtec.

- International: the first tone in the sequence defined cannot be a group tone. Any of the subsequent tones can be the group tone.
- Sigtec: the first tone in the sequence defined cannot be a group tone. All tones following the first group tone must also be a group tone.

[Advanced tone settings](#)

## ***Custom Toneset group box***

### **Fields**

[Based On](#)

[Group Tone](#)

[Repeat Tone](#)



## [Tone and Frequency](#)

### Based On

Available when [Tone Set](#) is Custom. To reorder a tone set, select one of the nine supported existing tone sets and select a frequency for each tone. Select All Frequencies to display all supported frequencies in the frequency list for each tone (not just restricted to those available in the tone sets).

[Re-ordering an existing tone set](#)

[Creating your own tone set](#)

[Custom Selcall tone frequencies and tolerances](#)

### Group Tone

Sets the tone that is substituted when G is used in any outgoing Selcall sequences, and that identifies incoming Selcall sequences as group calls. It can be set to any of the tones 0 to 9 and A to F in the current Selcall system, except the repeat tone (E).

[Advanced tone settings](#)

### Repeat Tone

Sets the tone that is substituted for the second tone when two tones are the same and adjacent. This prevents one long continuous tone which may not be decoded correctly. For example, if 1111 is transmitted in a sequence and E is the repeat tone, the actual sequence transmitted will be 1E1E.

[Advanced tone settings](#)

### Tone and Frequency

Lists the frequencies (in Hz) available for the option selected in the [Based On](#) field. If Based On is an existing tone set, only the frequencies for that tone set can be selected. If Based On is All Frequencies, then all supported frequencies can be selected for each tone. If you select a frequency that is already defined for another tone, the frequencies for each tone will be swapped.

[Re-ordering an existing tone set](#)

[Creating your own tone set](#)

[Custom Selcall tone frequencies and tolerances](#)

## **Control Status form**

### **Fields**

[Control Status Value](#)

[Control Status Type](#)

[Rx Processing](#)

### [Tx Processing](#)

#### Control Status Value

Sets the status digit that can be added to a fixed or preset call sequence. That sequence, if decoded, will carry out the action in the [Control Status Type](#) field.

[About status calls](#)

#### Control Status Type

Sets an action that will occur after the radio receives and decodes the [Control Status Value](#). See [Control status types](#) for the actions that can be assigned.

[About status calls](#)

#### Rx Processing

Sets whether the control status will be processed when received in a call. If No is selected, a call containing this control status will be ignored.

[About status calls](#)

#### Tx Processing

Enables the radio user to select the status digit from the radio, to be sent in a preset call. \*\*\*TBD Feature to be implemented later.

[About status calls](#)

### ***Control status types***

<a href="#">Priority Call</a>	<a href="#">Tx Stun</a>
<a href="#">Quiet Interrogation</a>	<a href="#">Revive</a>
<a href="#">Activate Digital Line 1 to 3</a>	<a href="#">Emergency</a>
<a href="#">Deactivate Digital Line 1 to 3</a>	<a href="#">Data Control</a>
<a href="#">Full Stun</a>	<a href="#">Call Diversion</a>

#### Priority Call

Identifies the outgoing call as a priority call. The receiving radio activates the alert specified for priority calls in the Selcall Rx Decode Setup form.

[Sending and decoding a priority call](#)

### Quiet Interrogation

Causes the receiving radio to transmit the auto acknowledge sequence for the current Selcall system without alerting the radio user to the receipt of the Selcall sequence.

[Setting a radio to interrogate another radio](#)

### Activate Digital Line 1 to 3

Activates the receiving radio's associated I/O line. The receiving radio pin must have [Direction](#) set to Output, and [Action](#) set to OTA Incoming Status Control 1, 2 or 3 (Programmable IO form).

### Deactivate Digital Line 1 to 3

Deactivates the receiving radio's associated I/O line. The receiving radio pin must have [Direction](#) set to Output, [Action](#) set to OTA Incoming Status Control 1, 2 or 3, and [Signal State](#) set to Latching (Programmable I/O form).

### Full Stun

Causes the receiving radio to cease normal operation. The radio resumes normal operation when the Revive Control Status is received.

[Setting a radio to stun and revive another radio](#)

### Tx Stun

Prevents the receiving radio from transmitting. The radio resumes normal operation when the Revive Control Status is received.

[Setting a radio to stun and revive another radio](#)

### Revive

Causes a stunned radio (either [Full Stun](#) or [Tx Stun](#)) to resume normal operation.

[Setting a radio to stun and revive another radio](#)

## Emergency

Sets a status digit that will be automatically appended to any emergency callout, and auto acknowledge sequences sent while in emergency mode. The status value will also be returned as a result of a [Quiet Interrogation](#) if the radio is in emergency mode.

If a call is received with this [Control Status Value](#), monitor will open and the radio will alert according to the settings in the Alerts form > Emergency tab.

[Setting activation and callout options](#)

## Data Control

Causes the radio to deactivate Selcall decoding and activate data decoding. This allows data to be received over the air on Selcall channels.

## Call Diversion

\*\*\*TBD feature to be implemented later

# Networks

### Forms

[Basic Settings form](#)

[Data form](#)

[Emergency form](#)

### Basic Settings form

#### Tabs

[Basic Network Settings tab](#)

[Subaudible Signalling tab](#)

[Receiver Monitoring tab](#)

### *Basic Network Settings tab*

#### Fields

[Network ID](#)

[Signalling Type](#)

[Signalling ID](#)

[Selective Call Mute](#)

[Squelch Detect Type](#)

[Audible Side Tones](#)

#### Topics

[TX Duration Timing group box](#)

## Network ID

Sets the unique ID for the network (read only). Select this ID when adding the network to a channel in the [Network](#) field (Channels form).

[Adding a new network](#)

[About networks](#)

## Signalling Type

Sets the type of [signalling](#) that will accompany each transmission on the channel. Selecting a different network type will change which fields and forms are available in the programming software. Select None, [Selcall](#), [DTMF](#) or [Two-tone](#). A selective system must have been defined to select Selcall, DTMF or Two-tone.

[Adding a selective system to a network](#)

[About selective signalling](#)

## Signalling ID

Sets the Selcall, DTMF or Two-tone [selective system](#) that is associated with this network. Selcall networks are added in the Selcall Identity form. A selective system must have been added to select an ID in this field (for example, add a Selcall system in the Selcall > Selcall Identity form).

[Adding a selective system to a network](#)

[About selective signalling](#)

## Selective Call Mute

Enables the selective call mute for a closed [selective system](#). When the selective call mute is closed, the radio remains quiet and the mute only opens when a valid call sequence is received. If the Selective Call Mute check box is cleared, the radio user will hear all activity on the system.

**Important:** If the Selective Call Mute check box is selected, monitor must be set to open when receiving and transmitting so transmissions can be heard. See [Using monitor with a closed selective system](#) for more information.

[About mutes](#)

## Squelch Detect Type

Sets whether the squelch (carrier) mute opens based on noise level or signal strength. Select Noise Level for the radio to mute based on dB SINAD, or Signal Strength for the radio to mute based on dBm sensitivity. Set the level as City, Country, or Hard on a per-channel basis using the [Squelch](#) field (Channels form).

[About the squelch type - signal strength or noise level?](#)

[Setting the squelch mute and squelch override](#)

## Audible Side Tones

Enables the generation of sidetones for all outgoing selective call sequences except for the auto acknowledge sequence and the emergency sequence. The radio user is able to hear the tones in an outgoing sequence as they are transmitted. If the check box is cleared, the only indicator the radio user has for an outgoing call is the valid keypress indicator. Not selectable when the [Signalling Type](#) (Basic Network Settings tab) is None.

[Defining Selcall audible tones and alerts](#)

## *TX Duration Timing group box*

### **Fields**

[Tx Timer Duration](#)

[Tx Lockout Duration](#)

## Tx Timer Duration

Sets the duration of the transmit timer, which determines the longest continuous transmission permitted by the radio. Enter a value between 1 and 255 seconds in steps of 1 second, or enter 0 to disable the transmit timer. The recommended value is 60 seconds.

[Restricting the transmit time and setting a lockout](#)

## Tx Lockout Duration

Sets the duration of the transmit lockout timer, which prevents the radio from transmitting once the [Tx Timer Duration](#) has expired. Enter a value between 1 and 255 seconds in steps of 1 second, or 0 to disable the transmit lockout timer. This field is unavailable if the Tx Timer Duration is 0.

[Restricting the transmit time and setting a lockout](#)

## ***Subaudible Signalling tab***

### **Fields**

[Validate When Selective Call Received](#)

[Generate When Selective Call Transmitted](#)

[Invalid Confirmation Delay](#)

[Rx CTCSS/DCS Filter Enabled for Reverse Tone Burst Duration](#)  
[Reverse Tone Burst Phase Shift](#)  
[Tx Deviation Percentage \(CTCSS\)](#)  
[Lead Out Delay \(CTCSS\)](#)  
[Tx Polarity](#)  
[Rx Polarity](#)  
[Stop Tone Duration](#)  
[Tx Deviation Percentage \(DCS\)](#)  
[Lead Out Delay \(DCS\)](#)

#### Validate When Selective Call Received

Sets whether subaudible signalling must be present when a selective signalling call is received. Select the check box to decode DCS/CTCSS ([Rx Sig](#) > Channels form), clear the check box to ignore incoming DCS/CTCSS signalling. Not selectable when the [Signalling Type](#) (Basic Network Settings tab) is None.

[Using Subaudible Signalling with a selective system](#)

#### Generate When Selective Call Transmitted

Sets whether subaudible signalling is generated when a selective signalling call is transmitted. Select the check box to send any valid DCS/CTCSS signalling ([Tx Sig](#) field on the Channels form). Not selectable when the [Signalling Type](#) (Basic Network Settings tab) is None.

[Using Subaudible Signalling with a selective system](#)

#### Invalid Confirmation Delay

Specifies the invalid confirmation delay for all received transmissions with subaudible signalling. When an incoming CTCSS or DCS signal is valid but then degrades to the point where the radio can no longer accurately decode it, the radio continues to consider it valid for the duration of this delay. If once the delay has expired the signal still cannot be accurately decoded, the signal is treated as invalid. Enter a value from 0 to 255 in steps of 1, where the invalid confirmation delay is the value of this field multiplied by 3.8 ms.

### Rx CTCSS/DCS Filter Enabled for

Determines the settings for the radio's CTCSS/DCS filter. The filter can be automatically switched off for channels that do not have CTCSS or DCS. Select All or CTCSS/DCS.

- All: The filter is active on all channels, regardless of whether they are programmed with CTCSS or DCS.
- CTCSS/DCS: The filter is active only on channels that have CTCSS or DCS programmed for the receive frequency ([Rx Sig](#)).

[Enabling the filter](#)

### Reverse Tone Burst Duration

Specifies how long a CTCSS reverse tone burst is transmitted. Reverse tone burst transmission increases the speed of receiver shutdown in some repeaters and associated equipment, and helps eliminate [squelch tail](#). Set a value from 0 to 250 ms in steps of 1 ms, or 0 to disable reverse tone burst transmission.

The recommended value is 130 ms, which should work for all CTCSS tones between 67.0 and 250.3 Hz. It should not be necessary to deviate from 130 ms unless your system has specific requirements.

[Configuring the end of a CTCSS transmission](#)

### Reverse Tone Burst Phase Shift

Specifies the degree that the reverse tone is out of phase with the original CTCSS tone. Not available if [Reverse Tone Burst Duration](#) is 0. Select 180 for a 180 degree phase shift (recommended), or 120 for a 120 degree phase shift.

[Configuring the end of a CTCSS transmission](#)

### Tx Deviation Percentage (CTCSS)

Sets the CTCSS output level for calibration, as a percentage of deviation. The voice deviation is adjusted to keep the overall deviation within statutory limits. When subaudible signalling is not enabled on a channel, voice deviation will not be affected. A value of 15% is recommended.

This field should only be adjusted for special system requirements.



### Lead Out Delay (CTCSS)

Sets a period for the radio to continue transmitting CTCSS after receiving a request to end transmit (for example, the PTT is released). This helps eliminate the [squelch tail](#) heard at the end of a received CTCSS transmission. Enter a delay between 0 and 12750 ms in steps of 50 ms.

[Configuring the end of a CTCSS transmission](#)

### Tx Polarity

Sets the polarity of all transmitted DCS codes defined in the Channels form. Some systems require the DCS code to be inverted when transmitted. Select Normal or Inverted.

[Setting the polarity of DCS](#)

[CTCSS tones and DCS codes](#)

### Rx Polarity

Sets the polarity of all received DCS codes defined in the Channels form. Select Normal or Inverted. If [Tx Polarity](#) is Inverted, then Rx Polarity must also be inverted to decode DCS correctly.

[Setting the polarity of DCS](#)

[CTCSS tones and DCS codes](#)

### Stop Tone Duration

Sets how long a stop tone is transmitted. The stop tone is a burst of signalling sent at the end of a DCS transmission. It is signal to the receiving radio that transmission is about to end, which eliminates the [squelch tail](#) heard at the end of a transmission. Enter a duration between 150 and 200 ms.

[Configuring the end of a DCS transmission](#)

### Tx Deviation Percentage (DCS)

Sets the DCS output level for calibration, as a percentage of deviation. The voice deviation is adjusted to keep the overall deviation within statutory limits. When subaudible signalling is not enabled on a channel, voice deviation will not be affected. A value of 15% is recommended.

This field should only be adjusted for special system requirements.

## Lead Out Delay (DCS)

Sets a period for the radio to continue transmitting DCS after receiving a request to end transmit (for example, the PTT is released). Enter a delay between 0 and 12750 ms in steps of 50 ms.

[Configuring the end of a DCS transmission](#)

## **Receiver Monitoring tab**

### **Fields**

[Monitor On \(Tx\)](#)

[Monitor On \(Rx\)](#)

[Hookswitch Monitor](#)

[Hookswitch Monitor Overrides](#)

[Monitor Overrides](#)

[Auto Quiet Time](#)

[Auto Quiet Timer Countdown](#)

[Restrict PTT Operation](#)

## Monitor On (Tx)

Determines when monitor is opened on outgoing Selcall fixed format calls, or free format calls with the Activate Monitor check box selected. This does not apply to ANI, Auto Acknowledge or Emergency calls. Select Call Setup or Call Acknowledge.

- Call Setup: monitor is opened as soon as the call is made.
- Call Acknowledged: monitor is opened when an auto acknowledge sequence is received, indicating that the call has been successful.

[Opening monitor when sending a selective call](#)

[About monitor](#)

## Monitor On (Rx)

Determines when monitor is opened when a Selcall call is received that matches one of the radio's Rx Decode sequences. This field is only available if the [Open Monitor](#) check box is selected (Alert Settings tab) for Rx Decode 1 or 2, and does not apply to sequences with a control status appended. Select Call Answered or Call Received.

- Call Answered: the radio user has to press a radio key or the PTT to answer the call before monitor is opened.
- Call Received: monitor opens upon the receipt of an appropriate Selcall call.

[Opening monitor when receiving a selective call](#)

[About monitor](#)

## Hookswitch Monitor

Sets whether monitor is opened when the microphone is taken off the hook. Setting this option does not affect any other scanning functions of the hookswitch.

[Opening and closing monitor via the hookswitch](#)

[About monitor](#)

## Hookswitch Monitor Overrides

Determines which mutes will open when the hookswitch monitor is open. Select All Mutes or Call Mutes.

- All Mutes: the selective call and the subaudible signalling mutes will open. The radio user can hear all traffic.
- Call Mutes: only the selective call mute will open. The radio user will not hear traffic that contains invalid subaudible signalling.

[Using monitor with subaudible signalling](#)

[Using monitor with a closed selective system](#)

[About monitor](#)

## Monitor Overrides

Determines which mutes will open when the radio's monitor is open. Select All Mutes or Call Mutes.

- All Mutes: the selective call and the subaudible signalling mutes will open. The radio user is able to hear all traffic.
- Call Mutes: only the selective call mute will open. The radio user will not hear traffic that contains invalid subaudible signalling.

[Using monitor with subaudible signalling](#)

[Using monitor with a closed selective system](#)

[About monitor](#)

## Auto Quiet Time

Sets the duration of the auto quiet timer. When the programmed duration of the auto quiet timer expires, monitor will close. The auto quiet timer does not apply to the Hookswitch Monitor. Enter a value between 1 and 300 seconds in steps of 1 second, or 0 to disable the auto quiet timer.

[Closing monitor via the auto quiet timer](#)

[About monitor](#)

## Auto Quiet Timer Countdown

Determines whether the auto quiet timer resets or continues its countdown after being suspended. The auto quiet timer is suspended while the radio is transmitting or while there is valid activity on a channel. Not available when the [Auto Quiet Time](#) is set to 0 (disabled). Select Continuous or Reset.

- Continuous: the auto quiet timer resumes from the point at which it was suspended.
- Reset: the auto quiet timer resets to its programmed value (Auto Quiet Time field) and begins counting down once again.

[Closing monitor via the auto quiet timer](#)

[About monitor](#)

## Restrict PTT Operation

\*\*\*TBD See [Inhibit PTT Transmission When Call Not Set Up](#). Will become Restrict/Inhibit PTT, Restrict/Inhibit External PTT 1 and Restrict/Inhibit External PTT 2.

## Features form

### Fields

[Auto Acknowledge Type](#)

[Delay Before Sending](#)

[Receive Acknowledgements](#)

[Indicate Acknowledgement Received](#)

[Number of 'No Acknowledge' Retries](#)

[Wait For Acknowledge](#)

[Acknowledge When Received](#)

[Alert When Received](#)

[Call Clear](#)

[Deferred Calling](#)

[Leading A.N.I.](#)

[Trailing A.N.I.](#)

[Include A.N.I. With PTT](#)

[Include A.N.I. With EPTT1](#)

[Include A.N.I. With EPTT2](#)

[A.N.I. Suppression Time](#)

[Enabled](#)

[Deactivation Timer](#)

[Tones To Receive Before Starting](#)

[Send Beep On PTT Release](#)

## Auto Acknowledge Type

Sets the type of auto acknowledge that is sent when receiving a call with the Auto Acknowledge check box selected (Alert Settings tab). Select None, Beep or Sequence.

- None: an auto acknowledge will not be sent.
- Beep: an auto acknowledge is sent in the form of a single beep.
- Sequence: an auto acknowledge is sent in the form of the sequence defined in the [Auto Acknowledge](#) field (Free Format Bursts form).

[Setting an auto acknowledge](#)

[About auto acknowledgements](#)

## Delay Before Sending

Sets the delay between when an incoming Selcall sequence is received and when an auto acknowledge is sent. Set a value from 100 to 12,000 ms in steps of 100 ms.

[Setting an auto acknowledge](#)

[About auto acknowledgements](#)

## Receive Acknowledgements

Sets whether auto acknowledge sequences received by the radio will be processed.

[Setting an auto acknowledge](#)

[About auto acknowledgements](#)

## Indicate Acknowledgement Received

Sets whether the radio's green LED displays and two short tones sound when an auto acknowledge is received.

[Setting an auto acknowledge](#)

[About auto acknowledgements](#)

## Number of 'No Acknowledge' Retries

Sets the number of times the radio automatically resends a call when no auto acknowledge response is received from the called radio. How long the radio waits for an auto acknowledge to be returned is set in the [Wait For Acknowledge](#) field. Set a value from 0 to 15.

[Setting an auto acknowledge](#)

[About auto acknowledgements](#)

## Wait For Acknowledge

Sets the delay between when the radio sends a call and:

- if the number of retries are above 0: when it resends the call if no auto acknowledge is received, or
- if the number of retries have reached 0: the call is indicated (through a low pitched tone) as unsuccessful.

Set a value from 1 to 20 seconds in steps of 1 second.

**Tip:** Make sure this wait time is higher than the [Delay Before Sending](#) setting of the radio sending the auto acknowledge.

[Setting an auto acknowledge](#)

[About auto acknowledgements](#)

## Acknowledge When Received

Sets whether an auto acknowledge ([Auto Acknowledge Type](#) field > Features form) is sent when a valid individual remote monitor reset (RMR) sequence or [Appended C Tone Monitor Reset](#) call is received. This does not apply to group calls with the C tone appended.

[Setting an auto acknowledge](#)

[About auto acknowledgements](#)

## Alert When Received

Sets whether the radio activates an audible alert when a valid remote monitor reset sequence or [Appended C Tone Monitor Reset](#) call is received. This has no effect when the radio is in emergency mode.

[Defining an appended C tone monitor reset for a fleet](#)

[Defining an RMR sequence for a fleet](#)

## Call Clear

Sets whether the radio clears any active incoming call when a valid remote monitor reset sequence or [Appended C Tone Monitor Reset](#) call is received.

[Defining an appended C tone monitor reset for a fleet](#)

[Defining an RMR sequence for a fleet](#)

## Deferred Calling

Enables the deferred calling option for all Selcall systems. The [Tx Inhibit](#) field (Channels form) should be set to Busy or Mute for deferred calling to be valid.

When the check box is selected and transmit is inhibited, the call is stored and sent at a random time between 1 and 10 seconds after the channel becomes free.

If the checkbox is cleared and transmit is inhibited, the radio gives an invalid keypress whenever a call is attempted on a busy channel.

## Leading A.N.I.

Determines if the [A.N.I. Sequence](#) (Free Format Bursts form) is sent whenever the PTT is pressed. Select Enabled, Suppress on Busy or Disabled.

- Enabled: the A.N.I. sequence is sent when the PTT is pressed, unless the A.N.I. suppression time is still counting down.
- Suppress on Busy: the A.N.I. sequence is sent when the PTT is pressed if the channel is free. The sequence will not be sent if there is activity on the channel, or the A.N.I. suppression time is still counting down.
- Disabled: the A.N.I. sequence is not sent when the PTT is pressed.

**Note:** If the A.N.I. sequence is the repeater access tone, then Leading A.N.I. should be the only A.N.I. transmit option enabled (\*\*TBD to be implemented later).

[Setting up Selcall A.N.I.](#)

## Trailing A.N.I.

Sets whether the [A.N.I. Sequence](#) (Free Format Bursts form) is sent at the end of the transmission, unless the [A.N.I. Suppression Time](#) is still counting down. The A.N.I. sequence is sent after release of the PTT but before any subaudible signalling termination sequence (i.e. CTCSS reverse tone burst, DCS stop code). There is no lead-in delay for trailing A.N.I. transmissions.

[Setting up Selcall A.N.I.](#)

## Include A.N.I. With PTT

Determines if A.N.I. is sent on voice transmissions initiated by the microphone PTT.

[Setting up Selcall A.N.I.](#)

#### Include A.N.I. With EPTT1

Determines if A.N.I. is sent on voice transmissions initiated by the rear voice PTT (digital input PTT2).

[Setting up Selcall A.N.I.](#)

#### Include A.N.I. With EPTT2

Determines if A.N.I. is sent on voice transmissions initiated by the third party audio PTT (digital input PTT3).

[Setting up Selcall A.N.I.](#)

#### A.N.I. Suppression Time

Sets a timer that will begin counting down at the end of an A.N.I transmission. If the radio requests another A.N.I. transmission in this time (for example, the PTT is pressed), the A.N.I will not be sent.

[Setting up Selcall A.N.I.](#)

#### Enabled

Sets whether the radio blanks out the tones of a received Selcall sequence so that the radio user does not hear them. The radio user may, however, hear the first few tones.

[Defining Selcall audible tones and alerts](#)

#### Deactivation Timer

Sets a number of gap periods for tone blanking to remain active, starting from the first gap after a valid tone. The purpose of this timer is so tone blanking does not deactivate when encountering gaps in a sequence. This should be set to at least the length of the longest gap in a Selcall sequence for the fleet. Enter between 1 and 100 gap periods, or 0 to disable the tone blanking deactivation timer.

[Defining Selcall audible tones and alerts](#)

#### Tones To Receive Before Starting

Sets the number of tones that must be received consecutively to start tone blanking. Enter a number of tones from 0 to 5. Two or three tones is recommended.

**Note:** If 1 is entered, certain speech tones may be blanked out during a call.

[Defining Selcall audible tones and alerts](#)



## Send Beep On PTT Release

Sends an over-the-air beep whenever the PTT is released. If this check box is selected, [Trailing A.N.I.](#) cannot be selected.

[Setting up Selcall A.N.I.](#)

## Emergency form

### Tabs

[Activator tab](#)

[Cycling tab](#)

[Behaviour tab](#)

### **Activator tab**

#### Fields

[Emergency Enabled](#)

[Signalling Type](#)

[Channel Type](#)

[Channel](#)

[Tx On High Power](#)

[Callout Type](#)

[Number Of Callouts](#)

[Callout Repeat Interval](#)

## Emergency Enabled

Sets whether emergency functionality is to be provided on the current network. If this check box is selected, add the [Emergency Call](#) option to a function key in the Key Settings form), or the Send Emergency Call action to an input pin in the Programmable I/O form.

[Setting up emergency operation](#)

[About emergency operation](#)

## Signalling Type

Displays the [Signalling Type](#) associated with the current network. This will determine the type of emergency call made. If None is displayed, then only 1 callout is possible before entering Tx/Rx cycling or resuming normal operation. If Selcall is displayed, then the [Emergency Sequence](#) defined in the Free Format bursts form will be sent.

[Setting up emergency operation](#)

[About emergency operation](#)

## Channel Type

Determines whether the radio will switch to a dedicated channel, or stay on the current channel after emergency mode is activated. If you select Dedicated, select a channel in the [Channel](#) field.

[Setting up emergency operation](#)

[About emergency operation](#)

## Channel

Sets the channel that the radio will switch to if the [Channel Type](#) is Dedicated.

**Note:** Only channels with the current network and emergency settings assigned will appear in this list of channels.

[Setting up emergency operation](#)

[About emergency operation](#)

## Tx On High Power

Sets whether the emergency call will override any existing power settings on the channel and transmit on high power.

[Setting up emergency operation](#)

[About emergency operation](#)

## Callout Type

The radio can repeatedly send a selective signalling sequence until an acknowledgement is received. An emergency callout is only available if there is a selective system defined on the network. Select Disabled, Continuous, or Fixed.

- Disabled: the radio will begin Tx/Rx cycling immediately (if set).
- Continuous: the radio will send the emergency sequence until an auto acknowledge is received.
- Fixed: the radio will send the emergency sequence until either an auto acknowledge is received, or the [Number Of Callouts](#) has been reached.

[Setting up emergency operation](#)

[About emergency operation](#)

## Number Of Callouts

Sets the number of callouts if the [Callout Type](#) is Fixed. Enter a number of callouts between 1 and 250.

[Setting up emergency operation](#)

[About emergency operation](#)

## Callout Repeat Interval

Sets the interval between callouts. Enter a time between 5000 and 60000 milliseconds (5 to 60 seconds). This is also the lead-out delay if the [Callout Type](#) is Fixed and no auto acknowledge is received. The lead-out delay sets a delay after the final callout is sent, and before cycling starts.

[Setting up emergency operation](#)

[About emergency operation](#)

## **Cycling tab**

### **Fields**

[Emergency Cycling Type](#)

[Number Of Cycles](#)

[Rx Time](#)

[Tx Time](#)

[Emergency A.N.I.](#)

[Over-The-Air Alert Tone](#)

[Begin Tone Frequency](#)

[Begin Tone Duration](#)

[End Tone Frequency](#)

[End Tone Duration](#)

## Emergency Cycling Type

Determines what happens after the callout sequence has been sent (if set). The radio will remain on the channel defined in the [Channel Type](#) field, and can be set to enter a period of Tx/Rx cycling. Select Disabled, Continuous or Fixed.

- Disabled: there is no cycling and the radio will end emergency mode. Only select Disabled if [Callout Type](#) is Fixed or Continuous.
- Continuous: the radio enters Tx/Rx cycling until emergency mode ends.
- Fixed: the radio enters Tx/Rx cycling for a fixed number of times ([Number Of Cycles](#) field) before emergency mode ends.

**Note:** When emergency mode ends, the radio will either resume normal operation, or enter a quiet state if the emergency type is stealth.

[Setting up emergency operation](#)

[About emergency operation](#)

## Number Of Cycles

Sets the number of Tx/Rx cycles if the [Emergency Cycling Type](#) field is set to Fixed.

[Setting up emergency operation](#)

[About emergency operation](#)

## Rx Time

Sets the amount of time spent receiving when the radio is in emergency cycling mode, before switching to transmit.

[Setting up emergency operation](#)

[About emergency operation](#)

## Tx Time

Sets the amount of time spent transmitting when the radio is in emergency cycling mode, before switching to receive.

[Setting up emergency operation](#)

[About emergency operation](#)

## Emergency A.N.I.

Sets whether the [A.N.I. Sequence](#) (Free Format Bursts form) is sent at the beginning of each Tx cycle. This is so the recipient can identify the radio unit sending the emergency call.

**Note:** The sequence will always be sent regardless of ANI suppression settings.

[Setting up emergency operation](#)

[About emergency operation](#)

## Over-The-Air Alert Tone

Sets whether an alert tone is sounded at the start ([Begin Tone Frequency](#) and [Begin Tone Duration](#)) and end ([End Tone Frequency](#) and [End Tone Duration](#)) of each Tx Cycle.

[Setting up emergency operation](#)

[About emergency operation](#)

## Begin Tone Frequency

Sets the frequency for an alert tone to sound at the start of each Tx cycle. The [Over-The-Air Alert Tone](#) checkbox must be selected. Enter a tone between 300 and 3000 Hz.

[Setting up emergency operation](#)

[About emergency operation](#)

### Begin Tone Duration

Sets the duration for the alert tone at the start of each Tx cycle. The [Over-The-Air Alert Tone](#) checkbox must be selected. Enter a duration between 1 and 250 ms, or 0 to disable the start tone.

[Setting up emergency operation](#)

[About emergency operation](#)

### End Tone Frequency

Sets the frequency for an alert tone to sound at the end of each Tx cycle. The [Over-The-Air Alert Tone](#) checkbox must be selected. Enter a tone between 300 and 3000 Hz.

[Setting up emergency operation](#)

[About emergency operation](#)

### End Tone Duration

Sets the duration for the alert tone at the end of each Tx cycle. The [Over-The-Air Alert Tone](#) checkbox must be selected. Enter a duration between 1 and 250 ms, or 0 to disable the end tone.

[Setting up emergency operation](#)

[About emergency operation](#)

## ***Behaviour tab***

### **Fields**

[Indicator](#)

[Tx Signalling Indicator](#)

[Mute Audio](#)

[PTT Enable](#)

[Allow False Powerdown](#)

[Toggle Cycling/Quiet State](#)

### Indicator

Sets whether the radio sounds a tone, lights the function LED and displays the current channel when entering emergency mode. If the checkbox is cleared, the radio will freeze to its current state.

[Setting up emergency operation](#)

[About emergency operation](#)

### Tx Signalling Indicator

Sets whether sidetones will sound when emergency signalling is transmitted. If disabled, there will be no indication of the call being made.

[Setting up emergency operation](#)

[About emergency operation](#)

## Mute Audio

Sets whether all received audio will be muted. If the checkbox is cleared, audio will follow standard muting behaviour.

[Setting up emergency operation](#)

[About emergency operation](#)

## PTT Enable

Sets whether the radio user can use the PTT while in emergency mode. If the checkbox is cleared, the radio user will not be able to use the PTT.

[Setting up emergency operation](#)

[About emergency operation](#)

## Allow False Powerdown

Sets whether the radio user can perform a false breakdown by switching the power off while in emergency mode. The radio will appear to shut down but will actually continue operating in emergency mode until emergency mode is ended by turning the radio off then on again.

[Setting up emergency operation](#)

[About emergency operation](#)

## Toggle Cycling/Quiet State

Determines what happens when the radio receives an [RMR Sequence](#) or [Appended C Tone Monitor Reset](#) call while in either the emergency cycling or emergency quiet states. If the check box is cleared, the radio will exit emergency mode and resume normal operation. If the check box is selected, the radio will toggle between emergency cycling and an emergency quiet state.

In the emergency quiet state, the radio remains in a receive state, but all indicators are switched off. To exit emergency mode, the radio user must turn the radio off then on again. If [Allow False Powerdown](#) is selected, then the radio will perform a false power down then power up as normal when the on/off key is pressed again.

[Setting up emergency operation](#)

[About emergency operation](#)

## Alerts form

### Tabs

[General tab](#)

[Emergency tab](#)

[External Alerts tab](#)

## General tab

### Topics

[Rx Decode Global Settings group box](#)

[Group Call Decode group box](#)

[Priority Call Decode group box](#)

*Rx Decode Global Settings group box*

### Fields

[Alert/Ring Pattern](#)

[Alert Type](#)

[Internal Alert Duration](#)

[Auto Acknowledge](#)

[Open Monitor](#)

[External Alert](#)

### Alert/Ring Pattern

Determines the alert pattern the radio sounds when receiving a call that matches Rx Decode 1 or 2, if the [Alert Type](#) for the network is Ring. Enter a 16-digit code using 1s and 0s, where a 1 indicates a tone and a 0 indicates a gap.

**Note:** This pattern is global and not per-network. If you change the pattern on one network, it will cause the same pattern on other networks to change as well.

[Defining Selcall audible tones and alerts](#)

### Alert Type

Sets how the alert will sound for calls on the network that match Rx Decode 1 or 2. Select None, Beep or Ring.

- Silence: the radio does not send an audible alert to the radio user.
- Beep: the alert is in the form of a single beep.
- Ring: the pattern defined in [Alert/Ring Pattern](#) is used.

[Defining Selcall audible tones and alerts](#)

### Internal Alert Duration

Sets the time that calls matching Rx Decode 1 or 2 remain unanswered before the radio enters the unanswered call state. Set a value from 0 to 250 seconds in steps of 1 second. If set to 0, the radio rings until answered.

[Defining Selcall audible tones and alerts](#)

## Auto Acknowledge

Determines whether an auto acknowledge is sent when a call is received that matches Rx Decode 1 or 2. If the Auto Acknowledge check box is selected, the auto acknowledge indicated in [Auto Acknowledge Type](#) (Features form) is sent. If no sequence is defined, no auto acknowledge is sent.

[Setting an auto acknowledge](#)

[About auto acknowledgements](#)

## Open Monitor

Specifies whether the radio's monitor will be opened for calls on the network that match Rx Decode 1 or 2. If the Open Monitor check box is selected, calls received using that sequence will be treated as voice calls, and as such will open monitor. If the Open Monitor check box is cleared, calls will be treated as information calls and monitor will not open.

If the check box is selected for Rx Decode 1 or 2, set whether monitor is opened when the call is received, or answered, using the [Monitor On \(Rx\)](#) field (Networks > Basic Settings form > Receiver Monitoring tab).

[Opening monitor when receiving a selective call](#)

## External Alert

Sets an external alert (such as a vehicle horn or lights) for calls received that match Rx Decode 1 or 2. Select 1 or 2, depending on the external alert defined in the Programmable I/O form > Digital tab, and Alerts form > External Alert tab.

[Setting an external alert](#)

### *Group Call Decode group box*

#### **Fields**

[Alert/Ring Pattern](#)

[Alert Type](#)

[Internal Alert Duration](#)

[External Alert](#)



## Alert/Ring Pattern

Determines the alert pattern the radio sounds when receiving a group call, if the [Alert Type](#) for the network is Ring. Enter an 8-digit code using 1s and 0s, where a 1 indicates a tone and a 0 indicates a gap.

**Note:** This pattern is global and not per-network. If you change the pattern on one network, it will cause the same pattern on other networks to change as well.

[Defining Selcall audible tones and alerts](#)

## Alert Type

Sets how the alert will sound for group calls on the network. Select None, Beep or Ring.

- Silence: the radio does not send an audible alert to the radio user.
- Beep: the alert is in the form of a single beep.
- Ring: the pattern defined in [Alert/Ring Pattern](#) is used.

[Defining Selcall audible tones and alerts](#)

## Internal Alert Duration

Sets the time group calls remain unanswered before the radio enters the unanswered call state. Set a value from 0 to 250 seconds in steps of 1 second. If set to 0, the radio rings until answered.

[Defining Selcall audible tones and alerts](#)

## External Alert

Sets an external alert (such as a vehicle horn or lights) for group calls. Select 1 or 2, depending on the external alert defined in the Programmable I/O form > Digital tab, and Alerts form > External Alert tab.

[Setting an external alert](#)

## *Priority Call Decode group box*

### **Fields**

[Alert/Ring Pattern](#)

[Alert Type](#)

[Internal Alert Duration](#)

[Auto Acknowledge](#)

[External Alert](#)

## Alert/Ring Pattern

Determines the alert pattern the radio sounds when receiving a call that contains a priority call control status, if the [Alert Type](#) for the network is Ring. Enter an 8-digit code using 1s and 0s, where a 1 indicates a tone and a 0 indicates a gap.

**Note:** This pattern is global and not per-network. If you change the pattern on one network, it will cause the same pattern on other networks to change as well.

[Sending and decoding a priority call](#)

[Defining Selcall audible tones and alerts](#)

## Alert Type

Sets how the alert will sound for calls on the network that contain a priority call control status. Select None, Beep or Ring.

- Silence: the radio does not send an audible alert to the radio user.
- Beep: the alert is in the form of a single beep.
- Ring: the pattern defined in [Alert/Ring Pattern](#) is used.

[Sending and decoding a priority call](#)

[Defining Selcall audible tones and alerts](#)

## Internal Alert Duration

Sets the time priority calls remain unanswered before the radio enters the unanswered call state. Set a value from 0 to 250 seconds in steps of 1 second. If set to 0, the radio rings until answered.

[Sending and decoding a priority call](#)

[Defining Selcall audible tones and alerts](#)

## Auto Acknowledge

Determines whether an auto acknowledge is sent when priority calls are received. If the Auto Acknowledge check box is selected, the auto acknowledge indicated in [Auto Acknowledge Type](#) (Features form) is sent. If no sequence is defined, no auto acknowledge is sent.

[Sending and decoding a priority call](#)

[Defining Selcall audible tones and alerts](#)

## External Alert

Sets an external alert (such as a vehicle horn or lights) for priority calls. Select 1 or 2, depending on the external alert defined in the Programmable I/O form > Digital tab, and Alerts form > External Alert tab.

[Setting an external alert](#)

## ***Emergency tab***

### **Fields**

[Alert/Ring Pattern](#)

[Alert Type](#)

[Internal Alert Duration](#)

## Alert/Ring Pattern

Determines the alert pattern the radio sounds when receiving an emergency call, if the [Alert Type](#) for the network is Ring. Enter a 16-digit code using 1s and 0s, where a 1 indicates a tone and a 0 indicates a gap.

**Note:** This pattern is global and not per-network. If you change the pattern on one network, it will cause the same pattern on other networks to change as well.

[Setting a Selcall emergency sequence alert](#)

## Alert Type

Sets how the alert will sound for emergency calls on the network. Select None, Beep or Ring.

- Silence: the radio does not send an audible alert to the radio user.
- Beep: the alert is in the form of a single beep.
- Ring: the pattern defined in [Alert/Ring Pattern](#) is used.

[Setting a Selcall emergency sequence alert](#)

## Internal Alert Duration

Sets the time emergency calls remains unanswered before the radio enters the unanswered call state. Set a value from 0 to 250 seconds in steps of 1 second. If set to 0, the radio rings until answered.

[Setting a Selcall emergency sequence alert](#)

## External Alert

Sets an external alert (such as a vehicle horn or lights) for emergency calls. Select 1 or 2, depending on the external alert defined in the Programmable I/O form > Digital tab, and Alerts form > External Alert tab.

[Setting an external alert](#)

## **External Alerts tab**

### **Fields**

[Delay](#)

[Duration](#)

[Mode](#)

### Delay

Sets the delay before the radio activates the external alert. Enter a value between 1 and 250 seconds. Enter 0 to activate the external alert immediately when receiving an incoming call. If using an external alert with an internal alert, the delay would usually be set so the external alert can sound after the internal alert has sounded for a period by itself.

Set the delay for Alert 1 or 2, depending on the action that is assigned to the output pin in the (Programmable I/O form > Digital tab (External Alert 1 and/or 2).

[Setting an external alert](#)

### Duration

Sets how long the external alert remains on, once started. Enter a value between 1 and 250 seconds. Enter 0 to disable the external alert.

Set the duration for Alert 1 or 2, depending on the action that is assigned to the output pin in the (Programmable I/O form > Digital tab (External Alert 1 and/or 2).

[Setting an external alert](#)

### Mode

Sets the signal pattern for the external alert. Select pulsed for an on/off pattern (for example, flashing lights) or steady for the external alert to be continuously on.

Set the mode for Alert 1 or 2, depending on the action that is assigned to the output pin in the (Programmable I/O form > Digital tab (External Alert 1 and/or 2).

[Setting an external alert](#)

## **Channel Setup**

### **Forms**

[Channels form](#)

[Scan Groups form](#)

## **Channels form**

### **Tabs**

[Summary tab](#)

[Detailed tab](#)

[Signalling Preset tab](#)

## Summary tab

**Note:** Fields in this grid are repeated for a single identity only in the Channel tab.

### Fields

ID

[Rx Frequency](#)

[Tx Frequency](#)

[Rx Sig](#)

[Tx Sig](#)

[Power](#)

[Network](#)

[Bandwidth](#)

[Squelch](#)

ID

Sets the unique channel number. This cannot be shared by any other channel or scan group.

[Adding channels](#)

[About channels](#)

Rx Frequency

Sets the receive frequency (in MHz) for the channel. Enter a frequency within the radio's frequency band ([Band](#) field > Specifications form), typically a multiple of 2.5, 3.125, 5 or 6.25 kHz.

[Adding channels](#)

Tx Frequency

Sets the transmit frequency (in MHz) for the channel. Enter a frequency within the radio's frequency band ([Band](#) field > Specifications form), typically a multiple of 2.5, 3.125, 5 or 6.25 kHz.

[Adding channels](#)

Rx Sig

Sets the subaudible signalling the radio must receive before the activity is regarded as valid and the subaudible signalling mute opened. Entries beginning with C denote CTCSS tones, and entries beginning with D denote DCS codewords.

[Defining subaudible signalling on a channel](#)

## Tx Sig

Sets the subaudible signalling that accompanies each transmission made on the channel. Entries beginning with C denote CTCSS tones, and entries beginning with D denote DCS codewords.

[Defining subaudible signalling on a channel](#)

## Power

Sets the transmit power level. Select Off, Very Low, Low, Medium or High. The actual power (in Watts) will vary based on the frequency band and calibration, but is generally between 1 W (Very Low) and 25 W (High) for 66-530 MHz radios, .

[Setting low power conditions](#)

## Network

Defines the [selective system](#) associated with the channel, and other per-network settings.

[Adding a network to a channel](#)

[Fields on a per-channel and per-network basis](#)

## Bandwidth

Sets the transmitter deviation and the receiver audio sensitivity for systems using different channel spacing. Select 12.5 kHz, 20 kHz or 25 kHz.

[Adding channels](#)

## Squelch

Sets the squelch (carrier) mute opening point. This is the level the signal must reach before it is regarded as intelligible and the radio's squelch mute opens. This will have a different meaning depending on the [Squelch Detect Type](#) field (Basic Network Settings). See [Default squelch levels](#) for the default values of Country, City and Hard.

[Setting the squelch mute and squelch override](#)

### ***Detailed tab***

**Note:** Fields in the left column are repeated in the Grid tab, for multiple Channel IDs. Use the navigation < and > buttons at the bottom of the form to change to a different channel.

#### **Fields**

[Tx Inhibit](#)

[Noise Blanker](#)

[Activate Birdie Killer](#)

[Is Data Channel](#)

[Tx Compression](#)  
[Reception Expansion](#)  
[Sw Decryption Enabled](#)  
[Sw Encryption Enabled](#)  
[Mic Equalisation](#)  
[Speaker Equalisation](#)

#### Tx Inhibit

Sets the conditions for the radio to prevent transmit. If the conditions are met, the radio will sound a warning tone and remain in receive mode. This applies to all calls (including Selcall) except emergency calls. Select None, Busy, or Mute.

- None: the radio will always transmit when requested.
- Busy: the radio will not transmit when the channel is busy (i.e. there is valid or invalid traffic).
- Mute: the radio will not transmit when the channel is busy and the subaudible signalling or selective call mute is closed. The radio will still transmit if traffic can be heard through the radio's speaker (for example, if the traffic is valid or monitor is open).

[Setting when the radio can transmit \(Transmit Inhibit\)](#)

#### Noise Blanker

Sets whether the radio will alter the receiver sensitivity to reduce unwanted noise created by external sources, such as a car engine. Only relevant for frequency bands between 66 and 225 MHz (A4, B1 and C1).

[Setting channel features](#)

#### Activate Birdie Killer

Sets a birdie killer for the current channel, which eliminates a hum or whistle on a channel caused by internal interference.

[Setting channel features](#)

#### Is Data Channel

Specifies the channel as data only. Selecting this option will disable certain stages in the radio's audio path, such as the high-pass audio filter, audio compression and expansion, de-emphasis, and pre-emphasis. Clear this check box if the channel is used for voice, with will use the full range of audio filters and programmable features.

[Setting channel features](#)

## Tx Compression

Sets the transmission part of the compression and expansion noise reduction feature. Compression and expansion can improve the desired audio under marginal conditions, such as when there is a lot of background noise.

**Note:** The receiving radio must have [Reception Expansion](#) programmed on the channel for this feature to operate correctly.

[Setting channel features](#)

## Reception Expansion

Sets the receive part of the compression and expansion noise reduction feature. Compression and expansion can improve the desired audio under marginal conditions, such as when there is a lot of background noise.

**Note:** The transmitting radio must have [Tx Compression](#) programmed on the channel for this feature to operate correctly.

[Setting channel features](#)

## Sw Decryption Enabled

Sets whether all calls received on the channel are decrypted using the selected encryption type.

[Setting channel features](#)

## Sw Encryption Enabled

Sets whether all calls transmitted on the channel are encrypted using the selected encryption type.

[Setting channel features](#)

## Mic Equalisation

\*\*\*TBD (feature to be implemented)

## Speaker Equalisation

\*\*\*TBD (feature to be implemented)

## ***Signalling Preset tab***

### **Fields**

[Rx Decode 1 Enabled](#)

[Rx Decode 2 Enabled](#)

[Group Call Decode](#)

[Channel Repeater Access Tone](#)

[Channel Lead In Tone](#)

[Channel Repeater Burst](#)



[Channel Caller ID Burst](#)

[Channel TX Call Burst](#)

[Channel Status Burst](#)

#### Rx Decode 1 Enabled

Sets whether the radio will decode and process Selcall sequences with an R-burst matching [Rx Decode 1](#).

[Entering RX decode details](#)

[Setting up a basic Selcall system on one or more radios](#)

#### Rx Decode 2 Enabled

Sets whether the radio will decode and process Selcall sequence with an R-burst matching [Rx Decode 2](#).

[Entering RX decode details](#)

[Setting up a basic Selcall system on one or more radios](#)

#### Group Call Decode

Sets whether the radio will decode and process Selcall sequence with an R-burst matching Rx decode 1 or 2 and at least one [Group Tone](#).

[Entering RX decode details](#)

#### Channel Repeater Access Tone

Sets the repeater access tone that is sent when the radio user presses a function key assigned to [Repeater Access Tone Tx](#). Select from the tones defined in the [Repeater Access Tones](#) grid (Selcall > Fixed Format Bursts form).

[Using a repeater with Selcall](#)

#### Channel Lead In Tone

Sets the tone that is sent for the duration of the [Lead In Delay](#) at the start of all outgoing Selcall sequences (except trailing A.N.I.). A two-tone period gap follows a lead in tone transmission. Select from the tones defined in the [Lead In Tones](#) grid (Selcall > Fixed Format Bursts form).

[Making sure Selcall sequences are decoded](#)

#### Channel Repeater Burst

Sets the repeater (B-burst) part of the call sequence when a [Channel Preset Call](#) is sent from a function key. Select from the bursts defined in the [Repeater Bursts](#) grid (Selcall > Fixed Format Bursts form).

[Defining fixed call sequences per-channel](#)

[Setting up a basic Selcall system on one or more radios](#)

## Channel Caller ID Burst

Sets the caller ID (C-burst) part of the call sequence when a [Channel Preset Call](#) is sent from a function key. Select from the bursts defined in the [Caller ID Bursts](#) grid (Selcall > Fixed Format Bursts form).

[Defining fixed call sequences per-channel](#)

[Setting up a basic Selcall system on one or more radios](#)

## Channel TX Call Burst

Sets the receiver identity (R-burst) part of the call sequence when a [Channel Preset Call](#) is sent from a function key. Select from the bursts defined in the [Tx Call Bursts](#) grid (Selcall > Fixed Format Bursts form).

[Defining fixed call sequences per-channel](#)

[Setting up a basic Selcall system on one or more radios](#)

## Channel Status Burst

Sets the status (S-burst) part of the call sequence when a [Channel Preset Call](#) is sent from a function key. Select from the bursts defined in the [Status Bursts](#) grid (Selcall > Fixed Format Bursts form).

[Defining fixed call sequences per-channel](#)

[Setting up a basic Selcall system on one or more radios](#)

## Scan Groups form

### Tabs

[ID/Membership tab](#)

[Scan tab](#)

[Priority Scan tab](#)

### ***ID/Membership tab***

The ID/Membership tab is the first tab on the Scan Groups form, and is used to assign an ID for the group and add member channels.

### Fields

[Group ID](#)

[Group Type](#)

[Group Sleep Time](#)

[Group Hold Time](#)

[Transmit Group Hold Time](#)

[Allow Scan When Off Hook](#)

[Resume Scanning When Placed On Hook](#)

[Hidden Channels](#)

[Channel ID](#)

[Group Active on Power Up](#)

## Group ID

Sets the group identity, which cannot be shared by any other channel or group. Enter a 2-digit number from 0 to 99.

[Defining a basic group](#)

[About scanning](#)

## Group Type

Defines the type of the group. Select either Scan or Vote.

- Scan: the radio scans all member channels to find a channel that is busy. When activity is found, the radio remains on that channel until there is no longer activity and the group hold time has expired.
- Vote: the radio polls all member channels to find a busy channel. The radio then measures the signal strength of all channels. The channel with the strongest signal becomes the home channel on which transmissions are made (\*\*TBD to be implemented later).

[Defining a basic group](#)

[About scanning](#)

## Group Sleep Time

Sets the length of time the radio will stay in an economy state after scanning all channels in the group. Enter a time between 0 and 3 seconds.

## Group Hold Time

Sets the delay until scanning resumes once valid channel activity has ceased, if no transmission was made on the captured channel.

Enter a time between 0 and 25 seconds. If set to 0, the group hold time is disabled and scanning will resume immediately after activity ends.

[Setting up a scan group](#)

[About the group hold time](#)

## Transmit Group Hold Time

Sets the delay until scanning resumes once valid channel activity has ceased, if the radio has made at least one transmission on the captured channel. A transmission can be a PTT call, Selcall setup, Selcall auto acknowledge, or a data burst.

Enter a time between 0 and 25 seconds. If set to 0, the transmit group hold time is disabled and scanning will resume immediately after activity ends.

[Setting up a scan group](#)

[About the group hold time](#)

## Allow Scan When Off Hook

Sets whether scanning is possible when the microphone is off the hook (the hookswitch is open). Priority channels are always scanned regardless of the hookswitch.

**Important:** If you want to restrict PTT use to off the hook only, select the [Inhibit PTT Transmission When Mic On Hook](#) check box (PTT form).

[Setting how the scan group is initiated](#)

## Resume Scanning When Placed On Hook

Sets whether the radio will disregard any group hold time and resume scanning immediately when the microphone is placed back on the hook. Selectable only if the Allow Scan When Off Hook check box is cleared.

[Setting how the scan group is initiated](#)

## Hidden Channels

Sets whether the channel members of this group are hidden from the radio user in channel selection mode. When the Hidden Channels check box is selected, channels that are assigned to a scan group are hidden from the user and so cannot be selected individually. If you wish to access the channels within a group, clear the Hidden Channels field.

**Important:** If all defined channels are added to a group, and this check box is selected, then the radio user will not be able to exit scanning. In this situation, [Group Active on Power Up](#) will be selected, the [Group Scanning Activity](#) function key option will not be available, and the [Scan Type](#) can only be Standard.

[Setting how the scan group is initiated](#)

## Channel ID

Lists the channels that are members of the group. To add a group member, click the Add button and select a channel ID. To delete a group member, click on a channel ID and click the Delete button. There can be no more than 24 channels for the group.

[Defining a basic group](#)

## Group Active on Power Up

Sets whether the radio begins scanning or voting after the power up sequence (but before any PIN entry sequence is entered). This option will only apply to the first time the radio is turned on after programming. The radio will subsequently start in the same state when it was switched off, such as scanning mode or channel entry mode.

**Note:** This option is selected automatically if all the channels are hidden.

[Setting how the scan group is initiated](#)

## ***Scan tab***

The Scan tab is the second tab in the Scan Groups form, and sets various options for scan groups such as the transmit channel and display options.

### **Fields**

[Scan Type](#)

[Scan Group Display Indicator](#)

[Scanning Tx Channel Selection \(Scan Talkback\)](#)

[Scanning Default Tx Channel](#)

[Preset Tx Channel](#)

[Suspend Scanning On PTT](#)

[Include Current Channel in Scan Regime](#)

[Validate DCS/CTCSS](#)

## Scan Type

Sets the type of scanning. Select Standard or Background.

- **Standard:** the group is activated from a function key pr when the radio is turned on. All group activity is indicated to the user, usually with the group ID shown on the radio display.
- **Background:** the group operates in the background with very little group activity being indicated to the user. The group is normally activated via a function key and the current channel the radio was on at time of activation is included as a group member. This current channel is usually displayed on the screen, which becomes the default transmit channel. This channel can be changed at any time by the user without having to deactivate and reactivate the group.

[Setting standard scanning options](#)

[Setting background scanning options](#)

[About scanning](#)

## Scan Group Display Indicator

Sets the label that displays when a scan group is active and no channel has been captured. Select "SC" to display the label SC, Group ID to display the group identity ([Group ID](#) field, ID/Membership tab) or Tx Channel to display the current transmit channel. Tx Channel is recommended for a Background [Scan Type](#), and is not available when [Scanning Default Tx Channel](#) is Last Free.

[Setting standard scanning options](#)

[Setting background scanning options](#)

## Scanning Tx Channel Selection (Scan Talkback)

Sets whether the scan talkback feature is enabled. Scan talkback allows the radio user to transmit on the captured channel, if the response is within the group hold time. Not applicable if the [Transmit Group Hold Time](#) is set to 0.

- **Captured:** the radio will respond on the channel that has valid activity. If the group hold time has expired, then the [Scanning Default Tx Channel](#) will be used.
- **Default:** the radio will always transmit on the channel defined in the Scanning Default Tx Channel field.

[About transmitting while scanning](#)

## Scanning Default Tx Channel

The meaning of this field is dependant on the [Scanning Tx Channel Selection \(Scan Talkback\)](#) field. If Captured, this is the transmit channel used if a channel is not held via the group hold time. If Default, this is the transmit channel used in all situations while scanning.

Select Preset, Last Captured, Last Free or Last Selected.

- Preset: the channel entered in the [Preset Tx Channel](#) field.
- Last Captured: the channel that was last captured through valid activity.
- Last Free: the last channel scanned that the radio was able to transmit on.
- Last Selected: the last channel selected before group activity was started (only valid for a Background [Scan Type](#)).

[About transmitting while scanning](#)

## Preset Tx Channel

Sets a channel for transmitting on when the group is active and the [Scanning Default Tx Channel](#) field is set to Preset Channel. Select any channel in the channel list (including hidden channels).

[About transmitting while scanning](#)

## Suspend Scanning On PTT

Determines what happens when the PTT is released after making a transmission while scanning.

- If the check box is selected: scanning will resume after the PTT is released and the [Transmit Group Hold Time](#) has expired.
- If the check box is cleared: the radio will revert to channel selection mode immediately after the PTT is released. The channel that was used to transmit on will be selected. The radio user will need to press a function key to resume scanning again.

[About transmitting while scanning](#)

## Include Current Channel in Scan Regime

Sets whether the current channel is temporarily added to the scan group when the group is activated. This only applies when the [Scan Type](#) is Background. You can make this channel as a priority channel by setting [Priority Scan](#) to Selected.

[Setting background scanning options](#)

## Validate DCS/CTCSS

Sets whether the subaudible signalling defined in [Rx Sig \(Channels form\)](#) is included when scanning non-priority channels. When the check box is selected, a channel will not be captured if activity is detected and it is invalid. When the check box is cleared, the selective call and subaudible signalling mutes will open during scanning, allowing any busy channel to be captured.

[Subaudible signalling with scanning](#)

## **Priority Scan tab**

The Scan tab is the third tab in the Scan Groups form, and sets specific options for single or dual priority channels in a scan group.

### **Fields**

[Priority Scan](#)

[Priority One Channel](#)

[Dual Priority Scan](#)

[Priority Two Channel](#)

[Validate DCS/CTCSS On Priority Channels](#)

[Captured Channel Priority Sample Timer](#)

[Busy Priority Sample Timer](#)

[Non-Captured Channel Priority Sample Timer](#)

[Delete Priority Channels](#)

## Priority Scan

Sets whether a priority channel is continuously monitored for activity, regardless of activity on other channels.

- Disabled: there are no priority channels.
- Fixed: the channel defined in the [Priority One Channel](#) field is the priority channel (recommended for a Standard [Scan Type](#)).
- Selected: the currently selected channel will be scanned as the priority channel. Only available when [Scan Type](#) is set to Background, and the [Include Current Channel in Scan Regime](#) check box is selected.

[Setting up priority scanning](#)

## Priority One Channel

Sets the priority channel if the [Priority Scan](#) field is set to Fixed. Select any channel in the channel list (including hidden channels).

[Setting up priority scanning](#)

[About scanning](#)



## Dual Priority Scan

Enables a second priority channel ([Priority Two Channel](#) field) that is continuously monitored for activity, regardless of activity on other channels. You can only select this check box if [Priority Scan](#) is set to Fixed.

[Setting up priority scanning](#)

[About scanning](#)

## Priority Two Channel

Sets a channel that will be scanned as the second priority channel. Select any channel in the channel list (including hidden channels).

[Setting up priority scanning](#)

## Validate DCS/CTCSS On Priority Channels

Sets whether the subaudible signalling defined in [Rx Sig](#) (Channels form) is included when scanning priority channels. When the check box is selected, a priority channel will not be captured if activity is detected and it is invalid. When the check box is cleared, the selective call and subaudible signalling mutes will open during scanning, allowing any busy priority channel to be captured.

**Note:** Because priority scanning occurs in the background when a channel has been captured, sidetones can cause blanking during some transmissions. Set the Busy Priority Sample Timer to reduce this effect.

[Subaudible signalling with scanning](#)

## Captured Channel Priority Sample Timer

Set the time that priority channels are sampled when a channel has been captured. Enter a time between 0 and 5 seconds.

**Note:** Short priority sample times (less than 1 second) should only be used when there is no subaudible signalling programmed on the member channels, or the [Validate DCS/CTCSS](#) check box is cleared.

[Setting up priority scanning](#)

### Busy Priority Sample Timer

Sets the time that priority channels are sampled when a channel has been captured, and a priority channel is identified as busy but not captured (due to invalid signalling). This can lead to blank periods in the conversation. Only enabled when [Validate DCS/CTCSS On Priority Channels](#) is selected. The value in this field is updated when the Captured Channel Priority Sample time is also updated. Enter a time from 0 to 25 seconds.

[Subaudible signalling with scanning](#)

### Non-Captured Channel Priority Sample Timer

Sets the time that priority channels are sampled when a call is not in progress and a channel has not been captured. Enter a time between 0 and 5 seconds.

[Setting up priority scanning](#)

### Delete Priority Channels

Sets whether priority channels can be deleted using the [Nuisance Delete](#) function key option.

**Note:** The current channel (if included in scanning due to the [Include Current Channel in Scan Regime](#) check box), and the [Scanning Default Tx Channel](#) can never be deleted using nuisance delete.

## Key Settings form

### Fields

[Key 1](#)

[Key 2](#)

[Key 3](#)

[Key 4](#)

[Setting 1 for Function Key 1 to 4](#)

### Key 1

Sets the operation for the first function key ( $F1$ ) on the front panel. See [Key Settings options](#) for more information.

### Key 2

Sets the operation for the second function key ( $F2$ ) on the front panel. See [Key Settings options](#) for more information.

### Key 3

Sets the operation for the third function key ( $\text{F}_3$ ) on the front panel. See [Key Settings options](#) for more information.

### Key 4

Sets the operation for the fourth function key ( $\text{F}_4$ ) on the front panel. See [Key Settings options](#) for more information.

### Setting 1 for Function Key 1 to 4

Defines the type of [Emergency Call](#), the group ID for [Group Scanning Activity](#), the preset call number for [Network Preset Calls](#), or the channel ID for a [Preset Channel](#).

## Key Settings options

**Note:** You cannot assign the same option to more than one key.

None	Low Power Transmit
Audible Indicators Volume	Monitor
Auxiliary Latching	Monitor / Squelch Override
Auxiliary Momentary	Network Preset Calls
Backlighting Timer	Nuisance Delete
Backlighting Toggle	Preset Channel
Backlighting Timer / Toggle	Quiet Operation
Channel Preset Call	Repeater Access Tone Tx
Emergency Call	Repeater Talkaround
External Alert	Silent Operation
Group Scanning Activity	Squelch Override
Keypress Tones Toggle	Scanning / Nuisance Delete
Keypress Tones Volume	

### None

A press of the function key will result in no action. The LED will not light, and there will be no audible alert.

### Audible Indicators Volume

Toggles the volume of audible indicators such as incoming call tones, warning tones and confirmation tones between high (6 dB above the audio volume) and low (6 dB below the audio volume).

[Setting the volume of audible indicators](#)

[About audible indicators](#)

### Auxiliary Latching

Permanently sets the auxiliary line to an active or inactive state each time the function key is pressed.

### Auxiliary Momentary

Sets the auxiliary output line to active or inactive for only as long as the function key is pressed.

### Backlighting Timer

Activates display backlighting, which will deactivate when the backlighting timer expires. You cannot select a backlighting timer option when the [Backlight Mode](#) (UI Preferences form) is set to Off or Continuous.

[Configuring the LCD backlight](#)

### Backlighting Toggle

The meaning of this option depends on [Backlight Mode](#) (UI Preferences form).

- If set to With Activity, this option will toggle backlighting between on continuously and with activity.
- If set to Off or Continuous, this option will toggle backlighting between on continuously and off.

[Configuring the LCD backlight](#)

### Backlighting Timer / Toggle

A long press of the function key activates backlighting with the backlighting timer (see [Backlighting Timer](#)), and a short press toggles backlighting (see [Backlighting Toggle](#)).

[Configuring the LCD backlight](#)

### Channel Preset Call

Sends the preset call for the current channel, specified in the Channel Setup > Channels form > Signalling Preset tab.

[Defining fixed call sequences per-channel](#)

## Emergency Call

Sends an non-stealth emergency call, as defined in the Networks > Emergency form.

[Setting up emergency operation](#)

[Stealth and non-stealth emergency](#)

[About emergency operation](#)

## External Alert

Turns the radio's external alert on or off.

[Setting an external alert](#)

## Group Scanning Activity

Toggles the radio between scanning (as defined in the Channel Setup > Scan Groups form) and channel selection modes. Scanning mode can be identified on the radio by a steady orange LED. The group ID is displayed in the [Setting 1 for Function Key 1 to 4](#) field.

[Setting how the scan group is initiated](#)

## Keypress Tones Toggle

Turns audible indicators for the front panel keys on or off.

[About audible indicators](#)

[Enabling all audible indicators](#)

## Keypress Tones Volume

Toggles the volume of audible indicators for the front panel keys between high (6 dB above the audio volume) and low (6 dB below the audio volume).

[About audible indicators](#)

[Setting the volume of audible indicators](#)

## Low Power Transmit

Toggles between low power mode (where all transmissions will be at low power regardless of the channel's default) and each channel's programmed [Power](#) level. Low power will be either 1 W or 5 W, depending on the setting of the [Front Panel Low Power Control](#) field (Start-up form).

[Setting low power conditions.](#)

## Monitor

Toggles the radio's monitor function. This is assigned to both a long and short press of the function key.

[Setting how monitor is opened](#)

[About monitor](#)

## Monitor / Squelch Override

A short press of the function key toggles Monitor, a long press toggles Squelch Override.

[Setting how monitor is opened](#)

[Setting the squelch mute and squelch override](#)

[About monitor](#)

## Network Preset Calls

Calls one of the Selcall preset calls (1 to 4) specified in the Selcall > Free Format Bursts form. Select a specific call in the Setting 1 field.

[Defining up to 4 free-form preset calls per-system](#)

## Nuisance Delete

Temporarily removes a captured channel from a scan or voting group, unless the channel is the last remaining channel in the group. Any channels removed will be reinstated when the group is reselected or the radio is turned off then on again. Priority channels can be deleted if the [Delete Priority Channels](#) check box (Scan Groups form > Priority Scan tab) is selected.

**Note:** The current channel (if included in scanning due to the [Include Current Channel in Scan Regime](#) check box), and the [Scanning Default Tx Channel](#) can never be deleted using nuisance delete.

[Setting standard scanning options](#)

## Preset Channel

Changes the channel to the ID specified in [Setting 1 for Function Key 1 to 4](#).

[Adding channels](#)

## Quiet Operation

Turns quiet operation on or off. This silences all audible indicators except incoming call tones and warning tones. See also [Silent Operation](#).

[Enabling all audible indicators](#)

## Repeater Access Tone Tx

Transmits the currently selected channel's repeater access tone (see [Channel Repeater Access Tone](#)).

[Using a repeater with Selcall](#)

## Repeater Talkaround

Turns repeater talkaround on or off. Repeater talkaround allows the radio user to bypass repeater operation and so communicate directly with other radios. While repeater talkaround is active, all transmissions are made on the [Rx Frequency](#) programmed for the channel.

[Using a repeater with Selcall](#)

## Silent Operation

Toggles between normal and silent mode, where all indicators are switched off. See also [Quiet Operation](#).

[Enabling all audible indicators](#)

## Squelch Override

Opens or closes the radio's squelch mute, and any other mutes currently active. The radio user can hear all noise and any activity occurring on the channel.

[Setting the squelch mute and squelch override](#)

[About mutes](#)

## Scanning / Nuisance Delete

A short press of the function key starts [Group Scanning Activity](#), a long press removes a captured channel from a scan group ([Nuisance Delete](#)).

[Setting how the scan group is initiated](#)

[Setting standard scanning options](#)

# UI Preferences form

### Fields

[Backlight Mode](#)

[Backlight Duration](#)

[Confidence Tones](#)

[Confidence Tones Level](#)

[Silent Mode](#)

[Quiet Mode](#)

[Mic Gain 1](#)

[Mic Gain 2](#)

[Mic Gain 3](#)

[Max Audio Level 1](#)

[Max Audio Level 2](#)

[Level](#)

[Indicators](#)

### Backlight Mode

Sets the state of the backlight when the radio is powered up. Select Off, With Activity or Continuous.

- Off: the backlight will be inactive after power-up.
- With Activity: the backlight will be inactive after power up, and active when activity is detected such as a keypress or an incoming call. Backlighting will deactivate once activity has ceased and after the [Backlight Duration](#).
- Continuous: the backlight will be active after power up.

[Configuring the LCD backlight](#)

### Backlight Duration

Sets the backlight timer, which deactivates the backlight after being activated via the [Backlighting Timer](#) function key option or if the [Backlight Mode](#) is With Activity.

Enter a time between 1 and 15 seconds, or 0 for a system-assigned backlight duration of under 1 second.

[Configuring the LCD backlight](#)

### Confidence Tones

Enables or disables keypress confidence tones when the radio is powered up. Confidence tones tell the radio user whether or not an action is permitted whenever a keypad key or function key is pressed. Select the check box to enable keypress confidence tones.

[Enabling all audible indicators](#)

[About audible indicators](#)

### Confidence Tones Level

Sets the initial volume of the radio's confidence tones. Select High (6 dB above the audio volume) or Low (6 dB below the audio volume). If Confidence Tones are disabled, then the setting of this field has no effect.

[Setting the volume of audible indicators](#)

[About audible indicators](#)

### Silent Mode

Sets whether the radio powers up in Silent mode, where all indicators are switched off.

[Enabling all audible indicators](#)

[About audible indicators](#)



## Quiet Mode

Sets whether the radio powers up in Quiet mode, which silences all audible indicators except incoming call tones and warning tones.

[Enabling all audible indicators](#)

[About audible indicators](#)

## Mic Gain 1

\*\*\*TBD Sets the ratio of the output signal of the amplifier to the input signal. If this is set too high, the audio may become distorted. It should not be necessary to change this setting, unless you have specific requirements.

## Mic Gain 2

\*\*\*TBD

## Mic Gain 3

\*\*\*TBD

## Max Audio Level 1

Sets the output volume when the volume control is turned all the way up. This can be useful when limiting the output volume in quiet environments.

**Note:** If you set this too high, the radio's speaker may become overdriven and audio will be distorted.

## Max Audio Level 2

\*\*\*TBD

## Minimum Volume Level

Sets the output volume when the volume control is turned all the way down. This setting does not impact on the maximum volume, which never changes. Enter from 0 to 127, where 127 represents half of the maximum output volume and 0 means no volume.

**Note:** If the radio has no control head, this parameter is used as the default output volume level that is set on power-up.

[Setting the volume of audible indicators](#)

## Level

Sets the initial volume of the radio's audible indicators. Select High (6 dB above the audio volume) or Low (6 dB below the audio volume). This will affect the volume of all tones except confidence tones.

[Setting the volume of audible indicators](#)

[About audible indicators](#)

## Indicators

Allows you to turn the tones and beeps for certain events on or off. If the radio is in Silent or Quiet mode, then all of these indicators will be disabled regardless of their settings in this grid.

[Permanently disabling individual audible indicators](#)

[About audible indicators](#)

## Start-up form

### Fields

[Power On Mode](#)

[Startup In Low Power Mode](#)

[Front Panel Low Power Control](#)

[Reset On Error](#)

[List Operation Wrap Around](#)

[Security Lock On Power Up](#)

[Security PIN](#)

## Power On Mode

Sets how the radio will respond when ignition sense or power is applied, but before the radio user presses the on/off button. Select Power On, Remain Off or Previous State.

- **Power On:** the radio will turn on when power is applied. The radio user does not need to press the on/off button.
- **Power Off:** the radio will remain off when power is applied. The radio user must press the on/off button to start the radio.
- **Previous State:** the radio will either turn on or remain off, depending on whether the radio was on or off when power was removed.

[Setting how the radio starts](#)

### Startup In Low Power Mode

Sets whether all transmissions will be made at low power, ignoring the channel's default power setting, when the radio is first powered up.

**Note:** Add the [Low Power Transmit](#) option to a function key in the Key Settings form so the radio user can turn low power mode off if necessary.

[Setting low power conditions](#)

### Front Panel Low Power Control

Sets the power level that the radio will transmit on when the Low Power Transmit function key option is selected, or the radio starts in low power mode (see [Startup In Low Power Mode](#)). Select Low for the radio to transmit at 5 watts, or Very Low for the radio to transmit at 1 watt.

[Setting low power conditions](#)

### Reset On Error

Determines whether the radio will reset and attempt to restart after a system error. Clear this check box for the error (such as E1) to remain on the radio display.

**Note:** If you do not select this check box, you will need to reset the radio manually.

### List Operation Wrap Around

Determines the behaviour of scrolling lists such as channel selection. Select the check box for lists to be treated as a continuous loop, with the first and last entries adjacent. The next entry displayed after the last is the first, and vice versa. If not selected, the list movement stops when the first or last entry is reached.

[Adding channels](#)

### Security Lock On Power Up

Sets whether the radio will enter a locked state when the radio is turned on. In a locked state, the radio will not respond to any keypress, including the PTT, unless it is the valid sequence of function keys ([Security PIN](#)).

[Setting how the radio starts](#)

### Security PIN

Determines the function key sequence that will return the radio to a normal state if Security Lock On Power Up is enabled.

[Setting how the radio starts](#)

# PTT form

Applies to PTT, external PTT 1 and external PTT 2.

## Fields

[PTT Press Call Setup](#)  
[De-key After PTT Call Setup](#)  
[PTT Monitor](#)  
[De-key After PTT Monitor](#)  
[Inhibit PTT Transmission When Call Not Set Up](#)  
[Inhibit PTT When Emergency Active](#)  
[Inhibit PTT Transmission When Mic On Hook](#)  
[Inhibit PTT When External PTT Inhibit Active](#)  
[PTT Inhibit Is Indicated To User](#)  
[PTT Transmission Type](#)  
[PTT State Is Reflected](#)  
[PTT Priority](#)  
[Audio Source](#)

## PTT Press Call Setup

Determines whether the current channel's fixed Selcall sequence is sent on a PTT press. The current channel must have a Selcall network assigned, and a fixed call sequence defined in the Channel Setup > Channels form > Signalling preset tab. The call will not be granted if emergency mode is active or the PTT is being used to answer an incoming call.

[Adding a fixed call sequence to one or more channels](#)  
[Setting what happens when the PTT is keyed](#)

## De-key After PTT Call Setup

Determines what happens when a call has been initiated by the PTT ([PTT Press Call Setup](#)). Select Always, When Ack Expected or Never.

- Always: the radio will stop processing the current PTT request. To continue the call, the radio user must release the PTT and press it again.
- When Ack Expected: the radio will de-key if the [Receive Acknowledgements](#) check box (Networks > Features form) is enabled on the current Network. If this check box is cleared on the current Network, then the radio will not de-key.
- Never: the radio will continue to process the current PTT request.

**Note:** If a call is set up, and the radio continues to key up in the same PTT press, then any Leading ANI transmission will be suppressed.

[Adding a fixed call sequence to one or more channels](#)  
[Setting what happens when the PTT is keyed](#)

## PTT Monitor

Sets whether monitor is opened when the PTT key is pressed. Select Always, Carrier Present or Disabled.

- Never: the PTT has no affect on the radio's current monitor state.
- Always: monitor is always opened by the PTT, if it is not already open.
- Carrier Present: monitor is opened by the PTT if it is not is already open and the channel is busy.

[Opening monitor via a press of the PTT](#)

[Setting what happens when the PTT is keyed](#)

[About monitor](#)

## De-key After PTT Monitor

Determines what happens after monitor has been opened due to a PTT press. If the check box is selected, the radio will stop processing the current PTT request, forcing the user to first release the PTT and then press it again to continue. If the check box is cleared, the radio will continue to process the current PTT request.

[Opening monitor via a press of the PTT](#)

[Setting what happens when the PTT is keyed](#)

## Inhibit PTT Transmission When Call Not Set Up

Sets whether the PTT is disabled whenever monitor is closed. When the check box is selected, the radio user can only use the PTT after monitor has been opened via a keypress or after receiving a valid call. When the check box is cleared, pressing the PTT will always transmit on the current channel, unless there is activity on the channel and **Tx Inhibit** is set to Busy or Mute (Channels form).

[Setting what happens when the PTT is keyed](#)

[About PTT Inhibit](#)

## Inhibit PTT When Emergency Active

Sets whether the PTT is disabled during emergency mode.

## Inhibit PTT Transmission When Mic On Hook

Sets whether the PTT is disabled whenever the microphone is on the hook (the hookswitch is closed).

[Setting what happens when the PTT is keyed](#)

[About PTT Inhibit](#)

### Inhibit PTT When External PTT Inhibit Active

Sets whether the PTT can be disabled by a control line programmed for Toggle PTT Inhibit ([Programmable I/O form](#)).

[About PTT Inhibit](#)

### PTT Inhibit Is Indicated To User

Sets whether the tone used for Transmit Inhibit will sound when the radio user attempts to press the PTT and the PTT is inhibited.

[Setting what happens when the PTT is keyed](#)

[About PTT Inhibit](#)

### PTT Transmission Type

Determines whether the PTT will be used to transmit Voice, Data or neither. Select Voice for all voice radio communication using the PTT.

### PTT State Is Reflected

Sets whether the PTT state is to be reflected. When this check box is selected and the PTT is active, then the radio will assert the PTT active digital output.

### PTT Priority

Specifies a priority value for each PTT, between 0 and 2. A PTT with a priority value of 0 will always take the highest precedence when the radio is trying to decide which PTT request source will gain control of the transmitter, if there are multiple active requests.

### Audio Source

Specifies the microphone the radio uses when transmitting using each PTT. Also determines the [Audio Source](#) when configuring the audio path ([Programmable I/O form](#)). Select one of CH\_MIC, AUX\_MIC or Audio Tap In for each relevant PTT.

- CH MIC - Control Head Mic: the microphone plugged into the microphone socket of the front panel.
- AUX MIC - Auxiliary Microphone: audio from the options or auxiliary interface audio I/O line to the start of the TX Audio Path.
- Audio Tap In: Audio from the options or auxiliary interface audio I/O line to a programmed tap-in point in the Tx Audio Path (see the [Audio tab](#) on the [Programmable I/O form](#)).

# Programmable I/O form

## Tabs

[Digital tab](#)

[Audio tab](#)

[BCD tab](#)

## Digital tab

### Fields

[Pin](#)

[Direction](#)

[Label](#)

[Action](#)

[Active](#)

[Debounce](#)

[Signal State](#)

[Mirrored To](#)

### Pin

Identifies the specific line to assign an input event or output action to.

### Direction

Specifies whether the event is an input (a change from inactive to active will trigger an event in the radio) or an output (an event in the radio will send a momentary or latching signal to the pin).

### Label

Assigns a meaningful identifier to the programmable pin.

### Action

If the [Direction](#) field is set to Input, this is the action that will occur in the radio when the associated input line changes from an inactive to an active state.

If the [Direction](#) field is Output, this is the internal event that will cause a change of state on the assigned output pin.

## Active

Indicates whether the active state for the line is high voltage or low voltage. Only editable if the [Direction](#) for the pin is Input.

**Important:** Setting the active state to High will cause the radio to key up and the action to commence if the connector is removed or dislodged while the radio is on. To prevent this happening set the active state to Low.

## Debounce

Defines the debounce time that will be applied when detecting a high or low signal transition. Only available when the [Direction](#) for the pin is Input. Select from 0, 10, 25, 60 or 100 milliseconds. BCD inputs default to a debounce of 8 milliseconds, which cannot be changed.

## Signal State

Defines whether the nominated digital output is activated and stays in an active state (Latching), or is set to active then inactive once the event has finished (Momentary). Only available when the [Direction](#) for the pin is Output.

## Mirrored To

If the input is to be reflected on an output line, then this field defines the ID of the line that the signal is to be mirrored on. Only input pins can be mirrored to output pins.

## Action Parameters

The action parameters are only available for pins that have a [Direction](#) set to Input, and the [Action](#) set as follows:

- Preset Channel: available if Action is Preset Channel.
- Send Emergency Call: available if the Action is Send Emergency Call.
- Toggle Mute External: available if the Action is Toggle Mute External Audio.
- Unmute Audio Output: available if the Action is Unmute Audio Output Path.
- Mute Audio Output: available if the Action is Mute Audio Output Path.

## Audio tab

### Fields

[Audio Source](#)

[Tap In](#)



[Tap In Type](#)  
[Tap Out](#)  
[Tap Out Type](#)  
[Tap In Unmute](#)  
[Tap Out Unmute](#)  
[BIN / BCD Operation](#)  
[Front Panel Channel Selection Lockout](#)

#### Audio Source

Lists the PTT types that have the [Audio Source](#) field (PTT form) set to Audio Tap In. No PTT is also listed, and can be used for third-party applications such as hardware encryption.

#### Tap In

Specifies the point in the audio path that external audio will feed into. You would normally only set this if the [Audio Source](#) for a particular PTT is Audio Tap In.

#### Tap In Type

Specifies the type of tap-in junction. The following are the only valid combinations of Tap In and Tap In Type:

T1 - Bypass In  
T2 - Bypass In or Splice  
T4 - Bypass In or Splice  
T5 - Bypass In  
T6 - Bypass In  
R3 - Bypass In or Splice  
R5 - Bypass In or Combine

#### Tap In Unmute

Specifies the type of mute behaviour at the specified [Tap In](#) point.

#### Tap Out

Specifies the point in the audio path that audio will feed out from.

## Tap Out Type

Specifies the type of tap-out junction. The following are the only valid combinations of Tap Out and Tap Out Type:

R1 - Bypass Out or Split

R2 - Bypass Out or Split

R3 - Split or Splice

R4 - Split

R5 - Split

T1 - Bypass Out or Split

T2 - Split or Splice

T3 - Split

T7 - Split

## Tap Out Unmute

Specifies the type of mute behaviour at the specified [Tap Out](#) point.

## BCD tab

### Fields

[BIN / BCD Operation](#)

[Front Panel Channel Selection Lockout](#)

## BIN / BCD Operation

Specifies how the bit pattern is interpreted on lines with the [Direction](#) set to Input and [Action](#) set to BCD Pin 0-4. Select BCD to interpret the bit pattern as Binary Coded Decimal, or BIN to interpret the pattern as a straight binary number.

## Front Panel Channel Selection Lockout

Sets whether the radio user can use the front panel channel selection keys after the radio has changed channels using a BCD line. A BCD line is a pin with the [Direction](#) set to Input and [Action](#) set to BCD Pin 0-4. If selected, the radio user will not be able to use the front panel channel selection keys. If the check box is cleared, those keys can be used to change channels in addition to the BCD line.

# Part D    **Calibrating your radio**

This section outlines the TM8000 Calibration Application, including a description of the various calibration tests available.

- [Calibration basics](#)
- [Calibration tests](#).



# Calibration basics

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Tait TM8000 radios are designed to be totally electronically tuned. No physical tuning is required, as all tuning is done by electronic trimming usually in the form of a Digital-Analog Converter (DAC). The calibration process uses a PC running the calibration software, which is connected to a radio via an RS232 programming cable. RF in/out and audio in/out from the radio are also provided for connection to test equipment.

## Calibrating your radio

1. Connect a radio to your PC, connect the radio to calibration equipment and a power source, and turn the radio on.
2. Read the radio (optional).
3. Either:
  - Change some constant settings (see [Variable Parameters](#)), or
  - Complete some calibration tests (see [Calibration tests](#)).
4. View and check the calibration data calculated (optional - see [Viewing calibration data](#)).
5. Program the radio.

## Additional fields

The fields below are specific to the Calibration Application. See also [Changing data](#).

### Sliders

Sliders typically modify a [DAC](#) setting in the radio. A slider appears as a line with a movable button, and two arrow buttons either side. Moving the button will alter a value in a box to the right of the slider.

#### To adjust a slider

- Keyboard: select a slider using the Tab key. Press the left and right arrow keys to adjust the value in the box in steps of 1, or Page Up and Page Down to adjust the value in steps of 10. To move the slider above the upper limit of a field, hold shift and the right arrow key. The box will turn red.
- Mouse: select a slider by clicking on it. Click the < and > buttons to adjust the value in the box in steps of 1, click on the line either side of the movable button to adjust the value in steps of 10, or click and drag the movable button. To move the slider above the upper limit of a field, hold shift and click the > button. The box will turn red.

### Option buttons

Option buttons are round buttons used to select one of a group of mutually exclusive options. They are typically used to select a current state.

To change data in a group of option buttons:

- Keyboard: select an option button using the Tab key. Select the radio button by pressing the Space bar.
- Mouse: select an option button by clicking on it.

## **Instruction boxes**

An instruction box contains text that describes the steps for a calibration task. After completing each step, select or click the Next> button to move to the next step.

## **Specifications form**

In the Specifications form, you can read a radio's Product Code, Band, Type, Model, Database Version, Calibration Database Version, Software Version, Hardware Version and Serial Number.

From the forms tree, select Specifications. Select the Read Radio button to read a radio's information. While not essential, it is recommended that you read a radio before beginning the calibration tests.

## **Viewing calibration data**

After you have finished one or more calibration tests, you can preview the results of those tests. This can be useful before clicking Program Radio to send the new calibration data to the radio.

To view calibration data, navigate to the Raw Data form and click on the various tab pages.

# Calibration tests

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Each calibration test includes step-by-step instructions on how to carry out the test. Once an instruction has been carried out, select the Next> button.

Forms in which a number of steps must be repeated have an additional button that loops back to the first instruction that must be repeated.

The calibration test unit's external PTT should be set to Rx for all tests. Some tests are frequency dependent and so must be carried out across a range of test frequencies.

Once a test is finished, click on another form or select Edit > Validate Form to exit the form and save the data, or Edit > Revert Form to exit the form without saving the data.

## Calibration Tests

[TCXO](#)

[FE Tuning/RSSI](#)

[AGC](#)

[Final Gate Bias and Tx Driver Bias Limit](#)

[Tx Power Control](#)

[Variable Parameters](#)

## TCXO

The TCXO (temperature compensated crystal oscillator) provides the reference frequency from which all other RF frequencies are derived. The TCXO requires careful alignment to ensure that the transmitter and receiver are on frequency.

The TCXO Calibration test must be carried out at a room temperature of 25 degrees Celsius ( $\pm 5$  degrees), and should be completed as rapidly as possible since extended transmission times increase temperature, thereby making the calibration test less reliable.

### Instructions

1. Provide an unmodulated RF input signal at greater than -47dBm from an accurate RF signal generator, set to the test frequency identified on screen.
2. Click the Calibrate button.
3. Click the Accept button to save changes or Reject to cancel.

## FE Tuning/RSSI

The front end (FE) tuning voltage sets the centre of the bandpass filter in the receiver section of the radio. The TCXO must be correctly calibrated (TCXO Calibration test) before the front end can be tuned.

The received signal strength indicator (RSSI) must be calibrated to give an accurate measurement of received signal strength.

### Instructions

1. Connect a signal generator and set it to generate a signal on the frequency identified in the test frequency box. Set the power of the generated signal to the level indicated in the Signal Input Level box, with 3kHz deviation, and a 1kHz modulated tone.

2. Click the Calibrate button.
3. Loop Back to Instruction 1 for the next test frequency or click Next when all test frequencies are calibrated.
4. Click the Accept button to save changes or Reject to cancel.

## AGC

The Automatic Gain Control (AGC) is used to adjust the radio's gain in relation to various power levels. The AGC will begin to reduce gain when the combined signal power of the wanted signal and first adjacent channels is greater than  $-70\text{dBm}$  approximately. The calibration test is run at  $-68\text{dBm}$ ,  $-60\text{dBm}$  and  $-50\text{dBm}$ .

### Instructions

1. Set a signal generator to generate a signal to the power level in the Test Power Level box, with 3kHz deviation and a 1kHz modulated tone, at the frequency in the Test Frequency box. Turn the RF signal on. From this point on during the test, do not adjust the signal generator power level downwards, the power level must always be increasing. If you overshoot a power level setting, remove the signal and restart the test from Step 1.
2. Click the Calibrate button.
3. Increase the power level to the indicated power level identified on the test power level box. Do not increase it past this value then wind the signal generator power back down; if you overshoot, restart the test from Step 1.
4. Click the Calibrate button.
5. If the final power level has not been calibrated, loop back to instruction 3 and repeat for the next power level. If the final power level has been calibrated, click the Next button.
6. Click the Accept button to save changes or Reject to cancel.

## Final Gate Bias and Tx Driver Bias Limit

The final transistor in the radio must be biased at a constant current. Each transistor is different and so requires a different voltage to obtain the same current.

The Final Gate Bias 1 test must be completed first before the Final Gate Bias 2 test.

**Warning: Jumping to a high DAC setting (the slider will change to red) can cause overheating and component damage.**

### Instructions

1. Adjust the Digital Power Supply to a current limit at 2 A.
2. Read the current in mA drawn by the radio from the digital power supply's ammeter. Enter this number in the Standby Current Field and click the Set button.
3. Increase the level on each DAC slider slowly until the target current level is reading on the digital power supply's ammeter - or as close as possible, within 10mA (be cautious not to raise the DAC too high or damage can occur).
4. Click the Accept button to save changes or Reject to cancel.



## Tx Power Control

Power control must be calibrated for high, mid and low and very low power at five points across the radio's frequency band to ensure a flat power output across the operating band.

The Power Control test requires a total of 20 adjustments, four at each test frequency.

### Instructions

1. Adjust the Digital Power Supply to a current limit at 9 A.
2. Connect an RF Power meter to the antenna connector.
3. Set each of the DAC sliders in turn until the RF Power meter reads the target power level next to the slider.
4. If not all frequencies have been calibrated, click the Go To Instruction 2 button. When all frequencies are calibrated, click Next.
5. Click the Accept button to save changes or Reject to cancel.

## Variable Parameters

The Variable Parameter form contains text fields for entering in values that require no test equipment. You can enter different values here for parameters such as the [Default squelch levels](#), the Scanning RSSI Threshold level and hysteresis.

These settings should only be adjusted for special system requirements.



# Part E      Changing the radio firmware

The TM8000 programming application enables you to update the radio firmware. For more information, see:

- [Downloading new radio firmware](#)
- [Erasing software configurations](#)
- [Download reference.](#)



# Downloading new radio firmware

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When you upgrade radio firmware, the application will examine the new file for download, and delete and replace those sections of the radio's firmware that are different.

Before you start, make sure you have a copy of the latest radio firmware. You can obtain this from the Tait Technical Support web site. See [Getting help on the Internet](#) for more information.

## To download new radio firmware

1. Connect the radio to a PC and a power source, and turn the radio on.
2. Select Tools > Download to access the Downloading TM8100 Firmware window.
3. Select a COM Port using the [COM Port drop-down box](#).
4. Selected a different baud rate using the [Baud Rate drop-down box](#) (optional).
5. Click the [Report Configuration button](#) to preview the radio's current software version (optional).
6. Click the [Download button](#).
7. Navigate to the directory containing the new \*.S2 file.
8. Double click the file.

A progress bar will indicate the status of the current download, and once finished a message will display telling you whether the upgrade was successful.

# Erasing software configurations

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Under most situations, downloading new firmware using the [Download button](#) will erase and replace old software automatically. Sometimes, when creating custom applications, old software may not be correctly erased and will need to be removed manually.

**Warning: Do not erase software unless you have a specific need or requirement.**

## To erase a configuration

1. Click the [Report Configuration button](#).
2. Select the checkbox next the radio applications or configurations that you want to erase.

**Note:** You cannot erase the radio's boot code.

3. Click the [Erase Configuration button](#).

# Download reference

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After selecting Tools > Download, the Downloading TM8100 Firmware window appears with the following:

- [Configuration box](#)
- [Current Download](#)
- [Progress indicator](#)
- [COM Port drop-down box](#)
- [Baud Rate drop-down box](#)
- [Report Configuration button](#)
- [Erase Configuration button](#)
- [Download button](#)
- [Allow Unprotected Upgrade check box](#)
- [Status bar](#)

## Configuration box

The configuration box lists the following information, after clicking the [Report Configuration button](#).

- **Hardware version ID.** This lists the hardware version number and product code.
- **Radio application version and status.** The radio application software is the main code that controls the operation of the radio.
- **Boot code version and status.** The boot code is used to start the radio, including upgrade mode.
- **FPGA code version and status.** The FPGA (field-programmable gate array) Image holds additional code and logic not in the control software.
- **Any non-standard product versions and status.** Modified code that replaces in part or full any of the above software.

## Current Download

While a download is in progress, the Current Download box displays the version of the file currently being downloaded to the radio.

## Progress indicator

Indicates the percentage complete of the current file being downloaded.

#### COM Port drop-down box

Specifies a COM port (1-4) or parallel port (LPT1) that will be used for the firmware download. FACTORY provides a synchronous serial connection to a PC parallel port.

#### Baud Rate drop-down box

Set the baud rate for serial communications in upgrade mode. Select Auto for the software to select the optimum baud rate. Alternatively, select a higher baud rate for faster communication, or a lower baud rate if the communication links are not secure.

#### Report Configuration button

Interrogates the radio, and lists the current radio software and hardware in the [Configuration box](#).

#### Erase Configuration button

Deletes the configurations that are selected using the check boxes.

#### Download button

Replaces the current firmware with that contained in the selected file.

#### Allow Unprotected Upgrade check box

Allows the FPGA Image, as well as the radio application, to be upgraded. If the check box is cleared, only the radio application software will be downloaded.

#### Status bar

The status bar displays:

- the current operation being performed when the application is running.
- the result once the application has ended, indicating error number and cause of a failure, or operation successful if completed correctly.
- the status of the serial or parallel port, whether it is connected or not, and at what baud rate.



# Part F Troubleshooting

This section covers typical problems when programming conventional radios. For additional help, see [Getting help on the Internet](#), or see your local Tait dealer.

Troubleshooting topics include:

- [Common application problems](#)
- [Common conventional programming problems.](#)



# Common application problems

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## Topics

- [Cannot see forms tree](#)
- [Cannot find a field](#)
- [Cannot enable a field](#)
- [Radio won't read or program](#)
- [Application Errors](#)

## Cannot see forms tree

The windows have been resized so the forms tree is no longer visible. Click and drag the bar to the right of the tree view to display it.

## Cannot find a field

Either:

- The field is factory only and can only be viewed with a dongle.
- The field is on another form. Search the online help for more information on the field and where to find it.

## Cannot enable a field

Either:

- The field is disabled for that access level. Select a higher Access Level (Tools > Access Levels).
- Another field is be disabling it. Use What's This help (click the toolbar icon or press Shift+F1) for help on how to enable the field.
- The field is read-only and cannot be changed.

## Radio won't read or program

Check start-up data options. The [Powerup State](#) (Data form) must be set to C-Mode to read or program the radio.

The wrong Communication Port has been selected. Select another Communication Port in Tools > Options.

The programming cable between the Communication Port and the Radio is not connected properly. Make sure all cables are working and are connected.

## Application Errors

### Topics

- [DLL error on start-up](#)
- [Checksum error](#)
- [No appropriate license error](#)

### DLL error on start-up

Restart the PC and try starting the program.

If there are still DLL errors, reinstall the application.

### **Checksum error**

The application displays a message: "Checksum failed for item ..." when attempting to load a file.

Some of the data in the file is corrupt. Try reading the radio and re-programming.

### **No appropriate license error**

The application displays the following message when starting:

"You do not have an appropriate license to use this functionality".

One or more system files have not been registered during installation due to the computer not restarting when prompted. Restart your PC.

# Common conventional programming problems

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## Topics

- [Radio not transmitting](#)
- [Scanning troubleshooting](#)
- [Subaudible signalling troubleshooting](#)
- [Selcall troubleshooting](#)
- [Download troubleshooting](#)

## Radio not transmitting

- Is the PTT inhibited? Check the various Inhibit PTT... options on the [PTT form](#).
- Is the radio not transmitting because of activity on the channel (Tx Inhibit)? Wait until the activity has ended and try again, or set [Tx Inhibit](#) (Channel Setup > Channels form > Detailed tab) to None.
- Is the channel's power set to Off? Set the [Power](#) field (Channel Setup > Channels form > Summary tab) to at least Low.
- Is the PTT set to transmit Data or None? Set the [PTT Transmission Type](#) (PTT form) to Voice.
- Is the radio locked due to the Lockout timer? Disable the lockout timer by setting the [Tx Lockout Duration](#) (Networks > Basic Settings form > Basic Network Settings tab) to 0.
- Is the radio overheating and inhibiting transmission? Turn the radio off and try transmitting again after the radio has cooled down.
- Is L flashing on the radio display? The synthesiser out of lock (a channel is programmed to transmit out of frequency). Make sure all the channel frequencies are within the radio's frequency band ([Band](#) field > Specifications form).

## Scanning troubleshooting

If the radio is not capturing a channel with activity:

- Set the [Squelch Detect Type](#) to Noise Level.
- Set the [Squelch](#) level to Country.
- Check that the activity is valid (for example, has a valid subaudible signalling code or tone).

If the radio is cutting in and out of a channel during scanning:

- Set the [Squelch Detect Type](#) to Noise Level.
- Set the [Squelch](#) level to City.

If priority scanning is disrupting received transmissions, either:

- Set a longer priority sample time ([Captured Channel Priority Sample Timer](#)).
- Consider disabling priority scanning (clear the [Priority Scan](#) check box) and define a channel more than once in the member list.

## Subaudible signalling troubleshooting

If you can hear transmissions that are not intended for you:

- Set [Monitor State at Power Up](#) to Closed (Receiver Monitoring form).
- Set [Monitor Overrides](#) to Call Mutes (Networks > Basic Settings form > Receiver Monitoring tab).

If you are not receiving intended transmissions:

- Is the same tone being sent and received? Check [Rx Sig](#) and [Tx Sig](#) (Channel Setup > Channels form > Summary tab).
- If using DCS, try inverting the polarity using [Tx Polarity](#) and [Rx Polarity](#) (Networks > Basic Settings form > Subaudible Signalling tab).

If subaudible signalling is causing transmissions to cut in and out, set the [Invalid Confirmation Delay](#) to a higher number (Networks > Basic Settings form > Subaudible Signalling tab).

## Selcall troubleshooting

If calls are not being decoded, refer to the topic [Making sure Selcall sequences are decoded](#). Faster tone speeds (such as a short [Tone Period](#) and [Lead Out Delay](#)) may increase speed but hinder performance.

If Selcall is still not operating as intended:

- It is important that settings (such as the Tx and Rx formats and tone settings) are the same for all radios in the fleet.
- If using a the selective call mute (a closed system), you must set monitor correctly. See [Using monitor with a closed selective system](#).

## Download troubleshooting

Checksum error: check hardware compatibility.

Radio can't reset: remove power to the radio. Re-apply power and restart the radio.

# Part G Reference

- [CTCSS tones and DCS codes](#)
- [Default squelch levels](#)
- [Selcall tone sets](#)





# CTCSS tones and DCS codes

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Table 1: Standard CTCSS Tones

Freq (Hz)	Freq (Hz)	Freq (Hz)	Freq (Hz)
67.0	94.8	131.8	186.2
69.3	97.4	136.5	192.8
71.9	100.0	141.3	203.5
74.4	103.5	146.2	210.7
77.0	107.2	151.4	218.1
79.7	110.9	156.7	225.7
82.5	114.8	162.2	233.6
85.4	118.8	167.9	241.8
88.5	123.0	173.8	250.3
91.5	127.3	179.9	

Table 2: Non-Standard CTCSS Tones

Freq (Hz)	Freq (Hz)
69.3/69.4	189.9
159.8	196.6
165.5	199.5
171.3	206.5
177.3	229.1
183.5	254.1

**Note:** While 69.4 is not included as an option, it is acceptable to use 69.3Hz as there is no practical difference.

Table 3: Standard DCS Codes and Their Inverses

Code : Inv	Code : Inv	Code : Inv	Code : Inv	Code : Inv	Code : Inv	Code : Inv
023 : 047	073 : 506	156 : 265	261 : 732	365 : 125	503 : 162	654 : 743
025 : 244	074 : 174	162 : 503	263 : 205	371 : 734	506 : 073	662 : 466
026 : 464	114 : 712	165 : 251	265 : 156	411 : 226	516 : 432	664 : 311
031 : 627	115 : 152	172 : 036	271 : 065	412 : 143	532 : 343	703 : 565
032 : 051	116 : 754	174 : 074	306 : 071	413 : 054	546 : 132	712 : 114
043 : 445	125 : 365	205 : 263	311 : 664	423 : 315	565 : 703	723 : 431
047 : 023	131 : 364	223 : 134	315 : 423	431 : 723	606 : 631	731 : 155
051 : 032	132 : 546	226 : 411	331 : 654	432 : 516	612 : 346	732 : 261
054 : 413	134 : 223	243 : 351	343 : 532	445 : 043	624 : 632	734 : 371
065 : 271	143 : 412	244 : 025	346 : 612	464 : 026	627 : 031	743 : 654
071 : 306	152 : 115	245 : 072	351 : 243	465 : 331	631 : 606	754 : 116
072 : 245	155 : 731	251 : 165	364 : 131	466 : 662	632 : 624	

Table 4: Commonly Used DCS Codes and Their Inverses

Code : Inv	Code : Inv	Code : Inv	Code : Inv	Code : Inv	Code : Inv
017 : 050	122 : 225	246 : 523	274 : 145	446 : 255	462 : 252
036 : 172	145 : 274	252 : 462	325 : 526	452 : 053	523 : 246
050 : 017	212 : 356	255 : 446	332 : 455	454 : 266	526 : 325
053 : 452	225 : 122	266 : 454	356 : 212	455 : 332	

# Default squelch levels

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Squelch	Noise Level (dB SINAD)	Signal Strength (dBm Sensitivity)
Country	8	119
City	12	110
Hard	20	100

# Selcall tone sets

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The following tone sets are available in the Selcall > Tone Settings form:

- [CCIR](#)
- [EIA](#)
- [EEA](#)
- [ZVEI-I](#)
- [ZVEI-II](#)
- [ZVEI-III](#)
- [PZVEI](#)
- [NATEL](#)
- [DZVEI](#)

**Note:** In all tone sets E is the repeat tone by default.

## CCIR

International Radio Consultative Committee.

Tone : Frequency (Hz)	Tone : Frequency (Hz)
0 : 1981	8 : 1747
1 : 1124	9 : 1860
2 : 1197	A : 2400
3 : 1275	B : 930
4 : 1358	C : 2247
5 : 1446	D : 991
6 : 1540	E : 2110
7 : 1640	F : 1055

## EIA

Electronic Industries Alliance.

<b>Tone : Frequency (Hz)</b>	<b>Tone : Frequency (Hz)</b>
0 : 600	8 : 1728
1 : 741	9 : 1869
2 : 882	A : 2151
3 : 1023	B : 2433
4 : 1164	C : 2010
5 : 1305	D : 2292
6 : 1446	E : 459
7 : 1587	F : 1091

## EEA

<b>Tone : Frequency (Hz)</b>	<b>Tone : Frequency (Hz)</b>
0 : 1981	8 : 1747
1 : 1124	9 : 1860
2 : 1197	A : 1055
3 : 1275	B : 930
4 : 1358	C : 2400
5 : 1446	D : 991
6 : 1540	E : 2110
7 : 1640	F : 2247

## ZVEI-I

Zentralverband der Elektrotechnik und Elektronikindustrie (the German Electrical and Electronic Manufacturers' Association).

<b>Tone : Frequency (Hz)</b>	<b>Tone : Frequency (Hz)</b>
0 : 2400	8 : 2000
1 : 1060	9 : 2200
2 : 1160	A : 2800
3 : 1270	B : 810
4 : 1400	C : 970
5 : 1530	D : 885
6 : 1670	E : 2600
7 : 1830	F : 680

## ZVEI-II

Zentralverband der Elektrotechnik und Elektronikindustrie (the German Electrical and Electronic Manufacturers' Association).

<b>Tone : Frequency (Hz)</b>	<b>Tone : Frequency (Hz)</b>
0 : 2400	8 : 2000
2 : 1060	9 : 2200
3 : 1160	A : 885
4 : 1270	B : 825
5 : 1400	C : 740
6 : 1530	D : 680
7 : 1670	E : 970
8 : 1830	F : 2600

## ZVEI-III

Zentralverband der Elektrotechnik und Elektronikindustrie (the German Electrical and Electronic Manufacturers' Association).

<b>Tone : Frequency (Hz)</b>	<b>Tone : Frequency (Hz)</b>
0 : 2400	8 : 2000
1 : 1060	9 : 2200
2 : 1160	A : 885
3 : 1270	B : 810
4 : 1400	C : 2800
5 : 1530	D : 680
6 : 1670	E : 970
7 : 1830	F : 2600

## PZVEI

<b>Tone : Frequency (Hz)</b>	<b>Tone : Frequency (Hz)</b>
0 : 2400	8 : 2000
1 : 1060	9 : 2200
2 : 1160	A : 970
3 : 1270	B : 810
4 : 1400	C : 2800
5 : 1530	D : 885
6 : 1670	E : 2600
7 : 1830	F : 680

## NATEL

Neues Auto Telefon (Switzerland).

Tone : Frequency (Hz)	Tone : Frequency (Hz)
0 : 1633	8 : 1336
1 : 631	9 : 1477
2 : 697	A : 1995
3 : 770	B : 571
4 : 852	C : 2205
5 : 941	D : 2437
6 : 1040	E : 1805
7 : 1209	F : 2694

## DZVEI

Tone : Frequency (Hz)	Tone : Frequency (Hz)
0 : 2200	8 : 1830
1 : 970	9 : 2000
2 : 1060	A : 825
3 : 1160	B : 740
4 : 1270	C : 2600
5 : 1400	D : 885
6 : 1530	E : 2400
7 : 1670	F : 680

## Custom Selcall tone frequencies and tolerances

**Note:** You cannot select a frequency for a tone that falls in the tolerance range of another tone.



<b>Tone : Tolerance</b>	<b>Tone : Tolerance</b>	<b>Tone : Tolerance</b>	<b>Tone : Tolerance</b>
571 : 540-589	930 : 911-949	1209 : 1192-1231	1830 : 1795-1866
600 : 570-618	941 : 922-960	1270 : 1252-1293	1860 : 1824-1897
631 : 603-649	970 : 951-989	1275 : 1257-1298	1869 : 1832-1906
680 : 654-698	991 : 973-1010	1305 : 1287-1328	1981 : 1937-2022
697 : 671-715	1023 : 1005-1043	1336 : 1318-1360	1995 : 1950-2036
740 : 716-758	1040 : 1022-1060	1358 : 1339-1382	2000 : 1955-2041
741 : 717-759	1055 : 1037-1075	1400 : 1381-1425	2010 : 1965-2052
770 : 747-788	1060 : 1042-1080	1446 : 1426-1472	2110 : 2057-2155
810 : 788-828	1091 : 1074-1111	1477 : 1456-1504	2151 : 2095-2198
825 : 803-843	1124 : 1107-1145	1728 : 1698-1761	2200 : 2140-2249
852 : 831-870	1160 : 1143-1181	1747 : 1716-1780	2205 : 2145-2254
882 : 862-901	1164 : 1147-1185	1805 : 1772-1840	2247 : 2183-2298
885 : 865-904	1197 : 1180-1219		



# Glossary

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The glossary contains a list of key words and phrases used in the programming application. Click one of the letters above to access the glossary topics.

## A

[A.N.I.](#)

[auto acknowledge](#)

### A.N.I.

Automatic number identification. This is a tone sequence transmitted during voice transmission in order to identify the radio in use. The tones transmitted can be a sequence of tones, a single beep or the repeater access tone.

### auto acknowledge

When a radio receives a Selcall sequence that contains its identity, it can be programmed to transmit an auto acknowledge sequence or beep.

An auto acknowledge sequence can also include a status digit, which can be displayed on the receiving radio upon receipt of the auto acknowledge.

## B

[BCD](#)

[BIN](#)

[birdie](#)

### BCD

Binary coded decimal. This refers to a means of selecting (addressing) channels on a radio from an external source. An alternative to BCD selection is BIN (binary) selection.

### BIN

BIN is an abbreviation for binary and refers to a means of selecting (addressing) channels on a radio from an external source. An alternative to binary selection is BCD selection.

### birdie

A birdie is a hum or whistle on a channel caused by internal interference. A birdie can be eliminated by activating a birdie killer on the channel.

## C

[calibration](#)

[captured channel](#)

[CCDI](#)

[control head](#)

[conventional operation](#)

[CTCSS](#)

### calibration

Calibration is the process whereby a radio is manually or electronically tuned for optimal performance. Calibration is normally only carried out during product manufacture or major service.

<b>captured channel</b>	A captured channel is a scanning group member channel the radio has selected for receiving traffic. A member channel will be captured if it carries valid activity.
<b>CCDI</b>	Computer controlled data interface. This provides a means of controlling radios from some form of computer equipment. The CCDI allows for the implementation of semi- and fully-automatic communications systems such as short data messaging (SDMs), computerised despatch terminals, remote outstations and data radio terminals.
<b>control head</b>	The control head is the part of the radio that provides the primary man-machine interface. The control head consists of input controls and output controls.
<b>conventional operation</b>	In conventional operation, what channel the radio is tuned to is determined by the radio itself, whereas in trunking the network manages what channel a radio is tuned to and allocates channels for calls.  A trunked radio can switch between trunking and conventional modes of operation.
<b>CTCSS</b>	Continuous tone coded squelch system (or similar). This is a type of signalling used for segregating groups of users. CTCSS uses subaudible tones between 67 and 250.3 Hz to identify a group of radio users.
<b>D</b>	<a href="#">DAC</a> <a href="#">database</a> <a href="#">DCS</a> <a href="#">Debounce</a> <a href="#">DTMF</a>
<b>DAC</b>	Digital to analog converter. An electronic device that outputs a voltage dependent upon the value of binary data input.
<b>database</b>	The set of programmable data points that allows the product to be customised for a particular application or mode of operation.
<b>DCS</b>	Digital coded squelch. This is a type of signalling used for segregating groups of users. DCS uses subaudible tones between 10 and 134 Hz to transmit digital data to identify a group of radio users.  DCS codes take the form of a continuously repeating 23-bit digital codeword that represents a user group. Codewords are identified by a three-digit octal number, which forms part of the codeword. The remainder of the codeword includes a sequence of bits derived mathematically from the three-digit code. When assigning DCS signalling for a channel, it is only necessary to specify the three-digit code.

<b>Debounce</b>	Bouncing is the tendency of any two metal contacts in an electronic device to generate multiple signals as the contacts close or open. Debounce is to counter the effect of bouncing to ensure that only one digital signal can be registered within the space of a given time (usually milliseconds).
<b>DTMF</b>	Dual tone multiple frequency. This is the tone-based system used for the world's telephone networks. A DTMF "tone" actually consists of a pair of tones. DTMF tones are sometimes referred to as "touch tones".  DTMF signalling is often used for the transmission of telephone dialling information and may be used on systems authorised to operate with connection to a PABX or a PSTN.
<b>E</b>	<a href="#">emergency mode</a>
<b>emergency mode</b>	When in emergency mode, the radio cycles between receiving and transmitting so that the called party can hear activity near the radio and so decide how to respond. The radio can be programmed so that all indicators remain unchanged while in emergency mode.
<b>F</b>	<a href="#">fixed call sequence</a> <a href="#">free-format sequence</a>
<b>fixed call sequence</b>	The fixed call sequence is a Selcall sequence that is defined at radio programming time and that can be transmitted by the press of a designated key. Fixed Call presets are per-channel. 20 channels mean you can have 20 different fixed preset calls per radio.
<b>free-format sequence</b>	A free-format sequence is a Selcall sequence that does not have to conform to the Selcall network's transmit (Tx) format. Free format presets are per-system. Four systems and four preset calls mean you can have up to 16 different free-format calls per radio.
<b>H</b>	<a href="#">handshaking</a> <a href="#">hookswitch</a>
<b>handshaking</b>	Handshaking refers to the character definitions used to begin and end data flow in CCDI (computer controlled data interface) operation. The handshaking characters prevent the loss of data between the radio unit and the computer equipment.
<b>hookswitch</b>	The microphone hookswitch is closed when the microphone button is connected to the clip. The hookswitch is open when the microphone is removed from the microphone clip.
<b>I</b>	<a href="#">inhibit</a>

[invalid activity](#)

[invalid call](#)

**inhibit** When the radio is inhibited, the state of the radio will not change. For example, transmit inhibit prevents the radio transmitting, and PTT inhibit prevents the radio's PTT from changing the radio's state.

**invalid activity** Invalid activity is traffic on a channel that carries signalling that does not match that of the receiving radio.

**invalid call** An invalid call is a Selcall sequence received that matches the [Rx Format](#) (or number of 'R's in the R-burst if the [Rx Call Sub-Sequence Decoding](#) check box is selected), but the R-burst does not match [Rx Decode 1](#), [Rx Decode 2](#) or the [RMR Sequence](#).

## M

[member channel](#)

[monitor](#)

[monitor-reset call](#)

[mute](#)

**member channel** A member channel is a channel that belongs to a scanning or voting group.

**monitor** Monitor allows the radio user to override a channel's signalling and so hear all traffic on a channel.

**monitor-reset call** A monitor-reset call is a received Selcall sequence that closes the radio's monitor and squelch, if open. This can be achieved through an appended C tone, or a remote monitor reset sequence. A monitor-reset call will also end emergency mode so the radio can resume normal operation (unless it is a stealth emergency will Toggle Cycling/Quiet state selected).

**mute** A mute controls the circumstances under which a received signal is passed to the radio's speaker. When a mute is active, the radio's speaker only unmutes under certain conditions, determined by the type of signalling operating on a channel and the squelch (carrier) mute threshold.

## P

[programming database](#)

**programming database** The programming database is the information that is altered using the radio programming application.

## R

[radio identity](#)

**radio identity** Conventional radios operating on a Selcall network can have a unique identity assigned. This identity is defined by the Rx decode sequence 1 or 2.

<b>S</b>	<a href="#">Selcall</a> <a href="#">selective system</a> <a href="#">signalling</a> <a href="#">squelch tail</a> <a href="#">subaudible signalling</a>
<b>Selcall</b>	<p>Selcall stands for “selective calling”, which is a signalling system that uses sequences of audible tones to isolate calls intended for specific radios. Each radio operating on a Selcall network can have a unique identity assigned.</p> <p>Selcall is sometimes called multi-tone or five-tone.</p>
<b>selective system</b>	<p>A selective system is one that isolates groups of users on a system by using some form of selective calling e.g. Selcall or two-tone.</p>
<b>signalling</b>	<p>Non-voice coding on the channel for the purpose of identifying parties and/or segregating user groups, e.g. CTCSS, DCS, DTMF, Selcall, two-tone.</p>
<b>squelch tail</b>	<p>The end of a received transmission where a radio’s squelch (carrier) mute remains open for a fraction of a second before closing. This results in a burst of squelch (a ‘chhk’ sound). This can be countered with <a href="#">subaudible signalling</a> by using a lead-out delay, or by sending a reverse tone (<a href="#">CTCSS</a>) or stop tone (<a href="#">DCS</a>) that signals the end of a transmission. This enables the radio to close the squelch mute sooner.</p>
<b>subaudible signalling</b>	<p>Subaudible signalling is signalling that is at the bottom end of the range of audible frequencies.</p>
<b>T</b>	<a href="#">traffic</a> <a href="#">Two-tone</a>
<b>traffic</b>	<p>Traffic is an intelligible signal on a channel that exceeds the radio’s noise mute threshold.</p>
<b>Two-tone</b>	<p>Two-tone signalling is in-band, two-tone sequential signalling used to control the muting and unmuting of a radio. This signalling is used for selective calling of individual units or groups of units.</p>
<b>V</b>	<a href="#">valid activity</a>
<b>valid activity</b>	<p>Valid activity is traffic on a channel that carries signalling that matches that programmed for the receiving radio. The radio’s mute opens upon detecting valid activity.</p>





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