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Important Note

This guide is optimized for the following web browsers:

- [Internet Explorer 7.0](#) and later

[Mozilla Firefox 3.0](#) and later

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If you have difficulty viewing this guide in your current browser, please try downloading one of the browsers listed.

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BCD396XT

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Conventional Systems

Since a conventional system is really a collection of frequencies, the first thing you need to know is the frequency for each channel you want to program. Here is an example of a conventional system frequency list from [RadioReference](#) :

Skywarn ▶

Frequency	Input	License	Type	Tone	Alpha Tag	Description	Mode	Tag
146.94000	146.34000	K5FTW-R	RM	110.9 PL	TC RACES Pri	Tarrant County RACES/Skywarn Primary	FM	Ham
146.76000	146.16000	K5FTW-R	RM	110.9 PL	TC RACES B/U	Tarrant County RACES/Skywarn Backup	FM	Ham
444.10000	449.10000	K5FTW-R	RM	110.9 PL	TC RACES Adm	Tarrant County Backup / Admin / Secondary Net Freq.	FM	Ham
224.94000	223.34000	K5FTW-R	RM	110.9 PL	TC RACES Int	Tarrant County Admin Freq. / WX Service Intercom Freq.	FM	Ham

Conventional System

- Here is a [conceptual layout diagram](#) of a basic conventional system. ([Click here](#) for a legend of the diagram.)
- You can download a planning worksheet for conventional systems as a [pdf file](#) or an [Excel spreadsheet file](#).

Programming a Conventional System

To program a conventional system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create a system

1. Go to the [Program System](#) menu and choose *New System*.
2. The scanner will prompt you for the System Type. Select *Conventional*.
3. When the scanner prompts you confirm, tap **YES**.
4. The scanner creates the system with a default name. Select [Edit Name](#) if you want to change it.
5. If you need to change any of the system properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

System properties

(All of these options can be found under the [Program System](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Number tag (Edit Sys Option#Set Number Tag) Quick key (Edit Sys Option#Set Quick Key)
Optional	Automatic Gain Control (AGC) (Edit Sys Option#Set Audio AGC) Delay time (Edit Sys Option#Set Delay Time) Hold time (Edit Sys Option#Set Hold Time) Lockout (Edit Sys Option#Set Lockout) P25 wait time (Edit Sys Option#P25 Waiting Time) Startup key (Edit Sys Option#Set Startup Key)
Available operations	Copy system Delete system

Create at least 1 channel group

Each conventional system can contain up to 20 channel groups, and all systems must contain at least 1 channel group.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Group](#) menu and select *New Group*.

- If you need to change any of the channel group properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel group properties

(All of these options can be found by selecting the group name under the [Edit Group](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Quick key (Set Quick Key)
Optional	Location information (Set LocationInfo) Lockout (Set Lockout)
Available operations	Delete Group

Create at least 1 channel in each group

Each conventional system can contain up to 1000 channels in each group, and all groups must contain at least 1 channel.

- On the [Edit Group](#) menu, select the channel group you just created.
- Go to the [Edit Channel](#) menu and select *New Channel*.
- Input the frequency for this channel in MHz.
- If you need to change any of the channel properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel properties

(All of these options can be found by selecting the channel name under the [Edit Channel](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	Frequency (Edit Frequency)
Recommended	Analog/digital (Set Audio Type) <ul style="list-style-type: none"> ▪ CTCSS/DCS (Edit Channel#Set CTCSS/DCS) (analog channels) ▪ P25 Network Address (Edit Channel#P25 NAC Option) (digital channels) Modulation (Set Modulation) Name (Edit Name) Number tag (Set Number Tag)
Optional	Alert (Set Alert) Attenuator Lockout (Set Lockout) Priority (Set Priority) Volume Offset
Available operations	Copy Channel Delete Channel

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EDACS SCAT Systems

This section deals with EDACS SCAT systems. [Click here for information on EDACS Wide and Narrow systems.](#) Below is an example of an EDACS SCAT system from [RadioReference](#) :

System Name:	Medley City Public Safety
Location:	Medley, FL
County:	Dade
System Type:	EDACS SCAT
System Voice:	Analog
Last Updated:	<i>Updated Function Tag assignments for 1 talkgroups</i>
Hits:	1742

System Frequencies

Red (c) are Primary Control Channels | **Blue (a)** are alternate control channels | Click a Site Name for additional site information | Site Map: [FCC Callsigns RR Locations](#)

Site Name	
000 Police 01 855.13750c	

System Talkgroups

Updated in the last 7 days
 Updated in the last 24 hours
 [List All in one table](#)
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POLICE Talkgroups ▶

DEC	AFS	Mode	Alpha Tag	Description	Tag
100	00-124	A	DISPATCH	Police Dispatch	Law Dispatch

EDACS SCAT System

And here is a [conceptual layout diagram](#) of a basic EDACS SCAT system. ([Click here](#) for a legend of the diagram.)

Programming an EDACS System

To program an EDACS system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create a system

1. Go to the [Program System](#) menu and choose *New System*.
2. The scanner will prompt you for the System Type. Select *EDCS*.
3. The scanner will prompt you for the sub-type. Select *SCAT*.
4. When the scanner prompts you confirm, tap **YES**.
5. The scanner creates the system with a default name. Select [Edit Name](#) if you want to change it.
6. If you need to change any of the system properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

System properties

(All of these options can be found under the [Program System](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Number tag (Edit Sys Option#Set Number Tag)
Optional	Automatic gain control (AGC) (Edit Sys Option#Set Audio AGC) Delay time (Edit Sys Option#Set Delay Time)
Available operations	Copy system Delete system

Create a site

Each EDACS SCAT system must contain exactly 1 site.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Site](#) menu.
3. If you need to change any of the site properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Site properties

(All of these options can be found by selecting the site name under the [Edit Site](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Quick key (Set Quick Key)
Optional	Attenuator (Set Attenuator) Hold time (Set Hold Time) Location information (Set LocationInfo) Lockout (Set Lockout) Modulation (Set Modulation) Startup key (Set Startup Key)
Available operations	None

Create at least 1 frequency

Each EDACS SCAT system must contain at least 1 frequency in its site.

1. Open the [Edit Site](#) menu.
2. Go to the [Set Frequencies](#) sub-menu and select *New Frequency*.
3. Enter at least 1 frequency for this site.
4. If you need to change any of the frequency properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Frequency properties

(All of these options can be found by selecting the frequency under the [Set Frequencies](#) sub-menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
-----------------	------

Recommended	Number tag (Edit Sys Option#Set Number Tag)
Optional	Lockout (Set Lockout)
Available operations	Delete Frequency

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EDACS Trunked Systems

This section deals with EDACS Wide or standard systems. [Click here for information on EDACS SCAT systems](#). Below is an example of an EDACS trunked system from [RadioReference](#) :

System Name:	Irving Public Safety System						
Location:	Irving, TX						
County:	Dallas						
System Type:	EDACS Standard						
System Voice:	Analog						
Last Updated:	11-08-2007 03:40						

System Frequencies								
Red* are Primary Control Channels				Blue* are Secondary Control Channels				
Site	Description							
001	Primary	01-868.53750*	02-868.06750	03-868.59750	04-855.46250	05-868.63750	06-857.21250	07-868.73750
		08-868.83750	09-866.56750	10-866.91250				

EDACS Wide System

- Here is a [conceptual layout diagram](#) of a basic EDACS Wide system. ([Click here](#) for a legend of the diagram.)
- You can download a planning worksheet for EDACS systems as a [pdf file](#) or an [Excel spreadsheet file](#).

Programming an EDACS System

To program an EDACS system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create a system

1. Go to the [Program System](#) menu and choose *New System*.
2. The scanner will prompt you for the System Type. Select *EDCS*.
3. The scanner will prompt you for the sub-type. Select *Wide/Narrow*.
4. When the scanner prompts you confirm, tap **YES**.
5. The scanner creates the system with a default name. Select [Edit Name](#) if you want to change it.
6. If you need to change any of the system properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

System properties

(All of these options can be found under the [Program System](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Number tag (Edit Sys Option#Set Number Tag)

Optional	Automatic gain control (AGC) (Edit Sys Option#Set Audio AGC) Delay time (Edit Sys Option#Set Delay Time) Emergency alert (Edit Sys Option#Emergency Alert) ID format (Edit Sys Option#Set ID Format (DEC/HEX) or (AFS/DEC)) ID scan/search (Edit Sys Option#ID Scan/Search) Priority ID scan (Priority ID scan)
Available operations	Copy system Delete system Review Locked-Out IDs (Edit Sys Option#Rvw ID:Srch L/O) Clear All Locked-Out IDs (Edit Sys Option#Clr All L/O IDs)

Create at least 1 site

Each EDACS system can contain up to 256 sites, and all systems must contain at least 1 site.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Site](#) menu and select *New Site*.
3. When you enter a new site, the scanner will prompt you to select the [Site Type](#). Select *Wide (standard)* or *Narrow*, according to the site type.
4. If you need to change any of the site properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Site properties

(All of these options can be found by selecting the site name under the [Edit Site](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	Site type (Set Site Type)
Recommended	Name (Edit Name) Quick key (Set Quick Key)
Optional	Attenuator (Set Attenuator) Hold time (Set Hold Time) Location information (Set LocationInfo) Lockout (Set Lockout) Modulation (Set Modulation) Startup key (Set Startup Key)
Available operations	Delete Site

Create at least 1 frequency in each site

Each trunked system can contain up to 23 frequencies in each site, and all sites must contain at least 1 frequency.

1. On the [Edit Site](#) menu, select the site you just created.
2. Go to the [Set Frequencies](#) sub-menu and select *New Frequency*.
3. Enter at least 1 frequency for this site.
4. When you enter a new frequency, the scanner will prompt you for the [logical channel number or LCN](#) for that frequency. Enter a number from 1 through 30.
5. If you need to change any of the frequency properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Frequency properties

(All of these options can be found by selecting the frequency under the [Set Frequencies](#) sub-menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	Logical channel number (Input LCN)
Recommended	None
Optional	Lockout (Set Lockout)
Available operations	Delete Frequency

Programming a system for Scanning

Once you create the system and at least 1 site, you can [Search](#) the system with no problems. However, if you want to [Scan](#) the system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create at least 1 channel group

Each EDACS system can contain up to 20 channel groups, and any system you want to scan must contain at least 1 channel group.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Group](#) menu and select *New Group*.
3. If you need to change any of the channel group properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel group properties

(All of these options can be found by selecting the group name under the [Edit Group](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Quick key (Set Quick Key)
Optional	Location information (Set LocationInfo) Lockout (Set Lockout)
Available operations	Delete Group

Create at least 1 channel in each group

Each trunked system can contain up to 500 channels in each group, and all groups must contain at least 1 channel.

1. On the [Edit Group](#) menu, select the channel group you just created.
2. Go to the [Edit Channel](#) menu and select *New Channel*.
3. Input the [Talk Group ID \(TGID\)](#) for this channel.
4. If you need to change any of the channel properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel properties

(All of these options can be found by selecting the channel name under the [Edit Channel](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	TGID (Edit Talk Group ID)
Recommended	Name (Edit Name) Number tag (Set Number Tag)
Optional	Alert (Set Alert) Lockout (Set Lockout) Priority (Set Priority) Volume Offset
Available operations	Copy Channel Delete Channel

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LTR Trunked Systems

Below is an example of an Logic Trunked Radio or *LTR* system from [RadioReference](#) :

System Name:	American Airlines Center System							
Location:	Dallas, TX							
County:	Dallas							
System Type:	LTR Standard							
System Voice:	Analog							
Last Updated:	08-15-2004 21:23							
System Frequencies								
Site	Description							
001	Site-1	01-461.50000	02-N/A	03-461.70000	04-N/A	05-462.17500	06-N/A	07-463.87500
		08-N/A	09-N/A	10-N/A	11-464.40000	12-N/A	13-N/A	14-463.33750
		15-N/A	16-464.08750	17-N/A	18-464.18750			

LTR System

- Here is a [conceptual layout diagram](#) of a basic LTR system. ([Click here](#) for a legend of the diagram.)
- You can download a planning worksheet for LTR systems as a [pdf file](#) or an [Excel spreadsheet file](#).
- For more information on the different types of LTR systems and how they work, see the [Logic Trunked Radio](#) page at [Radio Reference's Wiki](#) .

Programming an LTR System

To program an LTR system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create a system

1. Go to the [Program System](#) menu and choose *New System*.
2. The scanner will prompt you for the System Type. Select *LT*.
3. When the scanner prompts you confirm, tap **YES**.
4. The scanner creates the system with a default name. Select [Edit Name](#) if you want to change it.
5. If you need to change any of the system properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

System properties

(All of these options can be found under the [Program System](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Number tag (Edit Sys Option#Set Number Tag)

Optional	Automatic gain control (AGC) (Edit Sys Option#Set Audio AGC) Delay time (Edit Sys Option#Set Delay Time) ID scan/search (Edit Sys Option#ID Scan/Search) Priority ID scan (Edit Sys Option#Priority ID Scan)
Available operations	Copy system Delete system Review Locked-Out IDs (Edit Sys Option#Rvw ID:Src L/O) Clear All Locked-Out IDs (Edit Sys Option#Clr All L/O IDs)

Site properties

(All of these options can be found by selecting the site name under the [Edit Site](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Quick key (Set Quick Key)
Optional	Attenuator (Set Attenuator) Hold time (Set Hold Time) Location information (Set LocationInfo) Lockout (Set Lockout) Modulation (Set Modulation) Startup key (Set Startup Key)
Available operations	Delete Site

Create at least 1 frequency in each site

Each LTR system can contain up to 20 frequencies in each site, and all sites must contain at least 1 frequency.

1. On the [Edit Site](#) menu, select the site you just created.
2. Go to the [Set Frequencies](#) sub-menu and select *New Frequency*.
3. Enter at least 1 frequency for this site.
4. When you enter a new frequency, the scanner will prompt you for the [logical channel number or LCN](#) for that frequency. Enter a number from 1 through 20.
5. If you need to change any of the frequency properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Frequency properties

(All of these options can be found by selecting the frequency under the [Set Frequencies](#) sub-menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	Logical channel number (Input LCN)
Recommended	None
Optional	Lockout (Set Lockout)
Available operations	Delete Frequency

Programming a system for Scanning

Once you create the system and at least 1 site, you can [Search](#) the system with no problems. However, if you want to [Scan](#) the system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create at least 1 channel group

Each LTR system can contain up to 20 channel groups, and any system you want to scan must contain at least 1 channel group.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Group](#) menu and select *New Group*.
3. If you need to change any of the channel group properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel group properties

(All of these options can be found by selecting the group name under the [Edit Group](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Quick key (Set Quick Key)
Optional	Location information (Set LocationInfo) Lockout (Set Lockout)
Available operations	Delete Group

Create at least 1 channel in each group

Each trunked system can contain up to 500 channels in each group, and all groups must contain at least 1 channel.

1. On the [Edit Group](#) menu, select the channel group you just created.
2. Go to the [Edit Channel](#) menu and select *New Channel*.
3. Input the [Talk Group ID \(TGID\)](#) for this channel.
4. If you need to change any of the channel properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel properties

(All of these options can be found by selecting the channel name under the [Edit Channel](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	TGID (Edit Talk Group ID)
Recommended	Name (Edit Name) Number tag (Set Number Tag)
Optional	Alert (Set Alert) Lockout (Set Lockout) Priority (Set Priority) Volume Offset

Available operations

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Motorola Trunked Systems

A Motorola system can be an 800 MHz, 400 MHz (UHF), or 100-200 MHz (VHF) system. Below are some examples of these Motorola systems from [RadioReference](#) :

System Name:	Grand Prairie System
Location:	Grand Prairie, TX
County:	Dallas
System Type:	Motorola Type II SmartZone
System Voice:	Analog and APCO-25 Common Air Interface
Last Updated:	06-19-2006 16:37

System ID Table		
Sysid	CT	WACN
2515	105.88	

System Frequencies
Red* are Primary Control Channels Blue* are Secondary Control Channels

Site	Description	Freqs
001	Primary	856.96250 857.96250* 858.96250* 859.96250* 860.96250* 868.23750 868.51250 868.76250 868.96250

Motorola 800 MHz System

System Name:	Arlington System
Location:	Arlington, TX
County:	Tarrant
System Type:	Motorola Type II Smartnet
System Voice:	Analog
Last Updated:	09-12-2006 14:37

System ID Table		
Sysid	CT	WACN
162A	105.88	

System Frequencies
Red* are Primary Control Channels Blue* are Secondary Control Channels

Site	Description	Freqs
001	Primary	856.48750 856.71250 857.48750 857.71250* 858.48750 858.71250* 859.48750 859.71250* 860.48750 860.71250* 867.56250 868.26250

Another Motorola 800 MHz System

- Even though some (or all) of the System Voice channels are APCO 25, this system, and others like it, is correctly programmed as a Motorola 800 MHz system, per the information given for the System Type.

System Name:	United Parcel Service (DFW Airport) System
Location:	DFW Airport, TX
County:	2 counties
System Type:	Motorola Type II Smartnet
System Voice:	Analog
Last Updated:	06-04-2007 18:42

System ID Table		
Sysid	CT	WACN
7507	116.13	

Custom Frequency Table		
Base	Spacing	Offset
461.5000	380	12.5
451.0000	560	12.5

System Frequencies

Red* are Primary Control Channels Blue* are Secondary Control Channels

Site	Description	Freqs								
001	Primary	451.31250	451.66250	451.88750	452.03750	452.53750	452.68750*	452.88750*	462.18750*	462.48750*

Motorola UHF System (400 MHz band)

System Name:	Staffordshire Fire & Rescue System
Location:	Staffordshire, EN
County:	Staffordshire
System Type:	Motorola Type II Smartnet
System Voice:	Analog
Last Updated:	02-01-2008 11:17

System ID Table		
Sysid	CT	WACN
1533		

Custom Frequency Table		
Base	Spacing	Offset
152.0000	380	12.5
154.0000	461	12.5

System Frequencies

Red* are Primary Control Channels Blue* are Secondary Control Channels

Site	Description	Freqs								
001	North Simulcast	153.82500	154.08750	154.72500	154.88750	155.07500	155.30000	155.41250*	155.43750	155.58250
		155.61250								
002	South Simulcast	152.15000*	152.26250	152.31250	152.53750	152.82500	155.21250	155.52500	155.55000	155.87500
006	Site-6	152.83750	154.08750	154.72500	154.88750	155.07500	155.30000	155.41250*	155.43750	155.58250
		155.81250								
011	Site-11	152.02500*	154.57500	154.75000						

Motorola VHF System (100-200 MHz band)

- Here is a [conceptual layout diagram](#) of a basic Motorola system. ([Click here](#) for a legend of the diagram.)
- You can download a planning worksheet for Motorola systems as a [pdf file](#) or an [Excel spreadsheet file](#).
- For more information on the different types of Motorola systems and how they work, see the [Motorola](#) page at [Radio Reference's Wiki](#) .

Programming a Motorola System

To program a Motorola system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create a system

1. Go to the [Program System](#) menu and choose *New System*.
2. The scanner will prompt you for the System Type. Select *MOT*.

3. When the scanner prompts you confirm, tap **YES**.
4. The scanner creates the system with a default name. Select [Edit Name](#) if you want to change it.
5. If you need to change any of the system properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

System properties

(All of these options can be found under the [Program System](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	Fleet map (Edit Sys Option#Edit Fleet Map) (Required for Motorola Type I or Type I/II Hybrid systems only)
Recommended	Name (Edit Name) Number tag (Edit Sys Option#Set Number Tag)
Optional	Automatic gain control (AGC) (Edit Sys Option#Set Audio AGC) Delay time (Edit Sys Option#Set Delay Time) Emergency alert (Edit Sys Option#Emergency Alert) End code (Edit Sys Option#Set End Code) ID format (Edit Sys Option#Set ID Format (DEC/HEX) or (AFS/DEC)) ID scan/search (Edit Sys Option#ID Scan/Search) Priority ID scan (Edit Sys Option#Priority ID Scan) Status bit (Edit Sys Option#Set Status bit)
Available operations	Copy system Delete system Review Locked-Out IDs (Edit Sys Option#Rvw ID:SrcH L/O) Clear All Locked-Out IDs (Edit Sys Option#Clr All L/O IDs)

Create at least 1 site

Each Motorola system can contain up to 256 sites, and all systems must contain at least 1 site.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Site](#) menu and select *New Site*.
3. If you need to change any of the site properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Site properties

(All of these options can be found by selecting the site name under the [Edit Site](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Band plan (Edit Band Plan) Name (Edit Name) Quick key (Set Quick Key)
Optional	Attenuator (Set Attenuator) Control channel only (Set C-Ch Only) Hold time (Set Hold Time) Location information (Set LocationInfo) Lockout (Set Lockout) Modulation (Set Modulation)

	P25 wait time (P25 Waiting Time) Startup key (Set Startup Key)
Available operations	Delete Site

Create at least 1 frequency in each site

Each trunked system can contain up to 30 frequencies in each site, and all sites must contain at least 1 frequency.

1. On the [Edit Site](#) menu, select the site you just created.
2. Go to the [Set Frequencies](#) sub-menu and select *New Frequency*.
3. Enter at least 1 frequency for this site.
4. If you need to change any of the frequency properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Frequency properties

(All of these options can be found by selecting the frequency under the [Set Frequencies](#) sub-menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	None
Optional	Lockout (Set Lockout)
Available operations	Delete Frequency

Programming a system for Scanning

Once you create the system and at least 1 site, you can [Search](#) the system with no problems. However, if you want to [Scan](#) the system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create at least 1 channel group

Each Motorola system can contain up to 20 channel groups, and any system you want to scan must contain at least 1 channel group.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Group](#) menu and select *New Group*.
3. If you need to change any of the channel group properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel group properties

(All of these options can be found by selecting the group name under the [Edit Group](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Quick key (Set Quick Key)
Optional	Location information (Set LocationInfo)

	Lockout (Set Lockout)
Available operations	Delete Group

Create at least 1 channel in each group

Each trunked system can contain up to 500 channels in each group, and all groups must contain at least 1 channel.

1. On the [Edit Group](#) menu, select the channel group you just created.
2. Go to the [Edit Channel](#) menu and select *New Channel*.
3. Input the Talk Group ID (TGID) for this channel.
4. If you need to change any of the channel properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel properties

(All of these options can be found by selecting the channel name under the [Edit Channel](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	TGID (Edit Talk Group ID)
Recommended	Audio type (Analog or digital) (Set Audio Type) Name (Edit Name) Number tag (Set Number Tag)
Optional	Alert (Set Alert) Lockout (Set Lockout) Priority (Set Priority) Volume Offset
Available operations	Copy Channel Delete Channel

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Standard P25 Trunked Systems

This section deals with standard Project 25 or P25 systems. [Click here for information on P25 one-frequency systems](#). Below is an example of a standard P25 system from [RadioReference](#) :

System Name:	Austin / Travis County / Williamson County / Middle Rio Grande System
Location:	Austin, TX
County:	10 counties
System Type:	Project 25 Standard
System Voice:	APCO-25 Common Air Interface Exclusive
Last Updated:	02-28-2008 09:44

System Frequencies										
Red* are Primary Control Channels Blue* are Secondary Control Channels										
Site	Description	Freqs								
101	Simulcast 1	866.16250*	866.28750*	866.41250*	866.58250*	866.71250	866.81250	866.92500	867.08750	867.11250
		867.31250	867.33750	867.57500	867.60000	867.82500	867.85000	868.10000	868.12500	868.36250
		868.42500	868.62500	868.68750	868.95000					
102	Simulcast 2	866.13750*	866.31250*	866.38750*	866.58750*	866.73750	866.83750	867.16250	867.18750	867.41250
		867.63750	867.68750	867.95000	868.05000	868.27500	868.32500	868.55000	868.57500	868.85000
		866.46250	866.88750	867.28750	867.80000*	868.15000	868.75000			
103	Marble Falls IR									
104	Honeycomb IR	867.26250	867.72500*	868.17500	868.77500					
105	Burleson Manor IR	867.87500	868.22500*	868.50000	868.92500					
106	USGS Shingle IR	867.66250	867.92500*	868.40000	868.80000					

Standard P25 System

- Here is a [conceptual layout diagram](#) of a basic P25 system. ([Click here](#) for a legend of the diagram.)
- For more information on P25 systems and how they work, see the [Project 25](#) page at [Radio Reference's Wiki](#) .

Programming a P25 System

To program a P25 system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create a system

1. Go to the [Program System](#) menu and choose *New System*.
2. The scanner will prompt you for the System Type. Select *P25*.
3. The scanner will prompt you for the sub-type. Select *Standard trunk*.
4. When the scanner prompts you confirm, tap **YES**.
5. The scanner creates the system with a default name. Select [Edit Name](#) if you want to change it.
6. If you need to change any of the system properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

System properties

(All of these options can be found under the [Program System](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
----------	------

Recommended	Name (Edit Name) Number tag (Edit Sys Option#Set Number Tag)
Optional	Automatic gain control (AGC) (Edit Sys Option#Set Audio AGC) Delay time (Edit Sys Option#Set Delay Time) ID format (Edit Sys Option#Set ID Format (DEC/HEX) or (AFS/DEC)) ID scan/search (Edit Sys Option#ID Scan/Search) Priority ID scan (Edit Sys Option#Priority ID Scan)
Available operations	Copy system Delete system Review Locked-Out IDs (Edit Sys Option#Rvw ID:Src L/O) Clear All Locked-Out IDs (Edit Sys Option#Clr All L/O IDs)

Create at least 1 site

Each P25 system can contain up to 256 sites, and all systems must contain at least 1 site.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Site](#) menu and select *New Site*.
3. If you need to change any of the site properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Site properties

(All of these options can be found by selecting the site name under the [Edit Site](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Band plan (Edit Band Plan) Name (Edit Name) Quick key (Set Quick Key)
Optional	Attenuator (Set Attenuator) Hold time (Set Hold Time) Location information (Set LocationInfo) Lockout (Set Lockout) Startup key (Set Startup Key)
Available operations	Delete Site

Create at least 1 frequency in each site

Each P25 system can contain up to 20 frequencies in each site, and all sites must contain at least 1 frequency.

1. On the [Edit Site](#) menu, select the site you just created.
2. Go to the [Set Frequencies](#) sub-menu and select *New Frequency*.
3. Enter at least 1 frequency for this site.
4. If you need to change any of the frequency properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Frequency properties

(All of these options can be found by selecting the frequency under the [Set Frequencies](#) sub-

menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	None
Optional	Lockout (Set Lockout)
Available operations	Delete Frequency

Programming a system for Scanning

Once you create the system and at least 1 site, you can [Search](#) the system with no problems. However, if you want to [Scan](#) the system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create at least 1 channel group

Each P25 system can contain up to 20 channel groups, and any system you want to scan must contain at least 1 channel group.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Group](#) menu and select *New Group*.
3. If you need to change any of the channel group properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel group properties

(All of these options can be found by selecting the group name under the [Edit Group](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Quick key (Set Quick Key)
Optional	Location information (Set LocationInfo) Lockout (Set Lockout)
Available operations	Delete Group

Create at least 1 channel in each group

Each trunked system can contain up to 500 channels in each group, and all groups must contain at least 1 channel.

1. On the [Edit Group](#) menu, select the channel group you just created.
2. Go to the [Edit Channel](#) menu and select *New Channel*.
3. Input the [Talk Group ID \(TGID\)](#) for this channel.
4. If you need to change any of the channel properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel properties

(All of these options can be found by selecting the channel name under the [Edit Channel](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	TGID (Edit Talk Group ID)
-----------------	---

Recommended	Name (Edit Name) Number tag (Set Number Tag)
Optional	Alert (Set Alert) Lockout (Set Lockout) Priority (Set Priority) Volume Offset
Available operations	Copy Channel Delete Channel

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P25 One-Frequency Trunked Systems

P25 one-frequency systems are almost identical to [standard P25 systems](#), except they only have one site per system and the system can use a P25 network address.

- Here is a [conceptual layout diagram](#) of a P25 one-frequency system. ([Click here](#) for a legend of the diagram.)
- For more information on P25 systems and how they work, see the [Project 25](#) page at [Radio Reference's Wiki](#) .

Programming a P25 One-frequency System

To program a P25 one-frequency system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create a system

1. Go to the [Program System](#) menu and choose *New System*.
2. The scanner will prompt you for the System Type. Select *P25*.
3. The scanner will prompt you for the sub-type. Select *One-Freq trunk*.
4. When the scanner prompts you confirm, tap **YES**.
5. The scanner creates the system with a default name. Select [Edit Name](#) if you want to change it.
6. If you need to change any of the system properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

System properties

(All of these options can be found under the [Program System](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Network address (Edit Sys Option#P25 NAC Option) Number tag (Edit Sys Option#Set Number Tag)
Optional	Automatic gain control (AGC) (Edit Sys Option#Set Audio AGC) Delay time (Edit Sys Option#Set Delay Time) ID format (Edit Sys Option#Set ID Format (DEC/HEX) or

	(AFS/DEC) ID scan/search (Edit Sys Option#ID Scan/Search)
Available operations	Copy system Delete system Review Locked-Out IDs (Edit Sys Option#Rvw ID:Src h L/O) Clear All Locked-Out IDs (Edit Sys Option#Clr All L/O IDs)

Create exactly 1 site

Each P25 one-frequency system must contain exactly 1 site.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Site](#) menu and select *New Site*.
3. If you need to change any of the site properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Site properties

(All of these options can be found by selecting the site name under the [Edit Site](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Quick key (Set Quick Key)
Optional	Attenuator (Set Attenuator) Hold time (Set Hold Time) Location information (Set LocationInfo) Lockout (Set Lockout) Modulation (Set Modulation) Startup key (Set Startup Key)
Available operations	Delete Site

Create exactly 1 frequency in the site

A P25 one-frequency system contains exactly 1 frequency.

1. On the [Edit Site](#) menu, select the site you just created.
2. Go to the [Set Frequencies](#) sub-menu and select *New Frequency*.
3. Enter the frequency for this site.
4. If you need to change any of the frequency properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Frequency properties

(All of these options can be found by selecting the frequency under the [Set Frequencies](#) sub-menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	None
Optional	Lockout (Set Lockout)
Available operations	Delete Frequency

Programming a system for Scanning

Once you create the system and site, you can [Search](#) the system with no problems. However, if you want to [Scan](#) the system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create at least 1 channel group

Each P25 system can contain up to 20 channel groups, and any system you want to scan must contain at least 1 channel group.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Group](#) menu and select *New Group*.
3. If you need to change any of the channel group properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel group properties

(All of these options can be found by selecting the group name under the [Edit Group](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Quick key (Set Quick Key)
Optional	Location information (Set LocationInfo) Lockout (Set Lockout)
Available operations	Delete Group

Create at least 1 channel in each group

Each trunked system can contain up to 500 channels in each group, and all groups must contain at least 1 channel.

1. On the [Edit Group](#) menu, select the channel group you just created.
2. Go to the [Edit Channel](#) menu and select *New Channel*.
3. Input the [Talk Group ID \(TGID\)](#) for this channel.

4. If you need to change any of the channel properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel properties

(All of these options can be found by selecting the channel name under the [Edit Channel](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	TGID (Edit Talk Group ID)
Recommended	Name (Edit Name) Number tag (Set Number Tag)
Optional	Alert (Set Alert) Lockout (Set Lockout) Volume Offset
Available operations	Copy Channel Delete Channel

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Radio Systems Overview

There are two basic types of radio systems: conventional systems and trunked systems.

Conventional radio systems

In a conventional radio system, each group of users is assigned one (for simplex systems) or two frequencies (for repeater systems). For example, the police in your area might operate on 460.500 MHz, the fire department on 154.445 MHz, the highway department on 37.900 MHz, etc. All transmissions from each group always go out on the on the same frequency--the police won't randomly switch to 500.000 MHz, for instance.

Since each group always stays on the same frequency and frequencies never overlap, it's very easy to follow conversations on conventional systems: when your scanner stops on a frequency, you usually know who it is, and more importantly, you can stop on a channel and listen to an entire conversation.

Up until the late 1980s, this was the primary way that radio systems operated. Some examples of conventional radio systems are

- Aircraft
- Amateur radio
- FRS/GMRS users
- Small, private radio systems

Trunked radio systems

Several major trends have converged that have resulted in agencies moving to more efficient *trunked* radio systems:

- Higher levels of radio usage has meant that there aren't enough individual frequencies available to allow every group to have their own frequency.
- Technology advances have brought down the overall cost and complexity of implementing a trunked radio system while increasing the features available to the agency and individual radio users.
- Roll-out of major statewide trunked systems makes it easier for even small agencies to "piggy back" onto the larger system for less cost than replacing existing systems.

Trunked system basics

There are three major elements common to most trunked systems:

System Controller

The system controller is a special computer that assigns voice channels to users as they key up their radio. The controller is the "brains" behind the trunking system.

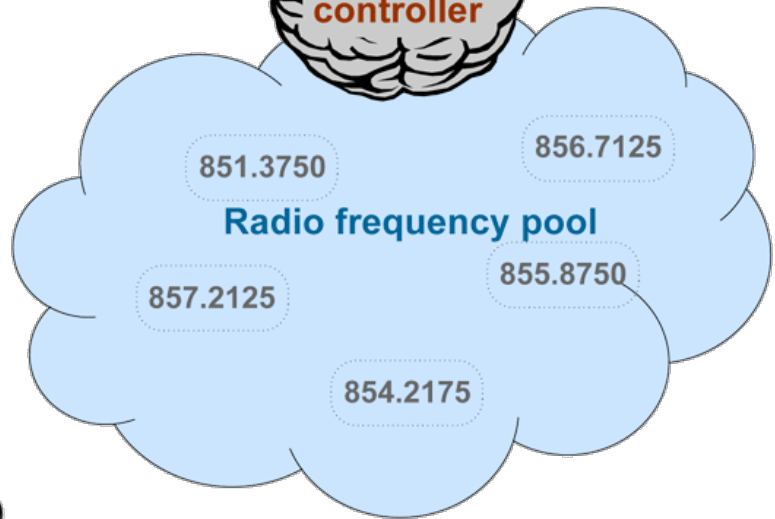
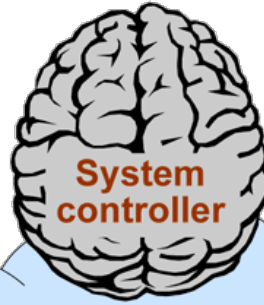
Voice Frequency Pool

The voice frequency pool is a selection of radio frequencies available to the system controller for assigning voice traffic. By assigning voice frequencies to channels only as they are needed, a trunked system can support many more channels than it actually has frequencies.

Talk Group IDs

A Talk Group ID identifies which user or agency has been assigned a particular voice frequency at any particular moment. The Talk Group ID is essentially the user's "channel": since each voice frequency is used over and over by all the agencies on the system, trunked systems rely on the Talk Group ID to identify which particular user or agency is talking.

How a trunked system works



A typical communication on a trunked system goes something like this:

1. A user selects the channel they want to communicate on and presses the PTT button on the side of their radio.
2. This sends a channel request message to the controller that the user wants to start a transmission on the Talk Group ID (the channel) that they selected.
3. The controller locates an unused voice frequency and assigns it to that Talk Group ID.
4. The controller then sends out a *channel grant message* to all radios on the system so everyone knows where to find the voice channel for that Talk Group.
5. At this point, the original user's radio beeps, and the user can begin their transmission. While this sounds complicated, in real life this process takes about half a second (sometimes less).

When the user releases the PTT button, the controller releases the voice frequency from its Talk Group ID assignment, leaving the frequency free for the next user that becomes active.

A real life example

A typical 20-frequency trunked system can support hundreds of channels. For example, the Fort Worth system includes over 400 channels providing communication support for Fort Worth agencies (Police, Fire and Ambulance) and agencies in the surrounding cities of Kennedale, North Richland Hills, Forest Hill, Haltom City and Richland Hills. In addition, the same system also supports the Tarrant County Sheriff and Texas Christian University. (You can see its setup in the [RadioReference database](#) .)

Before moving to the trunked system, the Police had only 6 channels (North, South, East, West, Information, and Tactical). Since moving to the trunked system, they are now able to provide 11 channels for North Side PD alone: a main dispatch channel, three "talkaround" channels, a supervisor channel, a bike patrol channel, and several community patrol channels. Other police districts have similar channel requirements, and now special operations teams such as SWAT, Narcotics, and Traffic each have one or more dedicated channels for their use as well.

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Deciphering Trunked Systems

Before you program a trunked system

To the average radio user, the complexity of a trunked system is invisible. Their radio is programmed up at the radio shop. They can still easily select who they need to communicate with by selecting a channel on their two-way. They can even directly call other radio users without tying up a dispatch channel...something they could never do before. As a scanner user, on the other hand, you need to know the different types of trunking systems in use, what options are available on each system, and three key pieces of information about any trunking system before you start any actual programming:

- System Type
- System Frequencies
- IDs of the Talk Groups you want to hear

All of this information is usually available from the online database at [RadioReference](#) . The picture to the right shows a screenshot of a system from the database, with the pertinent information highlighted.

System Name: Fort Worth / Tarrant County Public Safety
Location: Fort Worth, TX
County: Tarrant
System Type: Motorola Type II Smartnet
System Voice: Analog
Last Updated: 12/20/2016 10:58:33 AM by J.Likensuser
HRs: 25843

System ID List

System ID	Connect Tone
3632	90.00

System Frequencies
 Red (c) are Primary Control Channels | Blue (a) are alternate control channels | Click a Site Name for additional site information | Site Map: FCC Callouts, RR Locations

Site Name	Freqs
001 Primary	066.16250 066.21250 066.28750 066.36250 066.38750 066.66250 066.68750 066.71250 066.83750 066.88750 067.16250 067.21250 067.26250 067.33750 067.38750 067.66250 067.71250c 067.76250c 067.83750c 067.88750c

System Talkgroups
 Updated in the last 7 days Updated in the last 24 hours [List All](#) in one table [Show New](#) Talkgroups

FWPD North Talkgroups

DEC	HEX	Mode	Alpha Tag	Description	Tag
2992	0bb	A	N-PTRL	NORTH DIVISION - PATROL	Law Dispatch
3024	0bd	A	N-CID	NORTH DIVISION - CID	Law Tac
3056	0bf	A	N-COPS	NORTH DIVISION - CRO/CODE BLUE	Law Tac
3088	0c1	A	N-SUPV	NORTH DIVISION - SUPERVISOR	Law Tac
3120	0c3	A	N-FOOT	NORTH DIVISION - FOOT/BKIE PATROL	Law Tac
3152	0c5	A	N-TLK1	NORTH DIVISION - TALK CH 1	Law Talk
3184	0c7	A	N-TLK2	NORTH DIVISION - TALK CH 2	Law Talk
3216	0c9	A	N-TLK3	NORTH DIVISION - TALK CH 3	Law Talk
6864	1ad	A	N-COPS2	NORTH DIVISION - CRO/CODE BLUE	Law Tac
18832	499	A	N-COPS3	NORTH DIVISION - CRO/CODE BLUE	Law Tac
18864	49b	A	N-COPS4	NORTH DIVISION - CRO/CODE BLUE	Law Tac

FWPD South Talkgroups

DEC	HEX	Mode	Alpha Tag	Description	Tag
2448	099	A	S-PTRL	SOUTH DIVISION - PATROL	Law Dispatch
2480	09b	A	S-CID	SOUTH DIVISION - CID	Law Tac
2512	09d	A	S-COPS	SOUTH DIVISION - CRO/CODE BLUE	Law Tac

System type
System voice (Types of voice modulation used on the system.)
System frequencies (Red or blue text means the frequency is a control channel.)
Talk group information (There may be several screens of data in larger systems.)

System Type

There are five major types of scannable systems; some of these also have subtypes. In the RadioReference database, you can generally determine the radio system type by looking at the line labeled *System Type* at the top of the screen (inside the red square in the screenshot).

P25 Systems

These are identified in the RadioReference database as *Project 25 Standard*. If the System Type line says anything else, then it is not a P25 system (even though it might have some P25 channels).

LTR Systems

These systems are identified as *LTR Standard* in the system type.

Motorola Systems

There are several subcategories of Motorola systems, but they will all have some form of *Motorola* in the system type: *Motorola Fleetnet*, *Motorola Smartnet*, *Motorola Smartzone*, etc. Once you have identified that it is a Motorola system, you can check the system frequencies to confirm its subtype:

- Motorola 800: all of the frequencies are in the 800 MHz range
- Motorola 900: all of the frequencies are in the 900 MHz range
- Motorola UHF: all of the frequencies are between 400 and 512 MHz
- Motorola VHF: all of the frequencies are between 100 and 200 MHz.

EDACS Systems

There are three subtypes of EDACS systems:

- EDACS Wide: identified as *EDACS Standard* in the system type.
- EDACS Narrow: identified as *EDACS Narrowband* in the system type.
- EDACS SCAT: identified as *EDACS Scat* in the system type (these systems operate on a single frequency).

Conventional Systems

This fifth type of scannable system is a general catchall for all non-trunked systems. See [Conventional Systems](#) for more information.

Non-scannable Systems

There are several system types that cannot be monitored with a scanner, either because the systems use proprietary digital formats that are not licensable by scanner manufacturers, or because the systems are not in wide enough use to make it cost-effective for manufacturers to develop a scanner that can monitor them.

These non-scannable systems are identified in the system type as:

- EDACS w/ESK
- LTR Passport
- OpenSky Standard
- MPT1327
- Tetra

System Voice

The other line inside the red square in the screenshot is *System Voice*, which summarizes the kinds of voice modulation used on the system. You'll find the following voice types:

- Analog (can be heard with any trunking scanner)
- APCO-25 (can be heard with a digital scanner)
- ProVoice (cannot be heard by any scanner)
- VSELP (cannot be heard by any scanner)

System Name:	Mansfield Public Safety
Location:	Mansfield, TX
County:	Tarrant
System Type:	Motorola Type II SmartZone
System Voice:	Analog and APCO-25 Common Air Interface
Uniden DSP:	983 1985 2892
Last Updated:	<i>Tagged 21 Talkgroups with (Law Dispatch)</i>
Hits:	5225

The system voice also tells us when digital channels are mixed in with analog channels on the same system. Unfortunately, this means the system voice line can cause a lot of confusion. Just remember: system voice does not define the system type.

For example, in the system information shown to the left, we see that APCO-25 can be used as a voice type on a Motorola system that is not actually a *P25 system*. When we're trying to determine whether a system is a P25 system, we need to ignore the "System Voice" line and focus on the *System Type* line. If there is P25 Voice on a non-P25 system, the scanner can sort this out while scanning.

System Frequencies

The *system frequencies* section in the database lists all the frequencies used by the system (see the blue square in the screenshot above on the right). For Motorola and P25 systems, you will need to program only the system control channel frequencies: those are the frequencies shown in red (for primary control channels) and blue (for alternate control channels) in the database.

For EDACS and LTR systems, you will need to program all the listed frequencies and their associated LCN (that is a small number right next to the frequency). Some systems have multiple sets of frequencies. These are called *multi-site* systems: each set of frequencies corresponds to a different physical antenna site.

Talk Group IDs (Channels)

The Talk Group information section (inside the green rectangle) shows the different channels on the system and which agency uses them. You'll need to go through the list and make a note of the channels you want to hear. Then you can start thinking about how you want to organize those channels.

(Keep in mind that this screenshot shows just a few of the channels on a single system. One of the great features available to subscribers on RadioReference is the ability to tag channels directly on the site and print out a nicely-formatted hardcopy of each system. It makes this task much, much easier.)

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Location-based Scanning

Location-based scanning allows you to control which systems/sites and channel groups are scanned based on your exact location. This frees you from having to manually enable and disable systems or channel groups as you change location.

To use Location-Based scanning, you need to have the following:

- the location for the center point for each system/site or channel group you want to control
- the radius or distance from the center point you want to set as the range for each system/site or channel group
- if you are scanning while traveling, you may want to include the heading (direction) of travel
- some type of mapping method. If you don't want to use paper maps, you might try a mapping software (such as Microsoft® Streets and Trips or Delorme® Street Atlas) that allows you to draw markings and overlays on maps.
- a GPS receiver with a serial data output (NMEA)

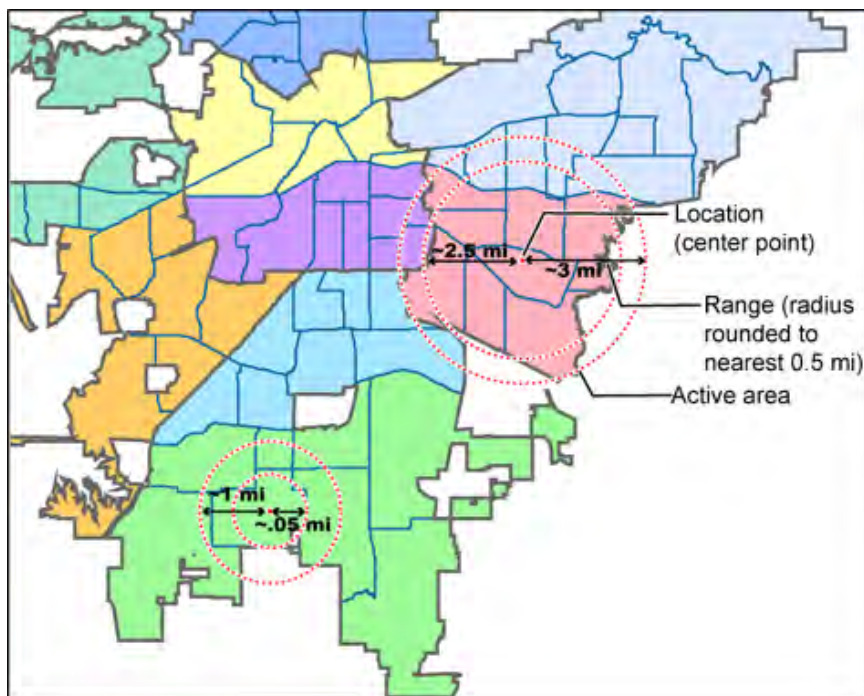
There are many different approaches you can use to determine where to place a center point for a system/site or channel group. The two most common are the geopolitical approach and the antenna-centric approach. For large trunked systems, you may find that a combination of these two approaches works best.

The Geopolitical Approach

With the geopolitical approach, you want the scanner to turn on the system/site or channel group at the limit of relevance rather than reception. This approach is useful for scanning targets that have a well-defined jurisdiction and their transmission

are only relevant when you are within that jurisdiction.

To use the geopolitical approach, find the geographical center of the scanning target's "territory" (whether city, county, district, precinct, or other agency jurisdiction), and set these coordinates as

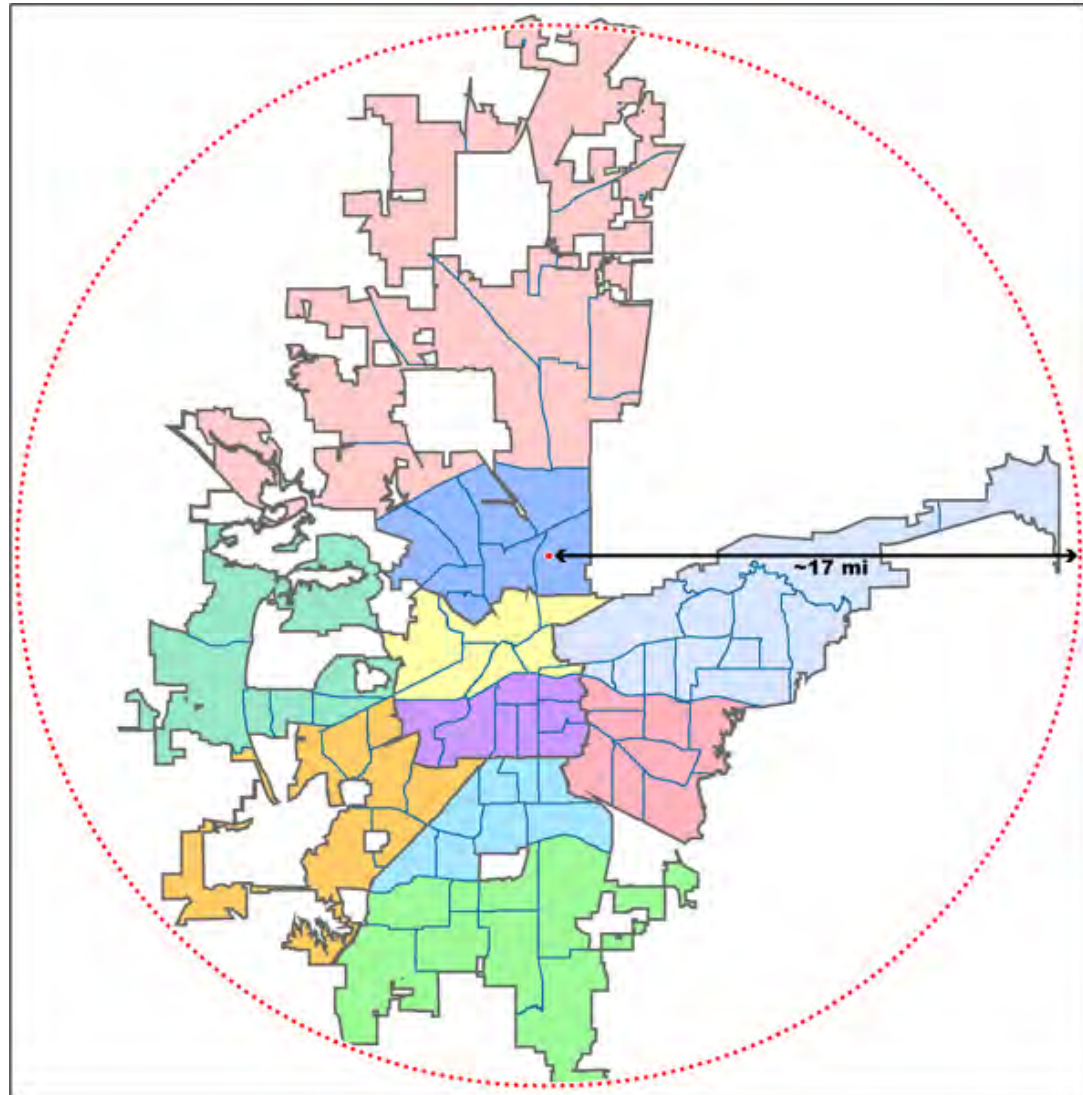


your center point location. Then, adjust the range or radius to cover the boundaries of that target.

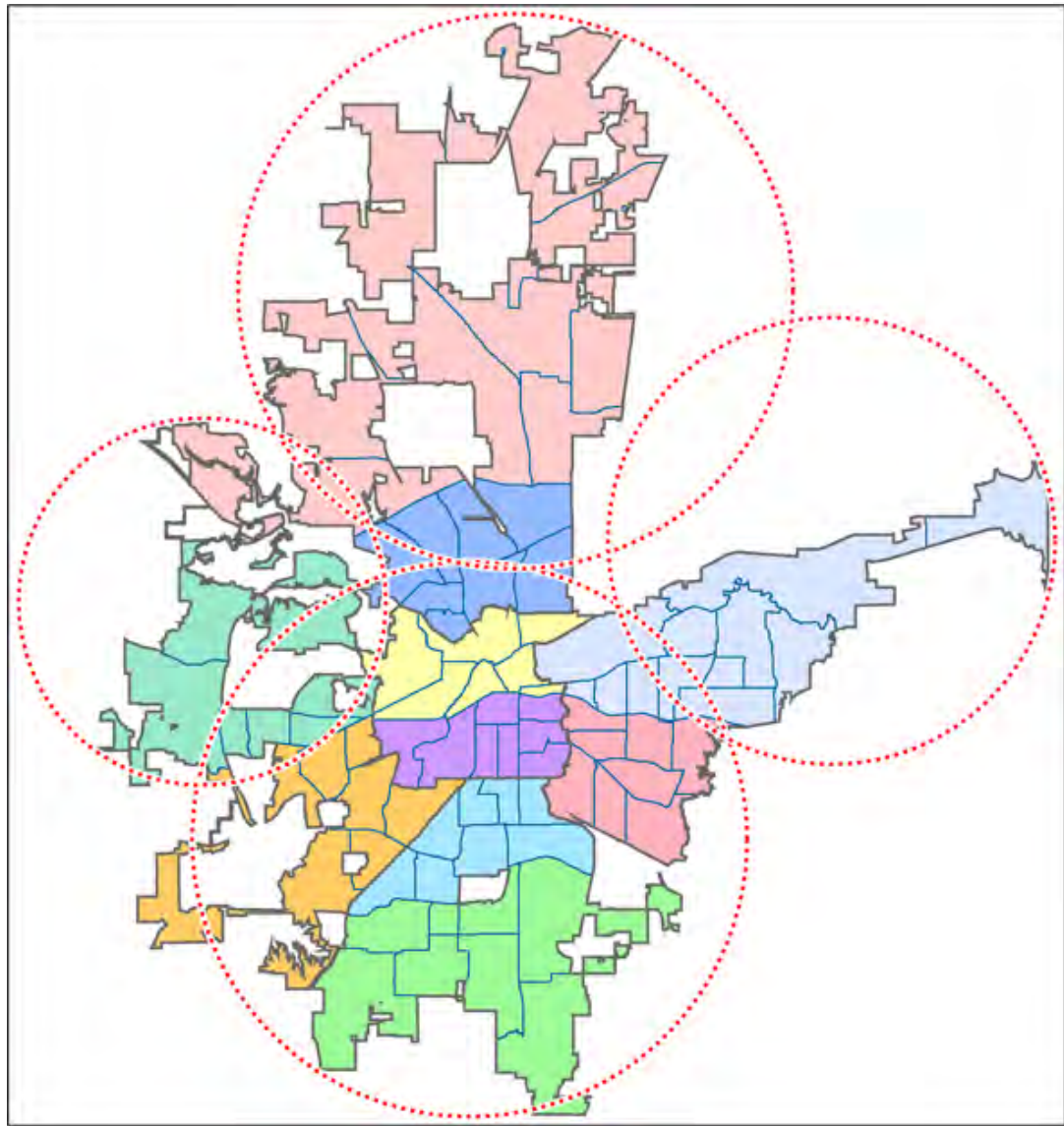
To use this method, use your chosen mapping application to zoom out so that the entire target is visible, then, draw a circle that just covers the target's boundaries. Adjust the size of the circle to the nearest 1/2 mile increment.

Depending on the shape of the territory, you may have to choose between a lot of overlap or not covering the entire area: jurisdiction, you might end up with a large amount of overlap. You'll have to decide which radius that best suits your application.

For example, if your territory is a city, you'll have a lot of "extra" area if you use one single location:

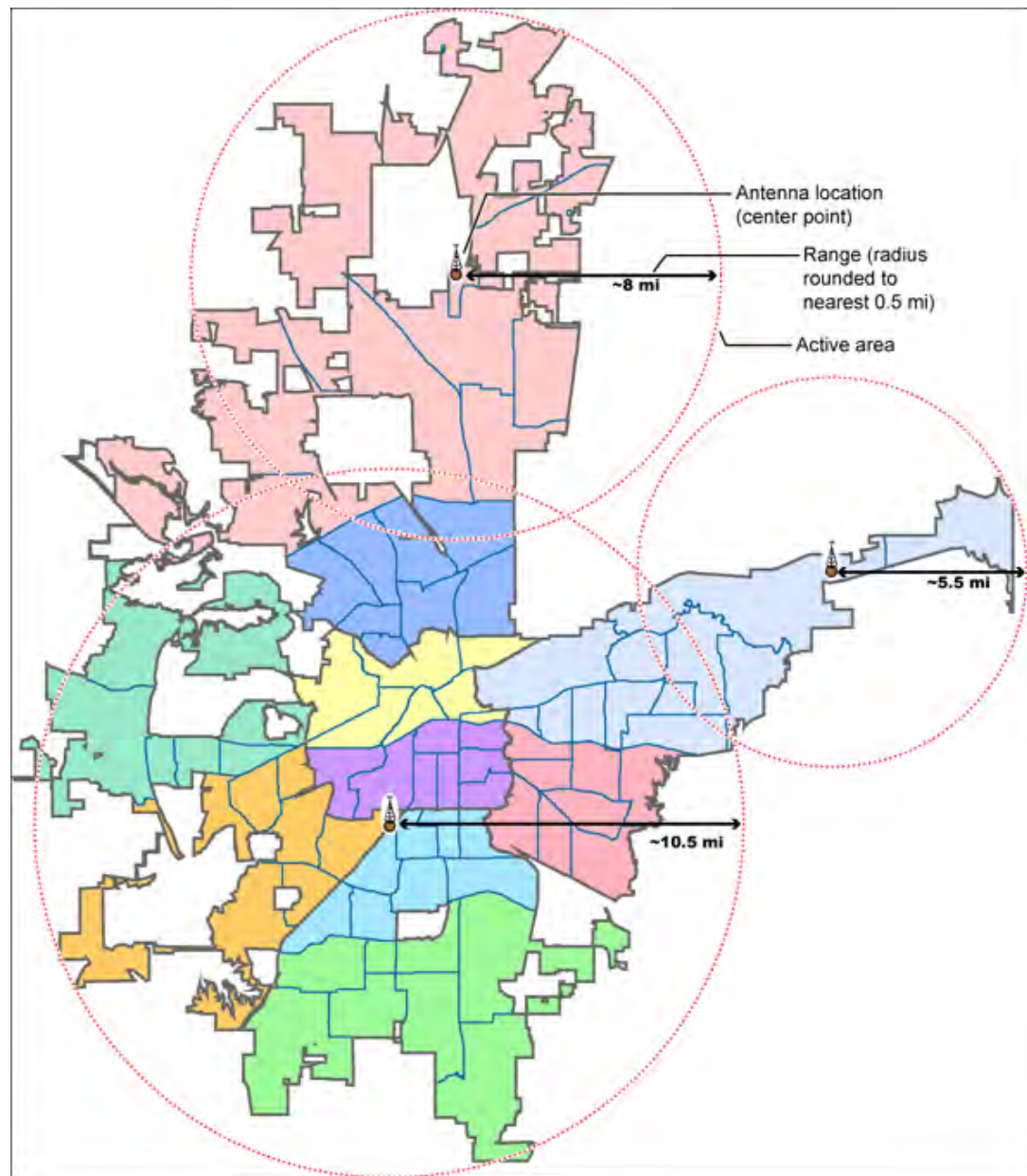


On the other hand, if you sub-divide the area, you may end up with areas that are not covered:



The Antenna-Centric Approach

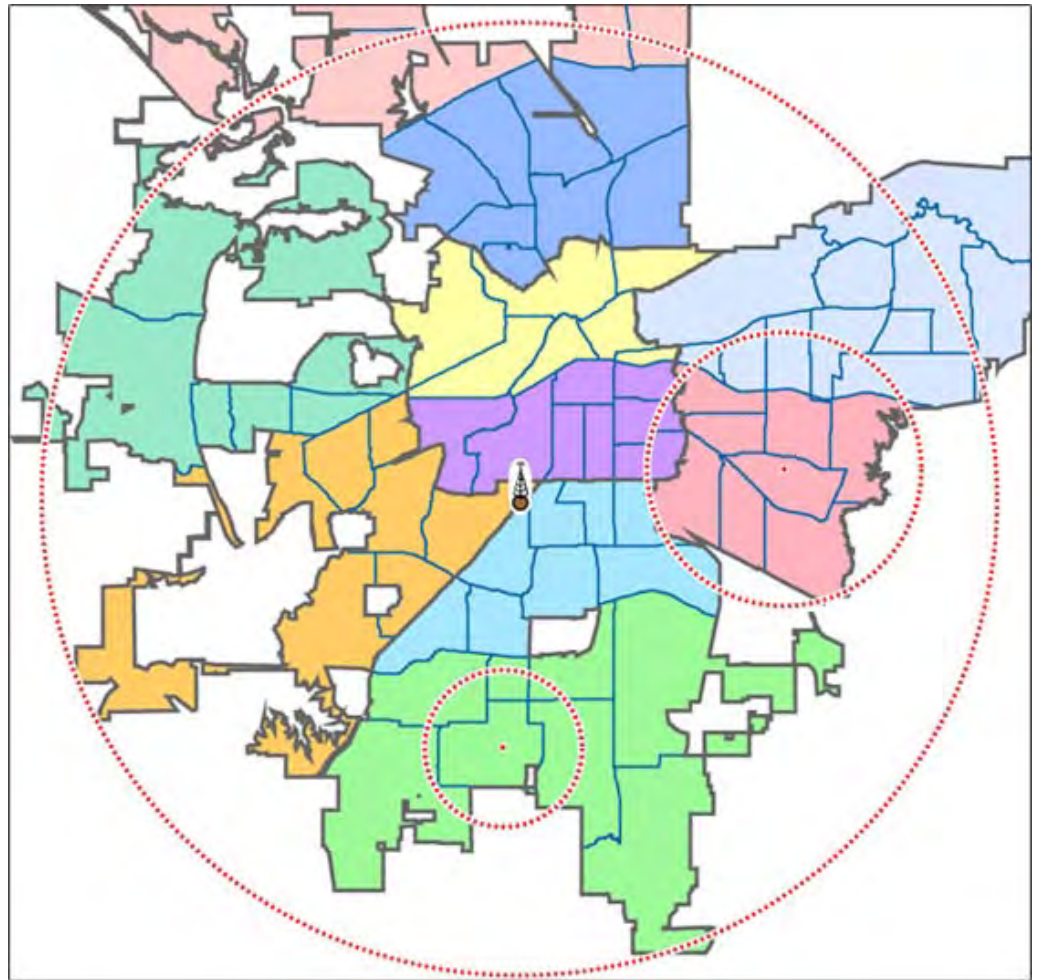
Using an antenna-centric approach, you set the physical antenna location as the system/site's center point and the antenna's actual reach as the range.



Finding an antenna location

You can find the physical location of antennas using the databases available at [Radio Reference](#) or the FCC's Antenna Structure Registration site. Both sites list the latitude, longitude, and height of the antenna, and both sites can map the exact location for you. ([Radio Reference](#) is more user-friendly, so it's easier to find what you're looking for.)

Combining for Efficiency



Because many trunked systems have both multiple antenna sites and multiple agencies with differing geographic boundaries, you may want to combine the approaches:

1. Use the antenna centric approach at the site level: set the geographic coordinates of the antenna as the central location for each site.
2. Use the geopolitical approach at the channel group level. Within the same system, set up a channel group for each agency, and set the central point of the agency territory as the group location.

With both approaches combined into a single system, the scanner will now seamlessly switch between antenna sites as needed to keep the scanner tuning only to those sites you can receive well, and will also turn channel groups on and off as you relocate to different jurisdictions.

See Also

[Connecting a GPS receiver](#)

[Programming locations](#)

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Scanning Legally

Your scanner covers frequencies used by many different groups, including police and fire departments, ambulance services, government agencies, private companies, amateur radio services, military operations, pager services, and wireline (telephone and telegraph) service providers.

It is legal to listen to almost every transmission your scanner can receive. However, there are some transmissions that you should never intentionally listen to. These include:

- Telephone conversations (cellular, cordless, or other private means of telephone signal transmission)
- Pager transmissions
- Any scrambled or encrypted transmissions

According to the Electronic Communications Privacy Act (ECPA), you are subject to fines and possible imprisonment for intentionally listening to, using, or divulging the contents of such a conversation unless you have the consent of a party to the conversation (unless such activity is otherwise illegal).

This scanner has been designed to prevent the reception of cellular telephone transmissions and the decoding of scrambled transmissions. This is done to comply with the legal requirement that scanners be manufactured so they are not easy to modify to pick up these transmissions. Do not open your scanner's case to make any modifications that could allow it to pick up transmissions that are illegal to monitor. Modifying or tampering with your scanner's internal components or using it in a way other than as described in the manual could invalidate your warranty and void your FCC authorization to operate it.

In some areas, mobile and/or portable use of this scanner is unlawful or requires a permit. Check the laws in your area. It is also illegal in many areas (and a bad idea everywhere) to interfere with the duties of public safety officials by traveling to the scene of an incident without authorization.

A license is required to use this product in Canada!

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General Precautions

Before you use this scanner, please read and observe the following:

Earphone Warning

Be sure to use only a monaural earphone with this scanner. You can also use an optional 32 Ω stereo headset. Use of an incorrect earphone or stereo headset might be potentially hazardous to your hearing. The output of the phone jack is monaural, but you will hear it in both headphones of a stereo headset.

Set the volume to a comfortable audio level coming from the speaker before plugging in the monaural earphone or a stereo headset of the proper impedance (32 Ω). Otherwise, you might experience some discomfort or possible hearing damage if the volume suddenly becomes too loud because of the volume control or squelch control setting. This might be particularly true of the type of earphone that is placed in the ear canal.

Liquid Exposure Warning

Uniden does not represent this unit to be waterproof. To reduce the risk of fire or electrical shock, do not expose this unit to rain or moisture!

Power Disconnection Caution

Important: If you have not installed any batteries in the scanner, never disconnect the AC adapter while the scanner is powered on. This might corrupt the scanner's memory.

Always turn the scanner off before disconnecting AC power.

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FCC Information

The FCC Wants You to Know

IMPORTANT! This scanning radio has been manufactured so that it will not tune to the radio frequencies assigned by the FCC for cellular telephone usage. The Electronic Communications Privacy Act of 1986, as amended, makes it a federal crime to intentionally intercept cellular or cordless telephone transmissions or to market this radio when altered to receive them. The installation, possession, or use of this scanning radio in a motor vehicle may be prohibited, regulated, or require a permit in certain states, cities, and/or local jurisdictions. Your local law enforcement officials should be able to provide you with information regarding the laws in your community.

For more details, see [Scanning Legally](#).

Modification Notice

Changes or modifications to this product not expressly approved by Uniden, or operation of this product in any way other than as detailed by this User's Guide, could void your authority to operate this product.

Part 15 Information

This scanner has been tested and found to comply with the limits for a scanning receiver, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This scanner generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

There is no guarantee that interference will not occur in a particular installation. If this scanner does cause harmful interference to radio or television reception, which can be determined by turning the scanner on and off, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the scanner and the receiver

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. this device must accept any interference received, including interference that may cause undesired operation.

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Warranty and Support Information

Support Information

Information online	www.uniden.com
Email support	(need link here)
Phone support	(800) 297-1023 (during regular business hours, Central time)

One-Year Limited Warranty

The following warranty applies to the following scanners:
BCD396XT
BC346XT

If your scanner is not listed, the warranty information below may not apply.

Important: Evidence of original purchase is required for warranty service!

WARRANTOR: UNIDEN AMERICA CORPORATION ("Uniden")

ELEMENTS OF WARRANTY: Uniden warrants, for one year, to the original retail owner, this Uniden Product to be free from defects in materials and craftsmanship with only the limitations or exclusions set out below.

WARRANTY DURATION: This warranty to the original user shall terminate and be of no further effect 12 months after the date of original retail sale. The warranty is invalid if the Product is

- (A) damaged or not maintained as reasonable or necessary,
- (B) modified, altered, or used as part of any conversion kits, subassemblies, or any configurations not sold by Uniden,
- (C) improperly installed,
- (D) serviced or repaired by someone other than an authorized Uniden service center for a defect or malfunction covered by this warranty,
- (E) used in any conjunction with equipment or parts or as part of any system not manufactured by Uniden, or
- (F) installed or programmed by anyone other than as detailed by the Operating Guide for this product.

STATEMENT OF REMEDY: In the event that the product does not conform to this warranty at any time while this warranty is in effect, warrantor will repair the defect and return it to you without charge for parts, service, or any other cost (except

shipping and handling) incurred by warrantor or its representatives in connection with the performance of this warranty. THE LIMITED WARRANTY SET FORTH ABOVE IS THE SOLE AND ENTIRE WARRANTY PERTAINING TO THE PRODUCT AND IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES OF ANY NATURE WHATSOEVER, WHETHER EXPRESS, IMPLIED OR ARISING BY OPERATION OF LAW, INCLUDING, BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THIS WARRANTY DOES NOT COVER OR PROVIDE FOR THE REIMBURSEMENT OR PAYMENT OF INCIDENTAL OR CONSEQUENTIAL DAMAGES. Some states do not allow this exclusion or limitation of incidental or consequential damages so the above limitation or exclusion might not apply to you.

LEGAL REMEDIES: This warranty gives you specific legal rights, and you might also have other rights which vary from state to state. This warranty is void outside the United States of America.

PROCEDURE FOR OBTAINING PERFORMANCE OF WARRANTY: If, after following the instructions in this Operating Guide you are certain that the Product is defective, pack the Product carefully (preferably in its original packaging). Include evidence of original purchase and a note describing the defect that has caused you to return it. The Product should be shipped freight prepaid, by traceable means, or delivered, to warrantor at:

Uniden America Corporation
Parts and Service Division
4700 Amon Carter Boulevard
Fort Worth, TX 76155

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Specifications

- Certificated in accordance with FCC Rules and Regulations Part 15 Subpart C as of date of manufacture. (See [FCC Information](#) for more details.)

General

Attenuation	20dB nominal
Audio Output Power	310mW nominal into 24Ω speaker 20mW nominal into 32Ω stereo headphone
Scan Rate	100 channels per second max (Conventional mode)
Search Rate	300 steps per second max (5kHz steps only)
External Jacks	Antenna Jack: SMA Type Phone Jack: 3.5mm (1/8 in.) Stereo Type DC Power Jack: EIAJ TYPE- (Center Positive) GPS/Remote Interface Jack: 4pin Mini Type Internal Speaker: 24 Ω, 0.8 W Max.(1.26 in.)
Power Requirements	3 x AA Size Rechargeable Ni-MH Batteries (2300mAh) 3 x AA size Alkaline Batteries AC Adapter (6V DC 800mA Regulated) (AD-1001)
Operating Temperature	Nominal: -20 to +60 -4°F to +140°F Close Call: -10 to +60 +14°F to +140°F
Size	2.40 in.(W) x 1.22 in.(D) x 5.35 in.(H) (Without Antenna)
Weight	0.37 lbs (Without Battery and Antenna)
Remote Functions	Direct PC control Database management Wired cloning
Display	64 x 128 Full Dot Matrix LCD with multi-color back light

Sensitivity (nominal) 12dB SINAD		
0.4uV	25 – 27.995 MHz	AM
0.3uV	28 – 53.98 MHz	NFM

0.5uV	54 – 71.95 MHz	WFM
0.2uV	72 – 75.995 MHz	FM
0.4uV	76 – 107.9 MHz	FMB
0.3uV	108 – 136.9916 MHz	AM
0.3uV	137 – 173.9875 MHz	NFM
0.5uV	174 – 215.95 MHz	WFM
0.3uV	216 – 224.98 MHz	NFM
0.3uV	225 – 379.975 MHz	AM
0.3uV	380 – 512 MHz	NFM
0.3uV	763 – 960 MHz	NFM
0.5uV	1240 – 1300 MHz	NFM

Signal Noise Ratio (nominal)		
50dB	25 – 27.995 MHz	AM
41dB	28 – 53.98 MHz	NFM
55dB	54 – 71.95 MHz	WFM
47dB	72 – 75.995 MHz	FM
60dB	76 – 107.9 MHz	FMB
50dB	108 – 136.9916 MHz	AM
41dB	137 – 173.9875 MHz	NFM
55dB	174 – 215.95 MHz	WFM
40dB	216 – 224.98 MHz	NFM
51dB	225 – 379.975 MHz	AM
40dB	380 – 512 MHz	NFM
41dB	763 – 960 MHz	NFM
37dB	1240 – 1300 MHz	NFM

Close Call Sensitivity (nominal):	
350uV	VHF Low1 Band
160uV	VHF Low2 Band
70uV	Air Band
60uV	VHF High1 Band
56uV	VHF High2 Band
100uV	UHF Band
200uV	800MHz+ Band

Frequency Range

Frequency Range (MHz)	Modulation	Step (kHz)	Name
25.0000 - 26.9600	AM	5	Petroleum Products & Broadcast Pickup
26.9650 - 27.4050	AM	5	CB Class D Channel
27.4100 - 27.9950	AM	5	Business & Forest Products
28.0000 - 29.6800	NFM	20	10 Meter Amateur Band
29.7000 - 49.9900	NFM	10	VHF Low Band
50.0000 - 53.9800	NFM	20	6 Meter Amateur Band
54.0000 - 71.9500	WFM	50	VHF TV
72.0000 - 75.9950	FM	5	Intersystem & Astronomy
76.0000 - 87.9500	WFM	50	VHF TV
88.0000 - 107.9000	FMB	100	FM Broadcast
108.0000 - 136.9916	AM	8.33	Aircraft Band
137.0000 - 143.9875	NFM	12.5	Military Land Mobile
144.0000 - 147.9950	NFM	5	2 Meter Amateur Band
148.0000 - 150.7875	NFM	12.5	Military Land Mobile
150.8000 - 161.9950	NFM	5	VHF High Band
162.0000 - 173.9875	NFM	12.5	Federal Government
174.0000 - 215.9500	WFM	50	VHF TV
216.0000 - 224.9800	NFM	20	1.25 Meter Amateur Band
225.0000 - 379.9750	AM	25	Military Aircraft Band
380.0000 - 399.9875	NFM	12.5	Military Land Mobile
400.0000 - 405.9875	NFM	12.5	Miscellaneous
406.0000 - 419.9875	NFM	12.5	Federal Government Land Mobile
420.0000 - 449.9875	NFM	12.5	70 cm Amateur Band
450.0000 - 469.9875	NFM	12.5	UHF Standard Band
470.0000 - 512.0000	NFM	12.5	UHF TV
763.0000 - 775.99375	NFM	6.25	Public Service Band
793.0000 - 805.99375	NFM	6.25	Public Service Band
806.0000 - 823.9875	NFM	12.5	Public Service Band
849.0125 - 868.9875	NFM	12.5	Public Service Band
894.0125 - 960.0000	NFM	12.5	Public Service Band
1240.0000 - 1300.0000	NFM	25	25 cm Amateur Band

Special Functions

Band Scope Function

- Frequency Span 0.2 Mhz To 500 Mhz
- Frequency Step 5 Khz To 100 Khz

Two-Tone-Sequential

- 250.0-3500.0Hz , 0.1Hz Step Programmable

WX Alert

- 1050 Hz Tone System
- NWR-SAME System (Warning / Watch / Statement)

Supported trunking systems

- MotorolaSystems: Type I, II, II/I (hybrid)
- EDACS Systems: FM, NFM, and SCAT
- LTR Systems
- APCO Systems: Astro Imbe, Astro 25

Dynamic memory allocation capacity

- Systems: 500 max
- Groups: 20 per system
- Site: 1000 max (All) 256 per system
- Channels: 25000 max (40128 memory blocks)
- Channels per Trunked System: 500 max

Heterodyne System

- 1st IF: 380.7 to 380.8 MHz / 265.5 to 265.6 MHz
- 2nd IF: 10.8 MHz
- 3rd IF: 450 kHz

CTCSS and DCS Tones

CTCSS Tone Frequencies (50 frequencies total)									
67.0	69.3	71.9	74.4	77.0	79.7	82.5	85.4	88.5	91.5
94.8	97.4	100.0	103.5	107.2	110.9	114.8	118.8	123.0	127.3
131.8	136.5	141.3	146.2	151.4	156.7	159.8	162.2	165.5	167.9
171.3	173.8	177.3	179.9	183.5	186.2	189.9	192.8	196.6	199.5
203.5	206.5	210.7	218.1	225.7	229.1	233.6	241.8	250.3	254.1

DCS Tone Codes (104 codes total)

023	025	026	031	032	036	043	047
051	053	054	065	071	072	073	074
114	115	116	122	125	131	132	134
143	145	152	155	156	162	165	172
174	205	212	223	225	226	243	244
245	246	251	252	255	261	263	265
266	271	274	306	311	315	325	331
332	343	346	351	356	364	365	371
411	412	413	423	431	432	445	446
452	454	455	462	464	465	466	503
506	516	523	526	532	546	565	606
612	624	627	631	632	654	662	664
703	712	723	731	732	734	743	754

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Available operation modes

The scanner has several different operation modes; in each mode, the scanner's operation, display, and key functions can be completely different:

Scan mode

The scanner checks each frequency in the user-programmed list of frequencies. For trunked systems, it checks each Talk Group ID in the user-programmed list. When it detects a signal, the scanner stays on the channel and opens squelch. For trunked systems, if the Talk Group ID becomes active, the scanner switches to the audio channel and opens squelch. When the signal stops, the scanner continues the scan.

To enter Scan mode, tap **SCAN**. (This is the default mode when the scanner powers on.)

Search mode

The scanner checks each frequency that falls within a user-programmed range. For trunked systems, it checks each control channel in the user-programmed list. When it detects a signal, the scanner stays on the channel and opens squelch. For trunked systems, when it detects an active Talk Group ID, the scanner switches to the audio channel and opens squelch. When the signal stops, the scanner continues the search.

To enter Search mode, **FUNCTION+** tap **SCAN**. The scanner asks if you want to perform the Quick Search: tap **YES** if this is the search you want. To start a different search, tap **NO**: the scanner takes you to the [Search for...](#) menu, and you can select your search.

Hold mode

The scanner stays on the current channel and enables save and edit options (options vary depending on the type of system).

To enter Hold mode, tap **HOLD**.

Close Call mode

Every two seconds, the scanner interrupts its current operation, searches for signals that are stronger than other signals on the selected band, then returns to the previous operation. When it detects a close call hit, the scanner can switch to

the channel and open squelch (depending on the setting).

To enter Close Call mode, **FUNCTION + tap HOLD**.

Close Call Only mode

The scanner stops the current operation and only performs Close Call checks as described above.

To enter Close Call only mode, **FUNCTION + press & hold HOLD**.

Priority Scan mode

At a specified interval, the scanner interrupts its current operation, checks the user-designated priority channels, then resumes the previous operation. You can set the interval for priority scan checks.

To enter Priority Scan mode:

1. Enter Hold mode.
2. **FUNCTION + tap NO**.

Priority Plus Scan mode

The scanner stops the current operation and only performs Priority Scan checks as described above.

To enter Priority Plus Scan mode:

1. Change the priority scan setting to *Plus On*.
2. Enter Hold mode.
3. **FUNCTION + tap NO**.

GPS mode

(Requires a connected GPS receiver.) The scanner displays longitude, latitude, and heading information.

To enter GPS mode, **FUNCTION + tap GPS**.

Weather mode

The scanner checks each of the 10 National Weather Radio channels and opens squelch when it detects a signal. When the signal stops, the scanner continues checking the other weather channels.

To enter Weather mode, **FUNCTION + press & hold WX**.

Weather Alert mode

This is similar to Weather mode: the scanner checks each of the 10 National Weather Radio channels and stays on a channel when it detects a signal. However, in Weather Alert mode, the scanner only opens squelch if it detects the EAS alert tone.

To enter Weather Alert mode:

1. Enter Weather mode.
2. **FUNCTION+ tap WX**.

Tone Out mode

The scanner checks up to 10 user-programmed channels for two-tone sequential, single, or group paging tones. When it detects a tone that matches the configuration for that channel, the scanner displays the tone information and opens squelch.

To enter Tone Out mode, tap **MENU**, then scroll down and select *Tone-Out for...*

To exit Tone Out mode, enter Scan mode.

Band Scope mode

The scanner searches a frequency ranges and displays a visual representation of the signal level.

To enter Band Scope Mode:

1. Set one of the 3 search keys to a Band Scope search.
2. Enter Search mode.
3. Press & hold the designated search key.

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Menu tree

BCD396XT main menu

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[Search for...](#)

[Close Call](#)

[Priority Scan](#)

[WX Operation](#)

[Tone-Out for...](#)

[Wired Clone](#)

[Settings](#)

Using the menu

- To open the menu, tap **MENU**.
- Turn the **SELECT-VOLUME-SQUELCH** knob to move the cursor and highlight menu items. The currently highlighted item appears in reversed-out text.
- To select the highlighted item or confirm an option setting, tap **E-YES** or press down on the **SELECT-VOLUME-SQUELCH** knob.
- To cancel an option setting, press **NO**.
- To go back one level in the menu, tap **MENU**.
- To exit the menu, press **LOCKOUT**. The scanner goes back to the operating mode it was in before you entered the menu.

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Keys and their functions

Key Overview

The diagram below shows the keys and what they are called throughout the guide:



Operating the controls

Each button has at least two different actions which you control using the key combinations explained below.

- *Tap*: press the button and release it immediately
- *Double tap*: press the button twice, as quickly as possible (within 1 second)
- *Press & hold*: press the button and keep it pressed for at least 2 seconds before releasing it
- **FUNCTION** + *tap*: press and release **FUNCTION**, then tap the button
- **FUNCTION** + *Double tap*: press and release **FUNCTION**, then double tap the button
- **FUNCTION** + *Press & hold*: press and release **FUNCTION**, then press and

hold the button

Using the **FUNCTION** button

When you tap **FUNCTION**, the scanner remembers the **FUNCTION** + key combination for the next 3 seconds; during this time, it displays an *F* icon at the top of the screen.

If you want the scanner to maintain the **FUNCTION** + key combination longer, press & hold **FUNCTION**. The scanner remembers the **FUNCTION** + key combination until the next time you tap **FUNCTION**; during this time, it displays *Function Key Holding* and flashes the *F* icon at the top of the screen.

Key functions in different operation modes

The keys have different functions in each operation mode:

- [Scan and Search mode key functions](#)
- [Hold mode key functions](#)
- [Close Call mode key functions](#)
- [Priority Scan mode key functions](#)
- [GPS mode key functions](#)
- [Tone Out mode key functions](#)
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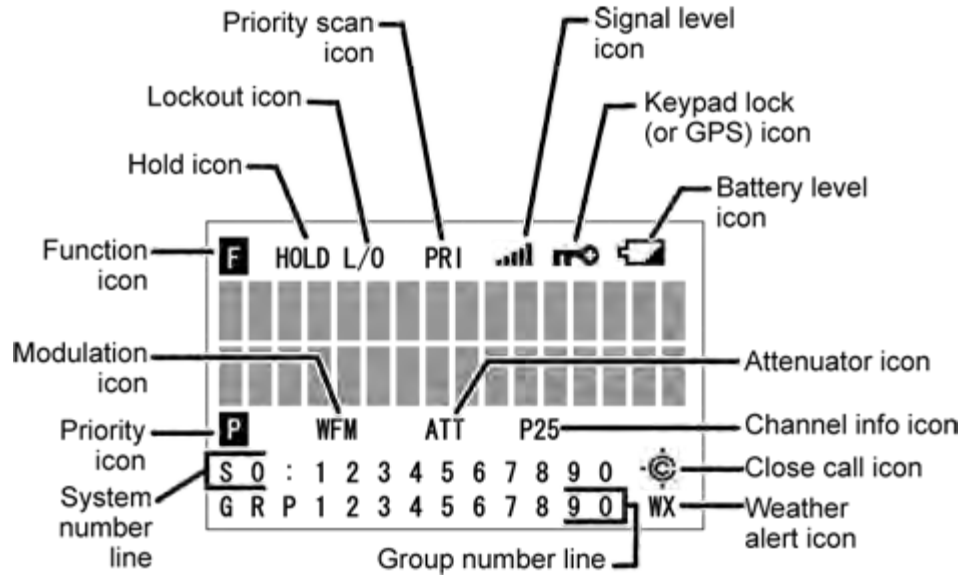
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Reading the display

The display icons vary depending on the status of the scanner and what you're doing at any given time. The diagram shows common icon locations, and table below lists the most common icons and their meanings:



<p>Attenuator icon</p>	<p>Steady: The attenuator is turned on for the current channel. Blinking: The attenuator is turned on globally (for all channels).</p>
<p>Battery level icon</p>	<p>x.xx: The remaining battery voltage is displayed in place of the X's. Blinking icon: The battery is low. (If the AC adapter is connected while the icon is blinking, the battery is incorrectly installed, is the wrong type, or has gone bad.)</p>
<p>Channel info icon</p>	<p>This icon has several available states:</p> <ul style="list-style-type: none"> ▪ P25: The received signal is digitized voice (APCO P25) ▪ LNK: The current channel is configured as a voice channel, but the scanner is receiving data on it. ▪ DAT: The current channel is configured as a control channel, and the scanner is receiving data on it. ▪ ENC: The received signal is encrypted P25 digitized voice, and the scanner has muted the audio. ▪ Cxx.x: The scanner has detected a CTCSS code; the

	<p>received code is displayed in place of the X's.</p> <ul style="list-style-type: none"> ▪ DCSxxx: The scanner has detected a DCS code; the received code is displayed in place of the X's. ▪ PNxxxx: The scanner has detected a P25 network address code (NAC); the received code is displayed in place of the X's.
Close call icon	<p>Normal (open) icon:</p> <ul style="list-style-type: none"> ▪ Steady: Close call priority mode is on. ▪ Blinking: Close Call Only mode is on, or the scanner has detected a close call signal. <p>Reversed (filled) icon:</p> <ul style="list-style-type: none"> ▪ Steady: Close call DND mode is on. ▪ Blinking: Close call DND mode is on, and the scanner has detected a close call signal.
Function icon	<p>Steady: You tapped the FUNCTION key; the scanner will remember the FUNCTION + key combination for the next 3 seconds.</p> <p>Blinking: You pressed & held the FUNCTION key: the scanner will remember the FUNCTION + key combination until you tap FUNCTION again.</p>
Group number line (GRP)	<p>In Scan mode: The group Quick Key numbers (GQK) of any unlocked groups in the current system or site are displayed on this line. The GQK number of the group that is currently being scanned blinks.</p> <p>In Hold mode: This line displays the GQK number of the current group only. In Custom Search mode: The numbers of any programmed search ranges are display on this line. The number of the custom range that is currently being searched blinks.</p>
Hold icon	The scanner is in Hold mode.
IFX icon	You switched to the intermediate frequency (IF exchange).
Keypad lock (or GPS) icon	<p>(key symbol): The keypad is locked.</p> <p>GPS: The scanner is receiving data from the GPS device.</p>
Lockout icon	The current channel is locked out.
Modulation icon	This icon displays the modulation type of the current channel: AM, FM, NFM, FMB, or WFM.
Priority icon	The current channel is set as a priority channel.
Priority scan icon	<p>Steady: Priority scan is turned on.</p> <p>Blinking: Priority Plus scan is turned on.</p>

(PRI)	
REP icon	The Repeater Find feature is turned on.
Signal level icon	This icon displays the strength of the current signal; the icon ranges from zero bars (no signal) to five bars (strong signal).
System number line (Sx:)	<p>In Scan mode: The system/site Quick Key numbers (SQK) of any unlocked systems or sites are displayed on this line. The SQK number of the system or site that is currently being scanned blinks. For SQK numbers above 9, the tens digit replaces the X in the icon; the ones digits are shown on this line.</p> <p>In Hold mode: This line displays the SQK number of the current system or site only. For SQK numbers above 9, the tens digit replaces the X in the icon; the ones digit is displayed on this line.</p> <p>In Service Search mode: The icon SCR replaces the System numbers if the broadcast screen feature is turned on.</p>
Weather alert icon	Weather Alert Priority scan is turned on.

Special displays

In some operation modes, the display can be very different from the main display. These modes also have 2 or 3 different displays you can cycle through.

- [Band Scope mode display](#)
- [Hold mode displays](#)
- [GPS mode display](#)

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Setting up the hardware

What's included

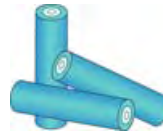
Inside the box you should find:



BCD396XT handheld trunking scanner



SMA antenna



NiMH rechargeable batteries (3)



AC adapter



SMA-to-BNC adapter for external antennas



Data transfer cable



Belt clip



Wrist strap

The CD contains a static version of the manual that you can use offline. The cover for the battery compartment might be packed separately, also.

If any of these pieces are missing or damaged, [contact customer service](#) immediately. Never use damaged equipment.

Install the batteries

Your scanner can use either regular alkaline batteries or rechargeable nickel-metal hydride (NiMH) batteries.

The batteries that came with your scanner are rechargeable NiMH.

To install the batteries,

1. Remove the cover from the battery compartment.
2. Make sure that the charge switch is set to the correct battery type:
 - Use the *Alkaline* setting for any regular or non-rechargeable battery
 - Use the *NiMH* setting for any rechargeable battery
3. Make sure the polarity (plus and minus) of each battery matches the diagram inside the compartment.
4. Replace the battery compartment cover.



Connect the antenna



To connect the antenna, just screw it onto the SMA connector at the top of the scanner.

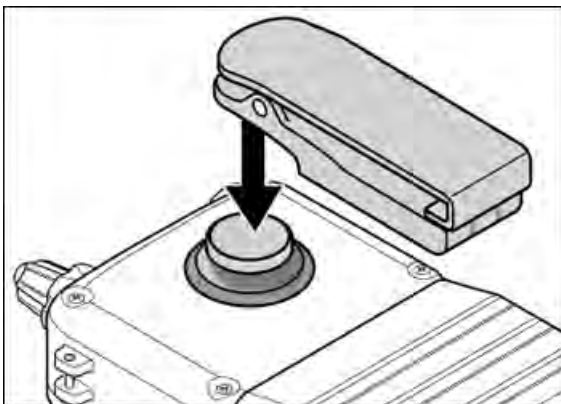
If you want to use an external antenna, attach the included SMA/BNC adapter to the scanner's SMA connector.

Then, connect your external antenna to the BNC connector.

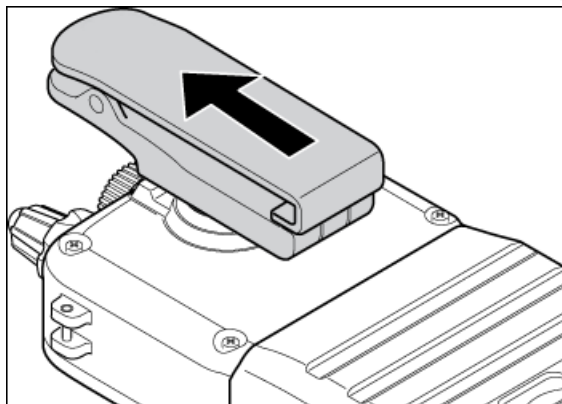
Note: Always use 50- or 75-ohm, RG-58, or RG-8, coaxial cable and the supplied SMA/BNC adapter to connect an outdoor antenna. If the antenna is over 50 feet from the scanner, use RG-8 low-loss dielectric coaxial cable. Cable loss increases with higher frequency.

Attach the belt clip

Hold the belt clip with the logo facing you and the hinge facing the top of the scanner. Place the clip over the post, and slide the belt clip straight up until you hear it click into place.



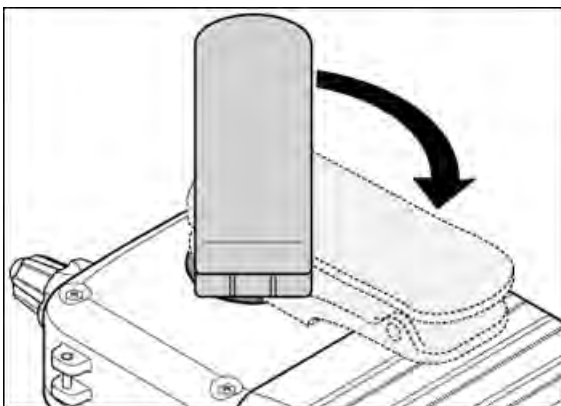
Place the clip over the post.



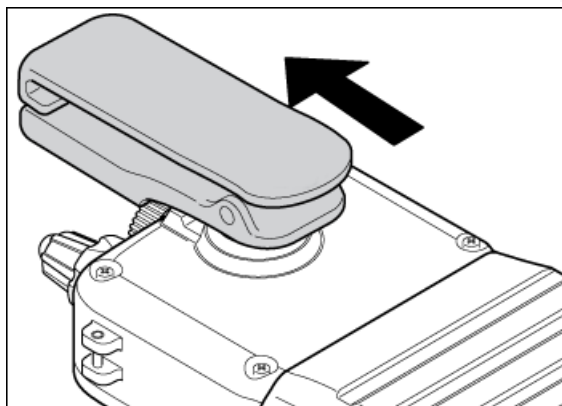
Slide the clip up into place.

To remove the belt clip

Rotate the belt clip so the hinge faces the bottom of the scanner. Slide the belt clip straight up until it comes free from the post.



Rotate the belt 180 degrees.



Slide the clip up and off the post.

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Connecting a GPS receiver

Compatible GPS receivers

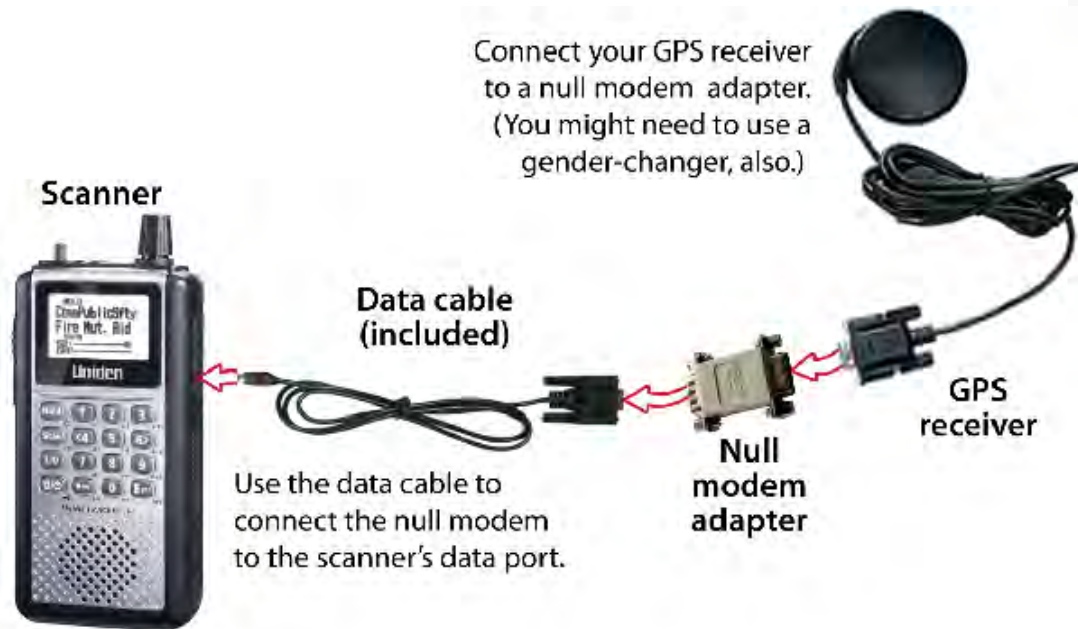
You can connect your scanner to any GPS receiver that meets the following criteria:

- Outputs NMEA-0183 v3.01-compliant location data
- Outputs both the Global Positioning System Fix (*GGA*) and Recommended Minimum Specific GNSS (*RMC*) data sentences
- Provides a serial data (RS-232) connection

Configuring your scanner

1. Go to the [Settings](#) menu and select *Set Serial Port*.
2. Select *4800* bps for the baud rate.

Connecting the receiver



1. Connect your GPS receiver to a *null modem* adapter or cable.
2. Connect the data cable that was supplied with your scanner to the null modem.
 - The data cable has a DE-9 socket (female) connector. To connect to the data cable, you need a DE-9 plug (male) connector. (DE-9 connectors are often called *DB-9* connectors.)
 - Depending on your GPS connection and your null modem, you might need a *gender changer* and/or a DB-25-to-DE-9 adapter.
3. Connect the data cable to the scanner's data port.
4. When the scanner recognizes the GPS input, it displays a confirmation message and

shows the GPS icon on the display.

- If the GPS receiver does not have a lock on the satellites, the scanner displays *Searching for Satellite*.

Troubleshooting

If you can't get the scanner to recognize the GPS receiver:

- Check the cables. Make sure you have exactly one null modem (either a cable or an adapter) somewhere in the connection: a *straight-through* connection will not work.
- Check the receiver's baud rate. Most compatible GPS receivers use a baud rate of 4800 bps, but it's possible your receiver is using a non-standard baud rate. Set the scanner's baud rate to match the GPS receiver's.

If the scanner recognizes the GPS receiver but doesn't lockout systems as you expected:

- Make sure the GPS receiver has a lock on the satellites.
- Check the location configuration for the sites and channel groups in the system.
 1. For each site or channel group, go to the [Set LocationInfo](#) menu.
 2. Check the range, latitude, and longitude settings to make sure they are correct.
 3. Make sure the *Set GPS Enable* option is set to *Yes*.

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Number Tags

- Number Tags let you quickly navigate to a specific system or channel.
- You can assign Number Tags at the system level (*System Number Tag*, or *SNT*), at the channel level (*CHannel Number Tag*, or *CHNT*), or at both levels.
- You can assign an SNT to the temporary system *Close Call Hits* that is created during [Close Call](#) searches. This system and its SNT operate like any other system.
- You can assign Number Tags to service searches and custom search ranges. These search Number Tags operate like regular SNTs.

Programming Number Tags

Assigning an SNT

- SNTs can range from 0 to 999.
- No two systems can have the same SNT. (This includes SNTs assigned to the Close Call Hits system or any search ranges.)

To a system:

1. Open the [Program System](#) menu.
2. Select the system you want to assign the number tag to.
3. Select [Edit Sys Option](#), then select [Set Number Tag](#).
4. Enter the number tag you want to use for this system.

To the Close Call Hits system:

1. Open the [Close Call](#) menu.
2. Select [Hits with Scan](#), then select [Set Number Tag](#).
3. Enter the number tag you want to use for the Close Call Hits system.

To a service search range:

1. Open the [Search for...](#) menu.
2. Select [Edit Service](#), then select the service search range you want to assign the number tag to.
3. Select [Search with Scan](#), then select [Set Number Tag](#).
4. Enter the number tag you want to use for this search range.

To a custom search range:

1. Open the [Search for...](#) menu.
2. Select [Edit Custom](#), then select the custom search range you want to assign the number tag to.
3. Select [Search with Scan](#), then select [Set Number Tag](#).

4. Enter the number tag you want to use for this custom search range.

Assigning a CHNT

- You can assign CHNTs to channels even if the system does not have an assigned SNT. However, without an SNT, you can only navigate to these channels from within that system itself.
- CHNTs must be unique within their own system, but you can re-use CHNTs in other systems.
- CHNTs can range from 0 to 999.
 1. Open the [Program System](#) menu.
 2. Select the system containing the channel you want to assign the number tag to.
 3. Select [Edit Group](#), then select the channel group you want.
 4. Select [Edit Channel](#), then select the channel you want to assign the number tag to.
 5. Select [Set Number Tag](#).
 6. Enter the number tag you want to use for this channel.

Using Number Tags

To navigate directly to:	Key sequence	Example
A system or search range	<ol style="list-style-type: none"> 1. Tap HOLD. 2. Enter the SNT. 3. Tap MENU. 	If the SNT is 4, enter HOLD / 4 / MENU .
A channel in the current system	<ol style="list-style-type: none"> 1. Tap HOLD. 2. Enter the CHNT. 3. Tap MENU. 	If the CHNT is 27, enter HOLD / 27 / MENU .
A channel in a different system	<ol style="list-style-type: none"> 1. Tap HOLD. 2. Enter the SNT followed by the decimal point. 3. Enter the CHNT. 4. Tap MENU. 	If the SNT is 4 and the CHNT is 27, enter HOLD / 4.27 / MENU .

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Quick Keys

- Quick Keys let you enable or disable systems and channel groups during a scan. Disabled systems and channel groups are ignored during scans.
- You can assign Quick Keys at the system/site level (*System/site Quick Key*, or *SQK*), at the channel group level (*Group Quick Key*, or *GQK*), or at both levels.
- You can assign an SQK to the temporary system *Close Call Hits* that is created during [Close Call](#) searches. This system and its SQK operate like any other system.
- You can assign Quick Keys to service searches and custom search ranges. These search Quick Keys operate like regular SQKs.

Programming Quick Keys

Assigning an SQK

- Multiple systems, sites, and search ranges can share the same SQK.
- All systems and sites assigned to the same SQK will be enabled (or disabled) when you enter the Quick Key.
- SQKs range from 0 to 99.

To a conventional system:

1. Open the [Program System](#) menu.
2. Select the system you want to assign the Quick Key to.
3. Select [Edit Sys Option](#), then select [Set Quick Key](#).
4. Enter the Quick Key you want to use for this system.

To a trunked system:

1. Open the [Program System](#) menu.
2. Select the system you want to assign the Quick Key to.
3. Select [Edit Site](#), then select the site you want.
4. Select [Set Quick Key](#), then enter the Quick Key you want to use for this site.

To the Close Call Hits system:

1. Open the [Close Call](#) menu.
2. Select [Hits with Scan](#), then select [Set Quick Key](#).
3. Enter the Quick Key you want to use for the Close Call Hits system.

To a service search range:

1. Open the [Search for...](#) menu.
2. Select [Edit Service](#), then select the service search range you want to

- assign the Quick Key to.
3. Select [Search with Scan](#), then select [Set Quick Key](#).
 4. Enter the Quick Key you want to use for this search range.

To a custom search range:

1. Open the [Search for...](#) menu.
2. Select [Edit Custom](#), then select the custom search range you want to assign the Quick Key to.
3. Select [Search with Scan](#), then select [Set Quick Key](#).
4. Enter the Quick Key you want to use for this custom search range.

Assigning a GQK

- All channels in the channel group will be enabled (or disabled) when you enter the GQK.
 - Multiple channel groups in the same system can share the same GQK. However, all of these channel groups will be enabled (or disabled) when you enter the GQK from within that system.
 - You can assign GQKs to channel groups even if their system does not have an assigned SQK.
 - You can only use GQKs within the current system: the GQK will not affect a channel group in another system.
 - GQKs range from 0 to 9.
 1. Open the [Program System](#) menu.
 2. Select the system containing the channel group you want to assign the Quick Key to.
 3. Select [Edit Group](#), then select the channel group you want.
 4. Select [Set Quick Key](#), then enter the Quick Key you want to use for this channel group.
-

Using Quick Keys

- Quick Keys only work in Scan mode.
- Entering the Quick Key toggles the enabled/disabled state of the system/site/search range or channel group (i.e., if the system is currently enabled, entering the Quick Key will disable it, and vice-versa).

To use SQK 0 through 9

- Enter Scan mode.
- Tap the number key that matches the SQK. (For example, if the SQK is 4, just enter 4.)
- Any systems, sites, or search ranges assigned to this SQK become disabled. (If they were already disabled, they become enabled.)

To use SQK 10 through 99

- Enter Scan mode.
- Tap the decimal point ([.NO](#)), then enter the SQK. (For example, if the SQK is 32, enter [.NO / 32](#).)
- Any systems, sites, or search ranges assigned to this SQK become disabled.

(If they were already disabled, they become enabled.)

To use a GQK

- Enter Scan mode.
- Go to the system that contains the channel group you want to enable or disable.
- Tap **FUNCTION**, then tap the number key that matches the GQK. (For example, if the GQK is 7, enter **FUNCTION / 7**.)
- Any channel groups assigned to this SQK *within the current system only* become disabled. (If they were already disabled, they become enabled.)

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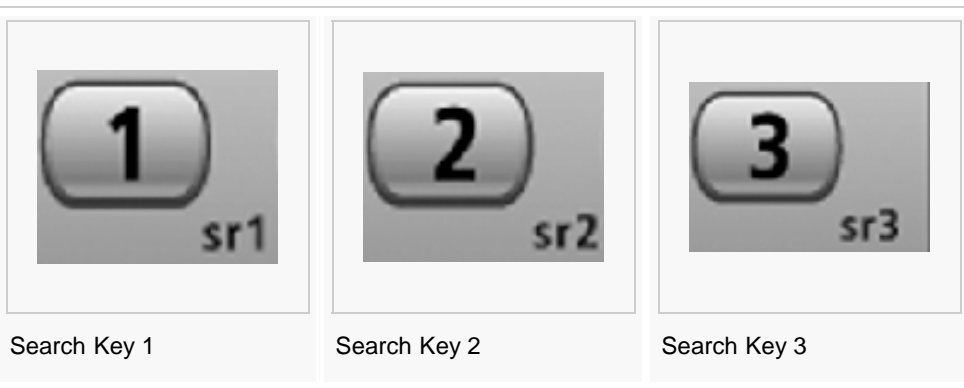
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Search Keys

The scanner has three Search Keys that you can assign to a special search range; the Search Keys are set to number keys **1**, **2**, and **3**:



Programming Search Keys

1. Open the [Search for...](#) menu.
2. Select [Set Search Key](#), then select the search key you want to program.
3. Select the search range you want to assign to this Search Key. Choose one of the pre-programmed service search ranges, one of the 10 custom search ranges, a Tone-Out search, or a Band Scope search.

If the Search Key you selected starts a Tone-Out search, the scanner switches to Tone-Out mode and searches the most-recently-used Tone-Out channel (out of the 10 available). If you want to search a different Tone-Out channel, use the **SELECT-VOLUME-SQUELCH** knob to select the Tone-Out channel you want to use.

Using Search Keys

To start the search assigned to a Search Key, **FUNCTION+** tap that Search Key. For example, to start the search assigned to Search Key 2, **FUNCTION+** tap **2**. (You can't use the Search Keys when the scanner is in Scan mode or GPS mode.)

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Programming locations

To use [Location-based Scanning](#) with a particular system, you will need to program your scanner with the geographic coordinates you want to use for each site or channel group. You can also program your scanner to alert you when you approach particular locations.

Programming a location for a site

Each system site can have separate location information.

1. Open the [Program System](#) menu.
2. Select the system you want to program for location based scanning.
3. Select [Edit Site](#), then select the first site you want to assign a location to.
4. Select the [Set LocationInfo](#) menu and enter the latitude, longitude, and range for this site.
5. Change the *Set GPS Enable* field to *On*.
6. Go back to the [Edit Site](#) menu and repeat these steps with any other sites you want to program for this system.

Programming a location for a channel group

Each channel group in a system can have separate location information.

1. Open the [Program System](#) menu.
2. Select the system you want to program for location based scanning.
3. Select [Edit Group](#), then select the first channel group you want to assign a location to.
4. Select the [Set LocationInfo](#) menu and enter the latitude, longitude, and range for this site.
5. Change the *Set GPS Enable* field to *On*.
6. Go back to the [Edit Group](#) menu and repeat these steps with any other sites you want to program for this system.

Remember: You have to turn on *Set GPS Enable* before the location information can effect that site or channel group.

Programming general locations

You can program general locations (i.e., locations that are not associated with a site or channel group). There are three types of general locations:

- points of interest (*POI*)
- intersections (*Dangerous Xing*)

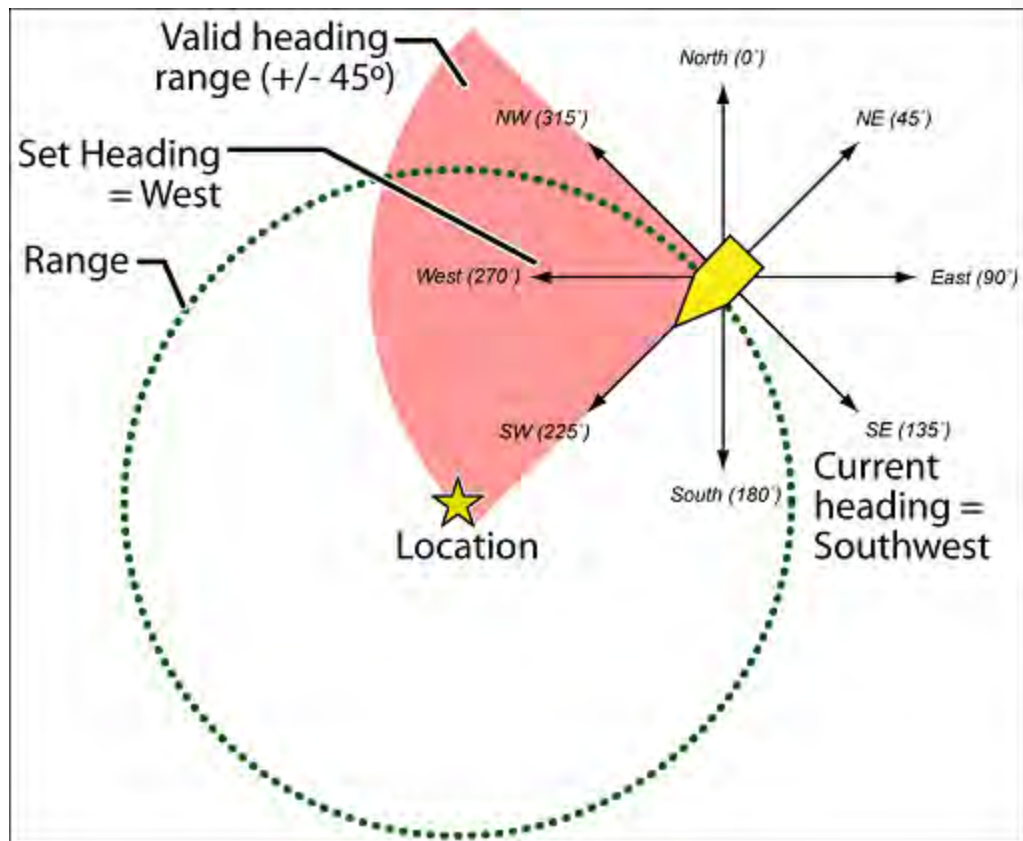
roads (*Dangerous Road*)

You can program the scanner to alert you when you come within a designated distance of that location.

To create a new location

1. Open the [Program Location](#) menu.
2. Select the type of location you want to create.
3. Select *New Location* to create a new location of this type.
 - If you want to create a different type of location, go back to the [Program Location](#) menu and select that location type.
4. If you want to change the default location name, select [Edit Name](#) and enter a new name.
5. Select *Set LocationInfo* and enter the latitude and longitude for this location.
6. Select *Set Range* and enter the distance from this location you want the scanner to alert you.
7. Choose the *Alert Tone* and *Alert Light* you want the scanner to use when you come within range of this location.

For Dangerous Xing and Dangerous Roads only



In addition to range, you can specify a heading and a speed limit for these types of locations:

- If you set a speed limit, the scanner will only trigger an alert when you are within the location's range *and* your current speed is over the programmed speed limit.
- If you set a heading, the scanner will only trigger an alert when you are within the location's range *and* your current heading is +/- 45 degrees from the

programmed heading. (For example, if you set the heading as *North*, the scanner will trigger an alert if your current heading is *North-east* but not if your current heading is due *East*.)

Edit an existing location

1. Open the [Program Location](#) menu.
2. Select the type of location you want to edit; the scanner lists the existing locations of that type in alphabetical order.
3. Select the location you want to edit, then change any of the location settings you want.

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Setting alerts

Your scanner can trigger alerts for several different events. The table below shows the different alerts and how to program them:

To sound an alert when	Follow these steps
<p>A channel becomes active</p>	<p>Edit the channel properties (Edit Channel#Set Alert):</p> <ol style="list-style-type: none"> 1. Go to the <i>Program System</i> menu and select the system that contains the channel you want set the alert for. 2. Select <i>Edit Group</i>, then select the group you want. 3. Select Edit Channel, then select the channel you want to set the alert for. 4. Select <i>Set Alert</i>. 5. Choose the <i>Alert Tone</i> and <i>Alert Light</i> you want the scanner to use.
<p>An active Talk Group on a system contains an emergency flag</p>	<p>Edit the system properties (Edit Sys Option#Emergency Alert):</p> <ol style="list-style-type: none"> 1. Go to the <i>Program System</i> menu and select the system you want set the alert for. 2. Select Edit Sys Option, then select <i>Emergency Alert</i>. 3. Choose the <i>Alert Tone</i> and <i>Alert Light</i> you want the scanner to use.
<p>The scanner detects a Close Call hit</p>	<p>Edit the Close Call properties:</p> <ol style="list-style-type: none"> 1. Go to the <i>Close Call</i> menu. 2. Select <i>Set CC Alert</i>. 3. Choose the <i>Alert Tone</i> and <i>Alert Light</i> you want the scanner to use. 4. For Close Call Alerts, you can also have the scanner pause before it resumes searching. Select <i>Set CC Pause</i> to activate this feature.
<p>The scanner gets a hit on a Tone-</p>	<p>Edit the Tone-Out channel properties:</p> <ol style="list-style-type: none"> 1. Go to the Tone-Out for... menu. 2. Select <i>Tone-Out Setup</i>, then select the Tone-Out channel you want to set the alert for.

Out channel

3. Select *Set Alert*.
4. Choose the *Alert Tone* and *Alert Light* you want the scanner to use.

You approach a particular location

- Point of Interest(*POI*)
- Dangerous Road
- Dangerous Intersection (*Dangerous Xing*)

Edit the location properties:

1. Go to the [Program Location](#) menu and select the type of location you want set the alert for.
2. Select the particular location.
3. For a *POI*, select *Set Alert*, then choose the *Alert Tone* and the *Alert Light* you want to use.
4. For a *Dangerous Road* or *Xing*, the alert tone is preset. Select the *Alert Volume* and the *Alert Light* you want to use.

NOTE: The scanner also triggers alerts for Weather Alerts ([WX Operation#Weather Alerts](#)), but you can't edit the alert tone and light.

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Using Quick Keys, Startup Keys, and Search Keys

The different shortcut keys have different functions:

Quick Keys

- Quick keys let you enable and disable systems and channel groups (disabled systems and channel groups are ignored during scans).
- You must be in Scan mode to use Quick Keys.
- System Quick Keys (SQKs) let you enable or disable systems, sites or search ranges: just enter the SQK from the number pad.
- Group Quick Keys (GQKs) let you enable or disable channel groups inside the current system: Tap **FUNCTION**, then enter the GQK from the number pad.

Startup Keys

- Startup Keys let you lock and unlock several systems, sites, and search ranges all at the same time.
- When you activate a Startup Key, the scanner unlocks all systems, sites, and search ranges that are assigned to that same Startup Key; the scanner also locks all systems, sites, and search ranges that are assigned to a different Startup Key.
- To activate a Startup Key, press & hold the number key while you power the scanner on.

Search Keys

- Search Keys let you quickly start one of 3 programmed searches.
- To start the search assigned to a Search Key, **FUNCTION+** tap that Search Key.

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Tone Out mode

With the tone out feature, the scanner monitors up to 10 different channels for paging tones (two-tone sequential, single tone, and group tone). Normally, the scanner monitors each of the 10 channels in turn. However, if any tone-out channels share the same frequency, modulator, and attenuator settings, the scanner checks these channels simultaneously.

Configuring Tone Out channels

To configure Tone-Out channels:

1. Go to the [Tone-Out for...](#) menu.
2. Select *Tone-Out Setup*.
3. Select the Tone-Out channel (*Tone-Out 1* through *Tone-Out 10*) you want to configure.
4. Select *Set Frequencies* and choose the frequencies for this channel
5. Select *Set Tone* and program Tone A and Tone B.
6. Set any of the other properties as you prefer (they aren't required).

Required	Frequencies Set Frequencies Tone A and Tone B Set Tone
Recommended	Name (Edit Name)
Optional	Automatic Gain Control (AGC) (Set Audio AGC) Delay time (Set Delay Time) Alert (Set Alert)

Using Tone-Out Mode


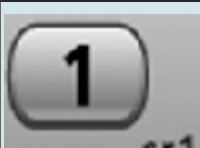
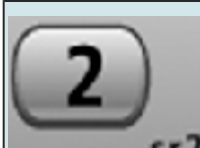
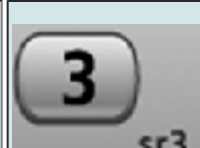

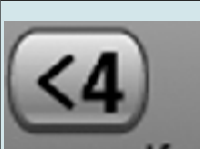
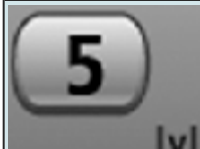


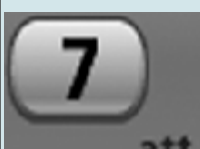


To start a Tone-Out search:





1. Tap **MENU**.
 2. Scroll down and select *Tone-Out for...*
 3. Select *Tone-Out Standby* to start the search.
- The scanner starts searching the most recently-used Tone-Out channel (and any other Tone-Out Channels that have the same frequency).
 - If you want to search a different channel, just turn the **SELECT-VOLUME-SCROLL** knob until you find the channel you want.

- To exit Tone-Out mode, tap **SCAN**.

Key operation in Tone Out Mode

- Turn the **SELECT-VOLUME-SCROLL** knob to change the channel.
- **FUNCTION** + tap **MENU** to go to the *Tone-Out for...* menu.

Key Name (2nd operation) Action on:	 Hold (Close call)	 1 (Search 1)	 2 (Search 2)	 3 (Search 3)
Tap	Enter Hold mode (the scanner opens squelch).	Enter the number on the key.		
FUNCTION + Tap	Toggle Close Call modes.	Start the search range assigned to this Search Key.		
FUNCTION + Press & hold	Enter Close Call Only mode.	NA	NA	NA
Key Name (2nd operation) Action on:	 Scan (Search)	 4 (IF exchange)	 5 (Volume offset)	 6 (Display mode)
Tap	Enter Scan mode.	Enter the number on the key		
FUNCTION + Tap	Display the Quick Search screen (enter Search mode).	Switch to the intermediate frequency (IF).	NA	NA
Key Name (2nd operation) Action on:	 Lockout	 7 (Attenuation)	 8 (Reverse freq.)	 9 (Modulation)
Tap	NA	Enter the number on the key.		
FUNCTION + Tap	NA	Toggle the attenuator state for this channel.	NA	Change the modulation.
FUNCTION		Toggle the		

+ Press & hold	NA	attenuator state for all signals.	NA	NA
Key Name (2nd operation) Action on:	 Backlight (Power, Lock)	 No (Decimal, Priority)	 0 (Weather)	 Yes (Enter, GPS)
Tap	Turn on the LCD backlight.	During a system message: Cancel the message and exit that screen.	Enter the number on the key.	Edit the current Tone-Out channel.
Press & hold	Turn the scanner on or off.	NA	NA	NA
FUNCTION + Tap	Lock or unlock the keypad.	NA	Change the WX Alert Priority settings.	Enter GPS mode.
FUNCTION + Press & hold	NA	NA	Enter Weather mode.	NA

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Close Call mode



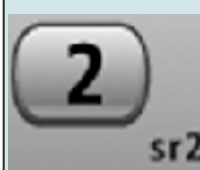
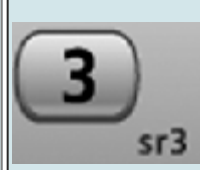
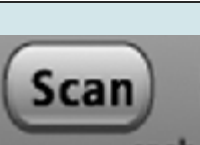
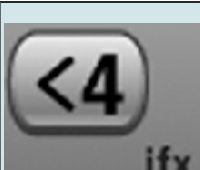


When the scanner is in Close Call mode, it performs a close call check every 2 seconds. The scanner switches to the selected bands and searches for unusually strong signals (indicating the transmitter is probably somewhere close by). After the close call check, the scanner returns to its previous function.



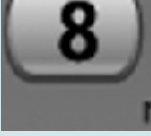





In *Close Call Only* mode, the scanner only performs close call checks.

The [Close Call](#) menu lets you change the operation settings of the close call feature. You can change the overall close call options through the [Srch/CloCall Opt](#) menu.

Key operation in Close Call mode

- Turn the **SELECT-VOLUME-SCROLL** knob to resume searching.
- **FUNCTION** + tap **MENU** to go to the *Close Call* menu.

Key Name (2nd operation) Action on:	 Hold (Close call)	 1 (Search 1)	 2 (Search 2)	 3 (Search 3)
Tap	When the scanner detects a Close Call hit: Enter Hold mode.	Disable the Close Call band associated with this key. Tap again to enable.		
FUNCTION + Tap	Toggle Close Call mode.	Start the search assigned to this Search Key.		
Key Name (2nd operation) Action on:	 Scan (Search)	 4 (IF exchange)	 5 (Volume offset)	 6 (Display mode)
Tap	Enter Scan mode.	Disable the Close Call band associated with this key. Tap again to enable.		

FUNCTION + Tap	Display the Quick Search screen (enter Search mode).	Switch to the intermediate frequency (IF).	NA	NA
Key Name (2nd operation) Action on:	 Lockout	 7 (Attenuation)	 8 (Reverse freq.)	 9 (Modulation)
Tap	Temporarily lock out the current Close Call frequency (until you turn the scanner off).	Disable the Close Call band associated with this key. Tap again to enable.	NA	NA
Double tap	Permanently lock out the current Close Call frequency.	NA	NA	NA
Press & hold	Unlock all Close Call and Search frequencies.	NA	NA	NA
FUNCTION + Tap	Review the list of locked out IDs.	Toggle the attenuator state for this channel.	NA	Change the modulation.
FUNCTION + Press & hold	NA	Toggle the attenuator state for all signals.	Show the reverse frequency for the current frequency. (The scanner returns to the current frequency when you release the key.)	NA
Key Name (2nd operation) Action on:	 Backlight (Power, Lock)	 No (Decimal, Priority)	 0 (Weather)	 Yes (Enter, GPS)
Tap	Turn on the LCD backlight.	During a system message: Cancel the message and	NA	When monitoring a Close Call frequency: store the current

		exit that screen.		frequency.
Press & hold	Turn the scanner on or off.	NA	NA	NA
FUNCTION + Tap	Lock or unlock the keypad.	NA	Change the WX Alert Priority settings.	Enter GPS mode.
FUNCTION + Press & hold	NA	NA	Enter Weather mode.	NA

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Band Scope mode

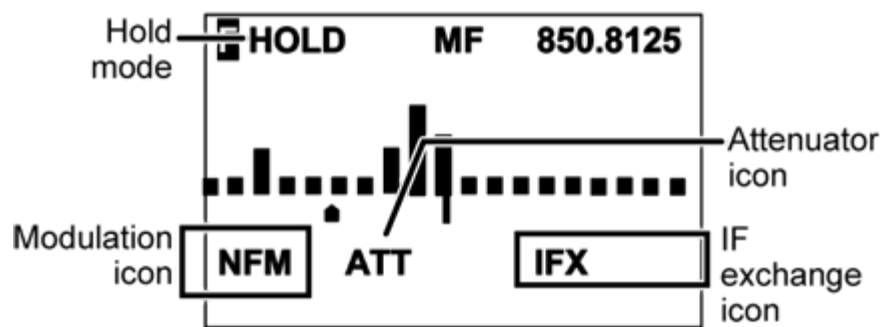
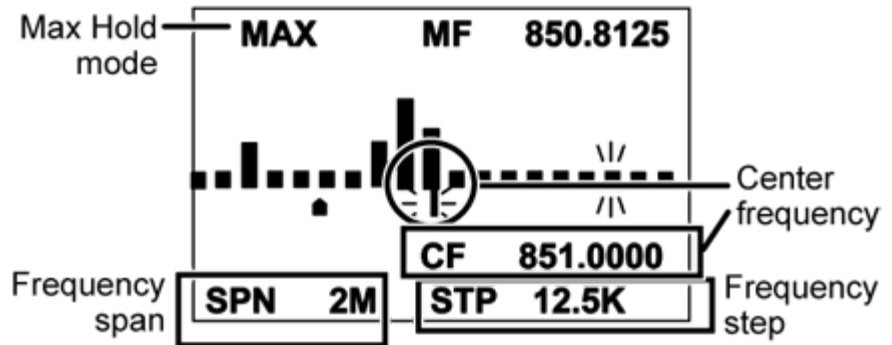
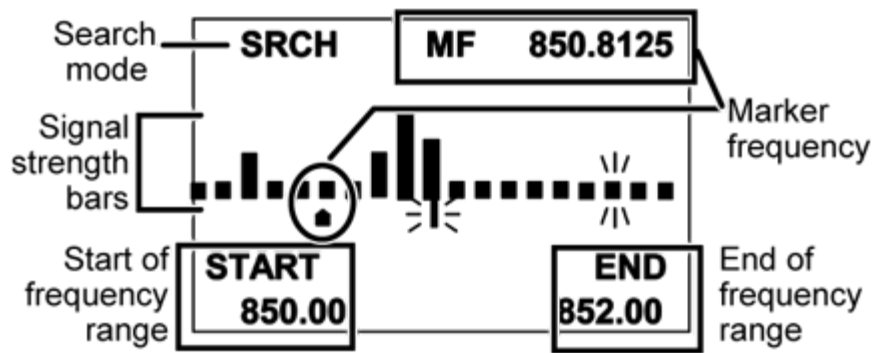
Band Scope mode is a special type of Search mode where the scanner displays the strength of any signal it finds.

- In a band scope search, the scanner starts at the lowest frequency in the range and moves up the search range.
- In *Max Hold* Search mode, the scanner displays the strongest signal that it found.

To turn on Band Scope mode:







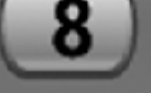




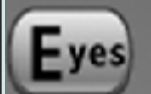
Band Scope mode is the default setting for Search Key 3. To turn on Band Scope mode, enter Search mode, then tap **FUNCTION + 3 (SR3)**. (To change the Search Key assignment, see [Search Keys#Programming Search Keys](#).)

Reading the display in Band Scope mode



Key operation in Band Scope mode

Key Name (2nd operation)				
Action on:	Hold (Close call)	1 (Search 1)	2 (Search 2)	3 (Search 3)
Tap	Enter Hold mode.	NA	NA	NA
FUNCTION + Tap	Toggle Close Call modes.	NA	NA	NA
FUNCTION + Press & hold	Enter Close Call Only mode.	NA	NA	NA
Key Name (2nd)				

operation) Action on:	 srch Scan (Search)	 ifx 4 (IF exchange)	 lvl 5 (Volume offset)	 disp 6 (Display mode)
Tap	Enter Scan mode.	NA	NA	NA
FUNCTION + Tap	Change the band scope search type.	NA	NA	NA
Key Name (2nd operation) Action on:	 Lockout	 att 7 (Attenuation)	 rev 8 (Reverse freq.)	 mod 9 (Modulation)
FUNCTION + Tap	NA	Toggle the attenuator state for the current signal.	NA	Change the modulation.
FUNCTION + Press & hold	Unlock all items regardless of type.	Toggle the attenuator state for all signals.	NA	NA
Key Name (2nd operation) Action on:	 Backlight (Power, Lock)	 pri No (Decimal, Priority)	 wx 0 (Weather)	 gps Yes (Enter, GPS)
Tap	Turn on the LCD backlight.	During a system message: Cancel the message and exit that screen.	NA	NA
Press & hold	Turn the scanner on or off.	NA	NA	NA
FUNCTION + Tap	Lock or unlock the keypad.	NA	Change the Weather Alert Priority settings.	Enter GPS mode.
FUNCTION + Press & hold	NA	NA	Enter Weather mode.	NA

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GPS mode

You must have a [compatible GPS receiver](#) connected!

See Also

GPS mode is only one small part of location-based scanning. For more information on using your scanner with a GPS receiver, see the following links:

Location-based Scanning contains

- an overview of why you might want to use a GPS receiver with your scanner
- an explanation of two different approaches to location-based scanning
- some information on fining antenna locations

Programming locations contains

- details on how to program locations for systems, sites, and channels
- details on how to program Points of Interest (*POI*), Dangerous Roads, and Dangerous Intersections (*Dangerous Xing*)
- information on reviewing and editing locations

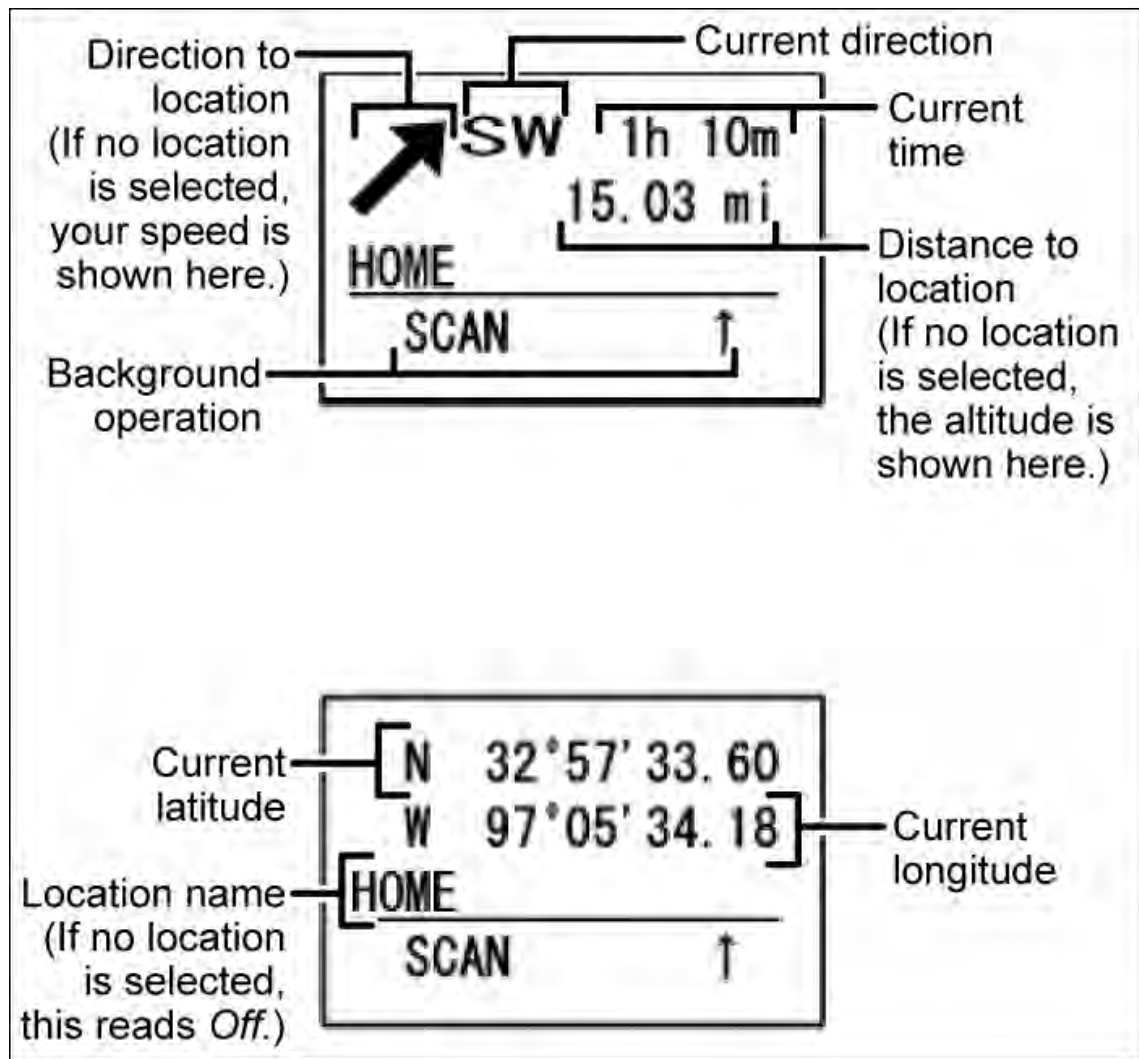
Connecting a GPS receiver contains

- details on which GPS receivers are compatible
- instructions on connecting a GPS receiver
- troubleshooting tips if you can't the receiver working with the scanner

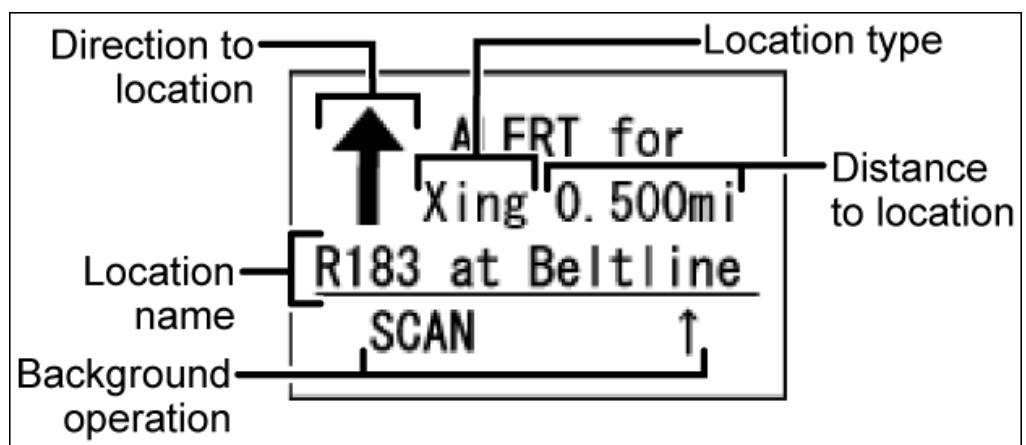
Reading the display in GPS mode

There are several displays available in GPS mode.

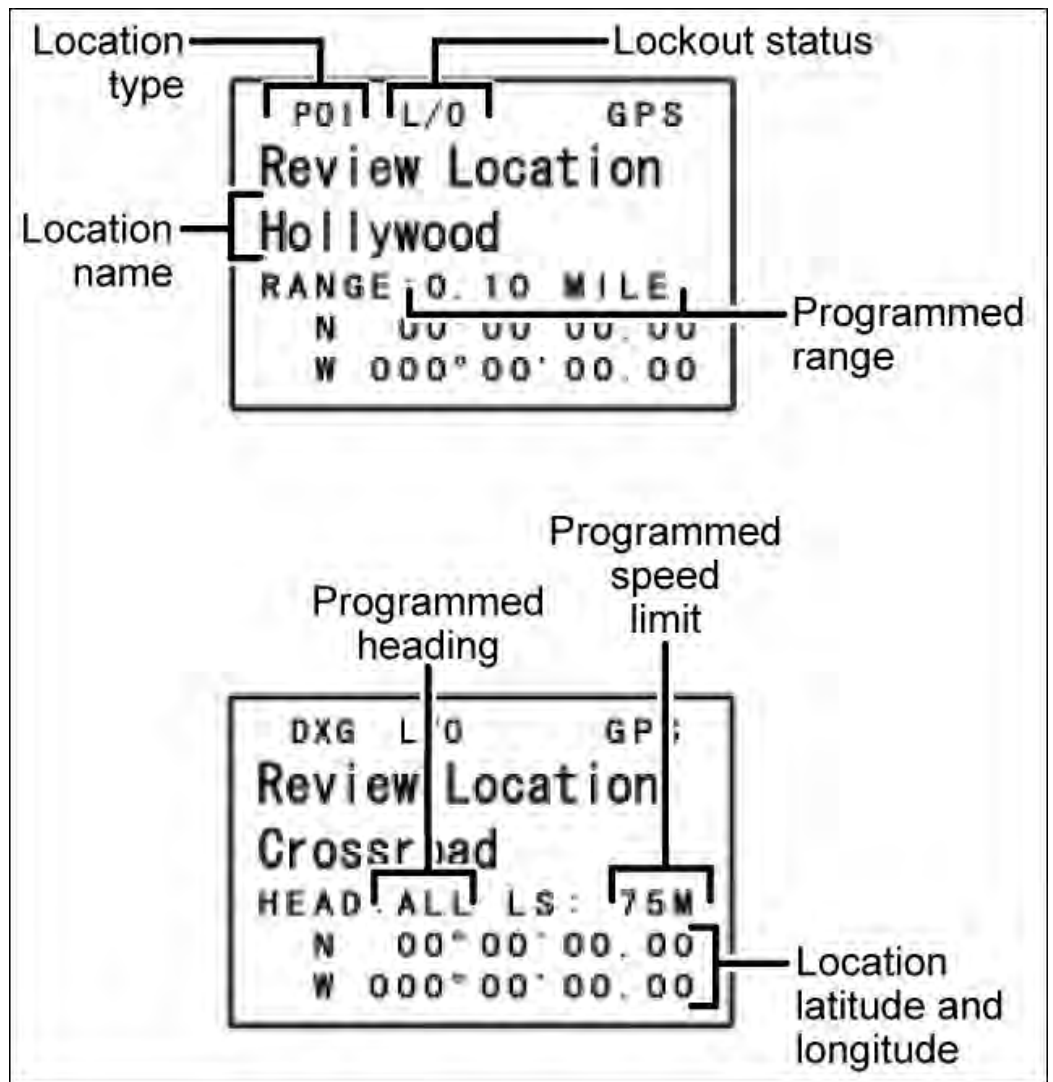
Main GPS display






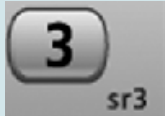
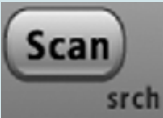

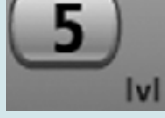

Location alert display



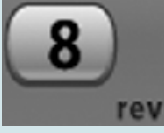







Location review display

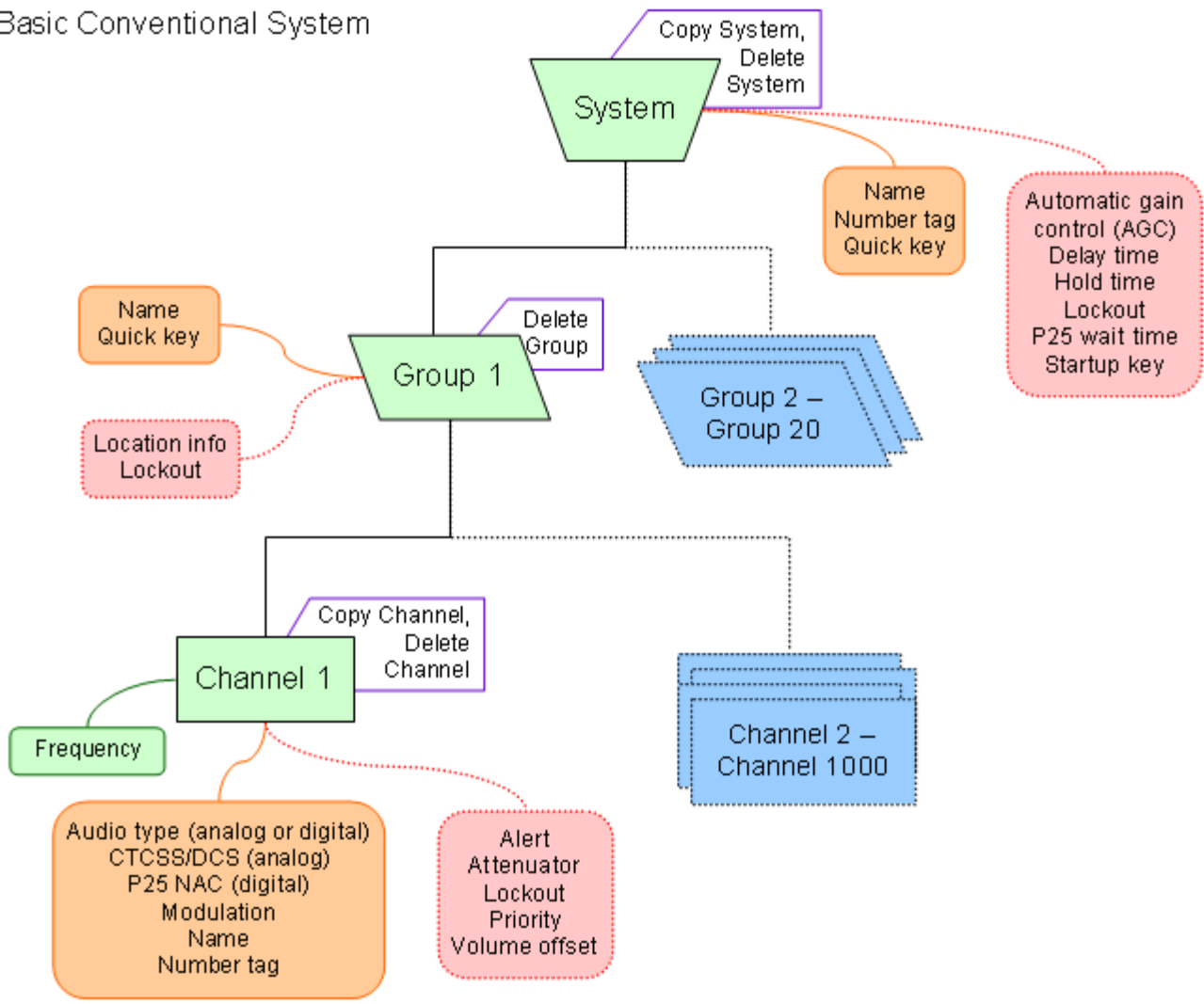


Key operation in GPS mode

Key Name (2nd operation) Action on:	 Hold (Close call)	 1 (Search 1)	 2 (Search 2)	 3 (Search 3)
Tap	Toggle Hold mode on the scan or search running in the background. When reviewing locations: Enter Scan Hold mode.	NA	NA	NA
Key Name (2nd operation) Action on:	 Scan (Search)	 4 (IF exchange)	 5 (Volume offset)	 6 (Display mode)
Tap	Return to previous operation. When reviewing locations:	NA	NA	NA

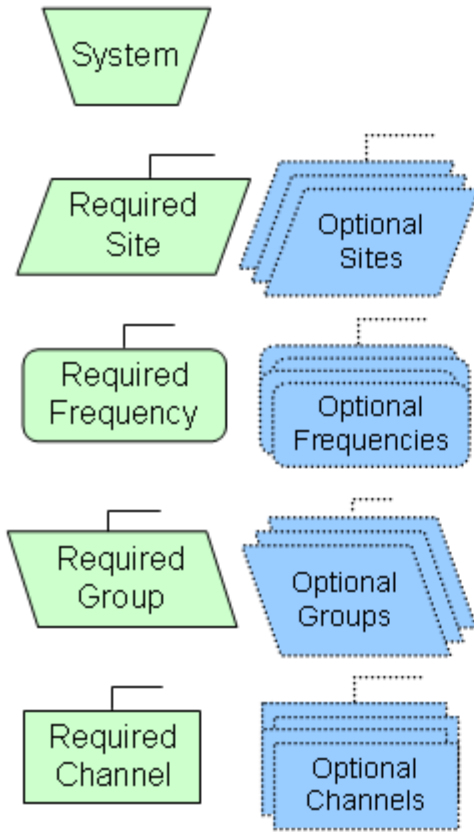
	Enter Scan mode.			
FUNCTION + Tap	NA	NA	NA	Cycle through the available displays.
Key Name (2nd operation) Action on:	 Lockout	 7 (Attenuation)	 8 (Reverse freq.)	 9 (Modulation)
Tap	Temporarily lockout the current Location Alert. When reviewing locations: Toggle the Lockout status of the current location.	NA	NA	NA
Double Tap	Permanently lockout the current Location Alert.	NA	NA	NA
Press & hold	When reviewing locations: Unlock all locations of the current type (POI, Dangerous Road or Crossing).	NA	NA	NA
FUNCTION + Press & hold	When reviewing locations: Unlock all locations regardless of type.	NA	NA	NA
Key Name (2nd operation) Action on:	 Backlight (Power, Lock)	 No (Decimal, Priority)	 0 (Weather)	 Yes (Enter, GPS)
Tap	Turn on the LCD backlight.	During a system message: Cancel the message and exit that screen. When reviewing locations: Close the location review list.	NA	Open the location review location list. When reviewing locations: Edit the selected location.
Press & hold	Turn the scanner on or off.	NA	NA	NA
FUNCTION + Tap	Lock or unlock the keypad.	NA	NA	NA
FUNCTION + Press & hold	NA	NA	NA	When reviewing locations: Replace the select location's coordinates with the coordinates of your current position.

Basic Conventional System



System Layout Legend

Items



Properties

Required Properties
(must be entered correctly)

Recommended Properties
(not required, but most users prefer to set them)

Optional Properties
(Two types:
1- things that rarely need to be changed from the default setting
2- things that configure advanced functions few people use)

Operations
(actions available at this level)

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Program System

The *Program System* menu lets you create systems and edit existing systems. All existing systems are listed in alphabetical order: select the system you want to edit, or select *New System* to create a new one.

When you create a new system, the scanner prompts you to select a system type; the system type you select controls what options are available for the system setup. You can't change a system type once the system is created: if you need to change the system type, delete the system and create it all over again as a new system.

The *System Type* options are:

- *P25*: Use for any P25 system. When you select this system type, the scanner prompts you to choose *Standard Trunk* or *One-Freq*.
- *MOT*: Use for any Motorola system.
- *EDCS*: Use for any EDACs system. When you select this system type, the scanner prompts you to choose *WIDE/NARROW* or *SCAT*.
- *LT*: Use for any LTR system.
- *Conventional*: Use for any non-trunked system.

REMEMBER: once you select a system type, you can't change it!

Edit Name

Enter a name or edit the existing one. Names can be 16 characters long, and they can contain upper and lower case letters, punctuation, and spaces. Turn the **SELECT-VOLUME-SQUELCH** knob to choose the character you want, then press **6** (right cursor) to move the cursor to the next character.

Edit Sys Option

This menu lets you set the options for each system.

Edit Site

(trunked systems only) This menu lets you create sites and edit existing sites. All existing sites are listed in alphabetical order: select the site you want to edit, or select *New Site* to create a new one.

Edit Group

This menu lets you create groups and edit existing groups. All existing groups are

listed in alphabetical order: select the group you want to edit, or select New Group to create a new one. You can have up to 20 groups in each system.

Copy System

Make a copy of this system and all its settings including all sites, groups, channels, and frequencies. The scanner prompts you to enter a new system name.

Delete System

Delete this system and all its settings; this includes sites, groups, channels, and frequencies.

New System

Create a new system.

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Edit Sys Option

You have the following options for systems (click on any setting for an explanation):

Options available for all systems:

Set Quick Key

Assign this system or site to a Quick Key so you can easily enable or disable it during scanning. Enter a number from 0 to 99; tap **NO** (the decimal point) if you don't want to assign this system or site to a Quick Key. (For more information, see [Quick Keys](#).)

Set Startup Key

Assign this system or site to a Startup Key so you can lock or unlock it during power up. Enter a number from 0 to 9; tap **NO** (the decimal point) if you don't want to assign this system or site to a Startup Key. (For more information, see [Startup Keys](#).)

Set Number Tag

Assign a number to this system or channel that you can use to tune directly to a specific channel. Choose a number from 0 to 999. (For more information, see [Number Tags](#).)

Set Lockout

Decide whether you want to lock out a system, site, or channel so the scanner will ignore it during Scan and Search modes. If you lock out a system or site, all channels within that system or site will be locked out. Choose one of the following options:

- *Unlocked*: The system, site, or channel is not locked out.
- *Temporary L/O*: The system, site or channel is locked out until you turn the scanner off and back on.
- *Lockout*: The system, site, or channel is permanently locked out.

Set Hold Time

Set the minimum number of seconds the scanner should spend checking this

system or site even if there is no traffic on any channel. (The scanner always checks each channel in a system or site once even if the hold time is set to 0 seconds.) Select the number of seconds from 0 through 255 (2 is the default).

Set Delay Time

Set the number of seconds the scanner should wait after a transmission stops before moving on to the next channel. Select 0, 1, 2 (default), 5, 10, or 30 seconds.

To have scanner leave the channel after a designated number of seconds whether the transmission stops or not, select one of the negative values. Choose -10 seconds to have the scanner leave the channel after 10 seconds even if the transmission is still going on; choose -5 seconds or -2 seconds to have the scanner leave after 5 seconds or 2 seconds, respectively.

Set End Code

Choose whether the scanner recognizes any end transmission codes when deciding to leave a channel. You have the following options:

- *Analog*: The scanner recognizes only analog end transmission codes.
- *Analog-Digital*: The scanner recognizes both analog and digital end codes.
- *Ignore*: The scanner waits for the carrier signal to drop before it leaves a channel.

Set Audio AGC

Turn on Automatic Gain Control (AGC) for this system. When you activate this feature, the scanner automatically adjusts the volume for each channel based on the signal strength. You can turn on the gain control for *Analog* and *Digital* signals separately.

To change the settings for the audio AGC, see [Settings#Adjust Audio AGC](#).

P25 Waiting Time

On channels that contain a mix of analog and digital signals (i.e., where the *Audio Mode* is set to *All*), it is possible to have *false decode* problems caused by digital noise at the beginning of transmissions. To prevent this, a user-configurable P25 wait time (from 0 to 1000 ms) has been added.

During the wait time, the scanner evaluates the received signal; if it detects P25 data, the scanner opens squelch immediately. If it does not detect any P25 data, the scanner opens squelch as soon as the wait time expires.

Note: Any analog transmissions on this channel will lose the first part of the transmission, up to the wait time you set here.

Select the number of milliseconds (after the start of a transmission) the scanner should wait while checking for P25 data. Choose a number from 0 through 1000 ms in 100 ms increments. The scanner only applies the wait time setting to Conventional or Motorola (non P25) systems, and only when the channel's *Audio*

Mode setting is *All*.

Trunked system options

The following options are available for trunked systems only:

ID Scan/Search

Choose whether the scanner only checks the Talk Group IDs that you program (*ID Scan*) or checks all the Talk Group IDs it can find (*ID Search*) when scanning this site.

Edit Fleet Map

(Motorola Type I or Hybrid systems only) This menu lets you choose one of the 16 pre-programmed fleet maps; select *Custom* to manually program your own fleet map information. (See [Motorola fleet maps](#) for more information.)

Priority ID Scan

Choose *On* to have the scanner check any priority-labeled channels in this system during Priority Scan mode. Choose *Off* if you want the scanner to ignore this system when scanning priority channels.

Set Status Bit

Choose *Yes* to have the scanner check the status bit in each TalkGroup ID, or choose *Ignore* to ignore all status bits in this system.

Emergency Alert

This menu lets you configure whether the scanner triggers an alert tone and light when it detects an emergency flag within an active Talk Group. (Compare this to the channel setting [Set Alert](#), which can trigger an alert tone and light whenever a channel becomes active.) The settings for [Set Alert Tone](#) and [Set Alert Light](#) are common to both types of alerts.

Set ID Format (DEC/HEX) or (AFS/DEC)

Trunked systems have three different formats for the Talk Group ID, but not all formats are used by each system type. Choose the Talk Group ID format used by this system:

- *Dec*: The system uses a decimal (base 10) format for the Talk Group IDs (available for all trunked systems)
- *Hex*: The system uses a hexadecimal (base 16) format for the Talk Group IDs (available for P25 and Motorola systems only)
- *AFS*: The system uses the Agency-Fleet-Subfleet format for the Talk Group IDs (available for EDACS wide or narrow systems only)

Rvw ID:Srch L/O

This feature displays a list of all locked out Talk Group IDs. If you want to unlock a Talk Group ID, just select it from the list and press **YES**.

Clr All L/O IDs

Choose yes to unlock all the Talk Group IDs in this system or site. (Choose no to

cancel and go back to the previous screen.)

P25 System options

The following options are only available for P25 systems:

P25 NAC Option

(P25 single frequency systems only) Choose whether the scanner searches for a specific Network Access Code (NAC) for this system or frequency.

- *Search*: The scanner searches for all NACs in this system or frequency.
- *Set P25 NAC*: The scanner searches for only the NAC you enter here. If you select *Set P25 NAC*, the scanner prompts you to enter the NAC the scanner should search for: enter a hexadecimal number between *0* and *FFF*.

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Edit Group

When you create a new channel group, the scanner automatically assigns a default name of Group XX, where XX is a 2-digit sequential number (1 through 20).

Options available for all groups:

You have the following options for channel groups:

Edit Name

Enter a name or edit the existing one. Names can be 16 characters long, and they can contain upper and lower case letters, punctuation, and spaces. Turn the **SELECT-VOLUME-SQUELCH** knob to choose the character you want, then press **6** (right cursor) to move the cursor to the next character.

Set Quick Key

Assign this group to a Quick Key so you can easily enable or disable it during scanning. Enter a number from 0 to 9; tap **NO** (the decimal point) if you don't want to assign this group to a Quick Key. (For more information, see [Quick Keys](#).)

Edit Channel

Use this menu to program channel information for this group.

Set LocationInfo

Use this menu to program location information for this group.

Set Lockout

Decide whether you want to lock out a system, site, or channel so the scanner will ignore it during Scan and Search modes. If you lock out a system or site, all channels within that system or site will be locked out. Choose one of the following options:

- *Unlocked*: The system, site, or channel is not locked out.
- *Temporary L/O*: The system, site or channel is locked out until you turn the scanner off and back on.
- *Lockout*: The system, site, or channel is permanently locked out.

Delete Group

Delete this group and all its settings, including any channels and frequencies.

New Group

Create a new group.

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Set LocationInfo

Use this menu to configure geographic information for each system or site. With this information and a standard NMEA GPS input, the scanner can automatically change which systems, sites and channel groups it scans as you change location. You must set the location information if you want to use Location-based Scanning.

Set Latitude and Set Longitude

Enter the latitude and longitude of the center of this system or site. You can use any geographical coordinates as the center, but most often it will be the physical location of the antenna, the center of a city, county, or other geopolitical territory, or some combination of the two.

Set Range

Enter the maximum distance from the center that this site or channel will be active. As long as your position is within the radius you enter here, the scanner monitors this site or channel; when you leave the channel range, the scanner locks out this site or channel. The scanner treats the number you enter here as miles or kilometers depending on the value you selected in the Set Unit field in the Set GPS Format menu (under the main Settings menu). Enter a range from 0.5 through 125.0 mi/ki, in 0.5 mi/km steps.

Set GPS Enable

(must have a GPS unit connected) Turn this feature on if you want the scanner to lock out this site or channel when you leave the range.

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Edit Channel

This menu lets you create channels and edit existing channels. All existing channels are listed in alphabetical order: select the channel you want to edit, or select New Channel to create a new one. You can have up to up to 1000 channels in a conventional system and 500 channels in a trunked system.

When you create a new channel, the scanner prompts you to enter the frequency (in a conventional system) or the Talk Group ID (in a trunked system) for the channel: you can edit these at any time through this menu.

Edit Frequency (conventional systems)

Enter a valid frequency for this band. If the frequency is invalid or if it already exists, the scanner sounds an error tone and prompts you enter the frequency again.

Edit Talk Group ID (trunked systems)

Options available for all channels:

You have the following options for channels (click on any setting for an explanation):

Edit Name

Enter a name or edit the existing one. Names can be 16 characters long, and they can contain upper and lower case letters, punctuation, and spaces. Turn the **SELECT-VOLUME-SQUELCH** knob to choose the character you want, then press **6** (right cursor) to move the cursor to the next character.

Set Audio Type

Select the type of audio signal contained on this channel. Choose *Digital Only* or *Analog Only* according to the signal type; select *All* if this channel might contain both digital and analog signals.

Set Number Tag

Assign a number to this system or channel that you can use to tune directly to a specific channel. Choose a number from 0 to 999. (For more information, see [Number Tags](#).)

Set Modulation

Select what type of modulation the scanner should use for this frequency or channel. (Only the modulation types available for this frequency or channel are displayed.)

Auto	The scanner uses the default modulation type for this frequency's band.
AM	The scanner treats the frequency as an AM band.
NFM	The scanner treats the frequency as a Narrowband FM band.
FM	The scanner treats the frequency as an FM band.
WFM	The scanner treats the frequency as a Wideband FM band.
FMB	The scanner treats the frequency as an FM broadcast band.

Set Attenuator

Turn on attenuation to reduce the signal strength by 20 dB. You can turn on attenuation for individual frequencies and channels or for entire sites. If you turn on attenuation for a site, all frequencies within that site will be attenuated.

Set Priority

Choose whether this channel should be flagged as a priority channel so the scanner checks it during priority scans and searches.

Set Alert

This menu lets you configure whether the scanner triggers an alert tone and light whenever this channel or frequency becomes active. (Compare this to the system setting [Emergency Alert](#), which triggers a tone and light when a Talk Group contains an emergency flag.) The available options for [Set Alert Tone](#) and [Set Alert Light](#) are common to both types of alerts.

Set Lockout

Decide whether you want to lock out a system, site, or channel so the scanner will ignore it during Scan and Search modes. If you lock out a system or site, all channels within that system or site will be locked out. Choose one of the following options:

- *Unlocked*: The system, site, or channel is not locked out.
- *Temporary L/O*: The system, site or channel is locked out until you turn the scanner off and back on.
- *Lockout*: The system, site, or channel is permanently locked out.

Volume Offset

The scanner can automatically adjust the volume when it tunes to this channel or frequency. Enter one of the following options:

Softer	No Change	Louder
--------	-----------	--------

-3, -2, -1	0 (default)	+1, +2, +3
------------	-------------	------------

Copy Channel

Copy this channel and all its settings into the buffer. When a channel is stored in the buffer, the scanner adds *Paste Channel* to the bottom of the *Program Channel* menu whenever you are editing a compatible system (that is, a system that is the same type as the one you copied the channel from).

Delete Channel

Delete this frequency or channel and all associated settings.

New Channel

Create a new channel.

Analog channel options

The following options are available only when the Audio Type is set to *Analog*.

Set CTCSS/DCS

(Conventional systems only) Choose one of the following CTCSS/DSC options for this channel:

Off	The scanner ignores all CTCSS and DCS tones and opens squelch on any signal.
Search	The scanner displays any received CTCSS and DCS tones, but it opens squelch on any signal.
CTCSS	The scanner prompts you to enter a CTCSS code; it will only open squelch if the received signal contains a CTCSS tone that matches the one you enter here.
DCS	The scanner prompts you to enter a DCS code; it will only open squelch if the received signal contains a DCS tone that matches the one you enter here.
Set Lockout	The scanner prompts you to enter a CTCSS or DCS code that you want to lockout for this channel. The scanner will not open squelch if the received signal contains a matching CTCSS or DCS tone.

Digital channel options

The following options are available only when the Audio Type is set to *Digital*.

P25 NAC Option

Choose whether the scanner searches for a specific Network Access Code (NAC) for this system or frequency.

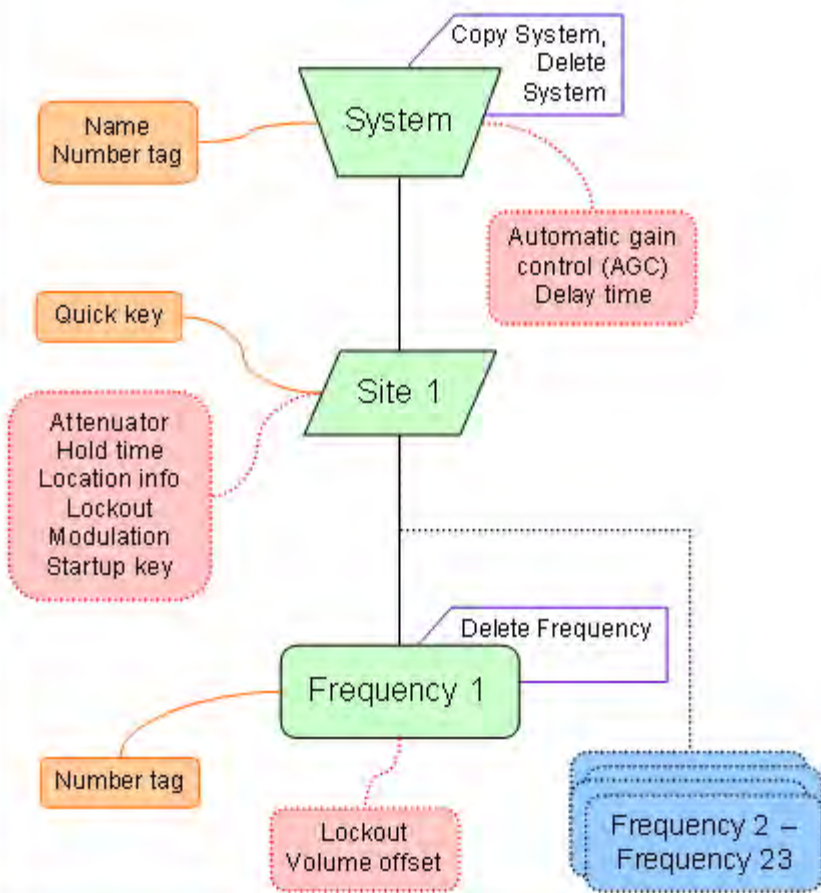
- *Search*: The scanner searches for all NACs in this system or frequency.

- *Set P25 NAC*: The scanner searches for only the NAC you enter here. If you select *Set P25 NAC*, the scanner prompts you to enter the NAC the scanner should search for: enter a hexadecimal number between *0* and *FFF*.

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EDACS SCAT System



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Edit Site

When you create a new site, the scanner automatically assigns a default site name using the following pattern

Site XXX-YYY TTT

where *XXX* is a 3-digit system index number, *YYY* is a sequential site number (1 through 256), and *TTT* is one of the following 3-letter type codes:

- *EDC* (any EDACS system)
- *LTR* (any LTR system)
- *MOT* (any Motorola system)
- *P25* (a standard P25 system)
- *1FQ* (a single-frequency P25 system)

Options available for all sites:

You have the following options for sites:

Edit Name

Enter a name or edit the existing one. Names can be 16 characters long, and they can contain upper and lower case letters, punctuation, and spaces. Turn the **SELECT-VOLUME-SQUELCH** knob to choose the character you want, then press **6** (right cursor) to move the cursor to the next character.

Set Quick Key

Assign this system or site to a Quick Key so you can easily enable or disable it during scanning. Enter a number from 0 to 99; tap **NO** (the decimal point) if you don't want to assign this system or site to a Quick Key. (For more information, see [Quick Keys](#).)

Set Startup Key

Assign this system or site to a Startup Key so you can lock or unlock it during power up. Enter a number from 0 to 9; tap **NO** (the decimal point) if you don't want to assign this system or site to a Startup Key. (For more information, see [Startup Keys](#).)

Set Frequencies

Use this menu to program frequencies for this site.

Set Modulation

Select what type of modulation the scanner should use for this frequency or channel. (Only the modulation types available for this frequency or channel are displayed.)

Auto	The scanner uses the default modulation type for this frequency's band.
NFM	The scanner treats the frequency as a Narrowband FM band.
FM	The scanner treats the frequency as an FM band.

Set Attenuator

Turn on attenuation to reduce the signal strength by 20 dB. You can turn on attenuation for individual frequencies and channels or for entire sites. If you turn on attenuation for a site, all frequencies within that site will be attenuated.

Set Lockout

Decide whether you want to lock out a system, site, or channel so the scanner will ignore it during Scan and Search modes. If you lock out a system or site, all channels within that system or site will be locked out. Choose one of the following options:

- *Unlocked*: The system, site, or channel is not locked out.
- *Temporary L/O*: The system, site or channel is locked out until you turn the scanner off and back on.
- *Lockout*: The system, site, or channel is permanently locked out.

Set Hold Time

Set the minimum number of seconds the scanner should spend checking this system or site even if there is no traffic on any channel. (The scanner always checks each channel in a system or site once even if the hold time is set to 0 seconds.) Select the number of seconds from 0 through 255 (2 is the default).

Set LocationInfo

Use this menu to program location information for this site.

Delete Site

Delete this site and all its settings; this includes any frequencies.

New Site

Create a new site.

Options available for Motorola systems

Edit Band Plan

P25 Waiting Time

Set C-Ch Only

If you activate this feature, you can monitor this system by programming only the control channel (instead of programming the control channel and all the voice channels).

Options available for P25 systems

Edit Band Plan (P25)

Normally, the scanner receives the band plan automatically from the repeater. However, if for some reason the repeater does not send the band plan, you can program it manually.

The scanner will prompt you for the following information:

Band plan number	Select one of the 16 available band plan slots.
Input Base Freq	Enter the lower limit of the band frequency. Valid frequencies are between 25.00000 MHz and 1300.00000 MHz at each 5.0 Hz step (25.000000 MHz, 25.000005 MHz, 25.000010 MHz, etc.).
Input Spacing	Enter the number of kHz between each channel. Valid spacings range between 125 kHz and 128 kHz at each 125 Hz step (125.000 kHz, 125.125 kHz, 125.250 kHz, etc.)

When you're finished, the scanner renames the band plan in the following pattern:

```
{band plan number} :{base frequency} / {spacing}
```

So a band plan label of 6:534.02585/127.750 means this is band plan number 6, with a base frequency of 534.02585 MHz and 127.750 kHz between each channel.

Options available for EDACS systems

Set Site Type

Select *Wide (standard)* or *Narrow* according to the EDACS site type.

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Set Frequencies

This menu lets you create frequencies and edit existing ones. All existing frequencies are listed in numeric order: select the frequency you want to edit, or select New Frequency to create a new one. When creating frequencies, keep the following rules in mind:

- You can't duplicate frequencies within a site.
- You can store at least 500 frequencies per site.
- You can store up to 1000 frequencies per site, depending on the number of TGID in the entire system.

Edit Frequency

Enter a valid frequency for this band. If the frequency is invalid or if it already exists, the scanner sounds an error tone and prompts you to re-enter the frequency.

Set Number Tag

Assign a number to this system or channel that you can use to tune directly to a specific channel. Choose a number from 0 to 999. (For more information, see [Number Tags](#).)

Set Lockout

Decide whether you want to lock out a system, site, or channel so the scanner will ignore it during Scan and Search modes. If you lock out a system or site, all channels within that system or site will be locked out. Choose one of the following options:

- *Unlocked*: The system, site, or channel is not locked out.
- *Temporary L/O*: The system, site or channel is locked out until you turn the scanner off and back on.
- *Lockout*: The system, site, or channel is permanently locked out.

Volume Offset

The scanner can automatically adjust the volume when it tunes to this channel or frequency. Enter one of the following options:

Softer	No Change	Louder
-3, -2, -1	0 (default)	+1, +2, +3

Delete Frequency

Delete this frequency or channel and all associated settings.

New Frequency

Create a new frequency.

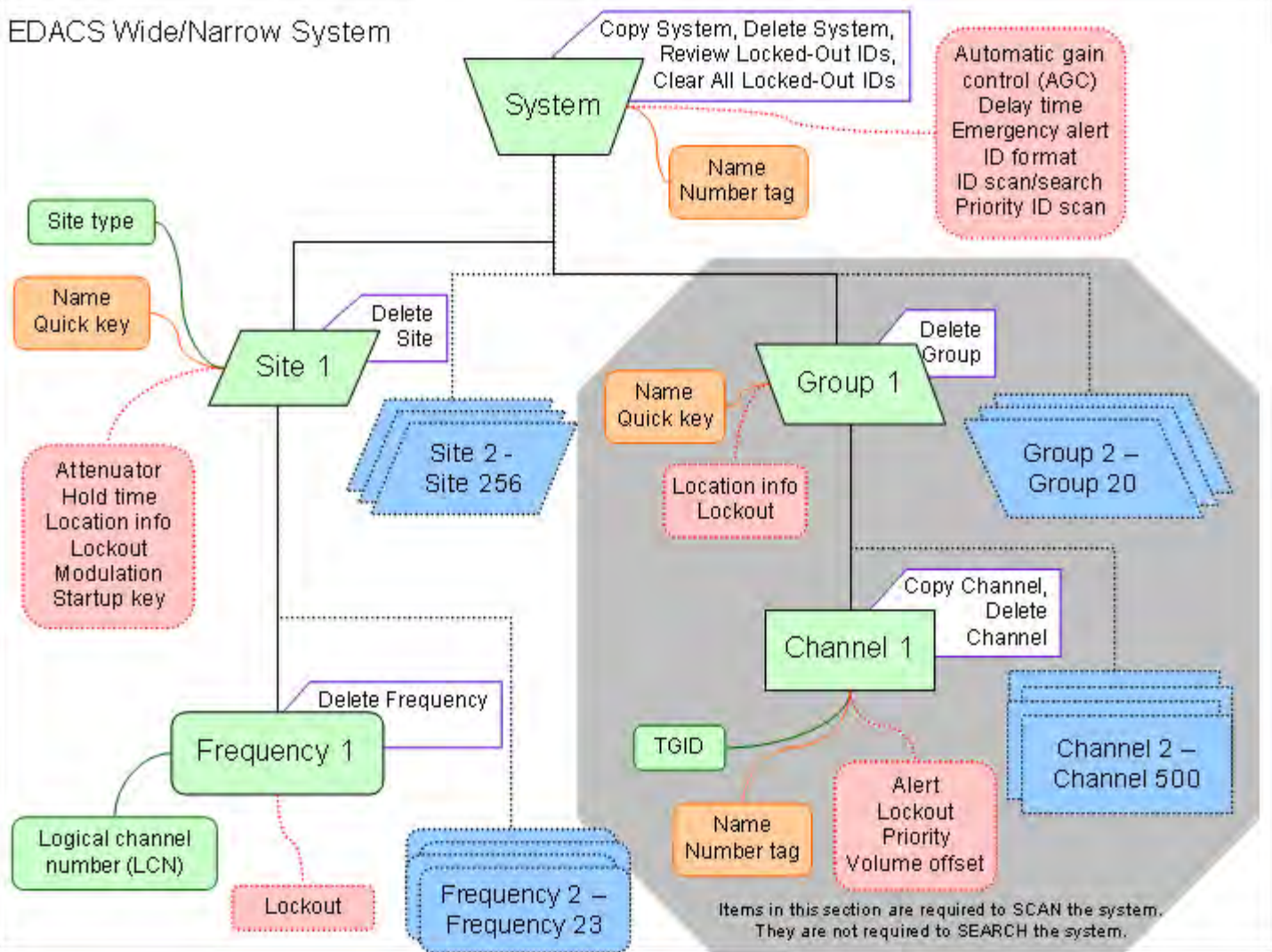
LCN (EDACS and LTR systems)

When you enter a new frequency on an EDACS wide or narrow system or an LTR system, the scanner prompts you enter a logical channel number (LCN). Enter a number from 1 through 20 for an LTR system or a number from 1 through 30 for an EDACS wide or narrow system.

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EDACS Wide/Narrow System



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Scan mode

Scanning vs. Searching

Scan and Search mode have very similar operations. In both Scan and Search modes, the scanner steps through a set of frequencies and checks for activity. For Scan mode, you program each individual frequency or Talk Group ID you want the scanner to check; for Search mode, you designate a range of frequencies, and the scanner will check each individual frequency that falls within that range.

With trunked systems, Scan mode and Search mode are very similar, so the scanner can combine the two in a single operation, switching from one to the other depending on the settings of each individual system:

Scanning trunked systems

- The scanner *scans* a system if the *ID Scan Search* option is set to *ID Scan*
- The scanner only checks for activity on unlocked Talk Group IDs *that are programmed for this system*.
- If any programmed Talk Group ID becomes active, the scanner switches to the voice channel and monitors the transmission until it ends or until the *Delay Time* expires.
- The scanner checks each unlocked Talk Group ID at least once; if the hold time has expired, it moves on to the next system.

Searching trunked systems

- The scanner *searches* a system if the *ID Scan Search* option is set to *ID Search*.
- When any Talk Group ID becomes active, the scanner checks to see if that ID is locked out.
- If the ID is unlocked, the scanner switches to the voice channel and monitors the transmission until it ends or until the *Delay Time* expires.
- The scanner monitors the system until the hold time expires, then moves on to the next system.

Default Scan Mode

In the default Scan mode, the scanner checks frequencies in the following order:

1. Scans or searches any unlocked systems programmed to system Quick Keys (SQKs) in ascending order starting with the system or site assigned to SQK #1.

In the system, the scanner first checks any unlocked groups assigned to group Quick Keys (GQKs) in ascending order starting with the system or site assigned to SQK #1 (through GQK #0).

- The scanner then checks any remaining unlocked groups in that system in the order in which you created them. If none of the groups in the system have been assigned to GQKs, the scanner checks all unlocked groups in the order in which you created them.
 - The scanner does not check systems if the SQK is disabled off.
 - The scanner does not check groups if the GQK is turned off.
2. Scans any remaining unlocked conventional systems (not assigned to an SQK) in alphabetical order based on the system's Name. (The scanner checks groups within each system as described in step 1.)
 3. Checks all unlocked trunked systems (not assigned to an SQK) in alphabetical order based on the system's Name. (The scanner checks groups within each system as described in step 1.)
 4. Searches through the designated general service frequencies (Public safety, Military, Air, etc.).
 5. Searches through any unlocked frequencies saved in the Custom Search list.
 6. Checks any frequencies saved in the Close Call Hits list.

Locked Items

The scanner does not check locked out items in either scanning or searching:


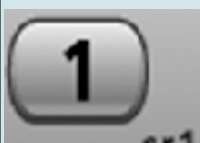
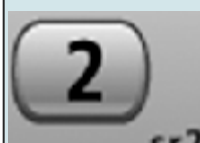
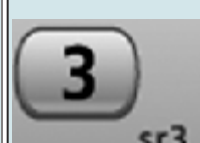
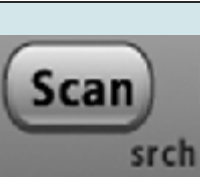

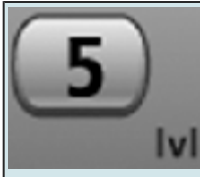



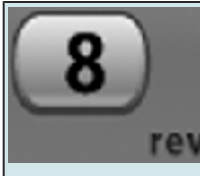

- A *system* or *site* is considered locked if
 - its SQK is turned off
 - its [Set Lockout](#) field is set to *Locked Out* or *Temporary L/O*
- A *group* is considered locked if
 - the system or site containing it is locked
 - its GQK is turned off
 - its [Set Lockout](#) field is set to *Locked Out* or *Temporary L/O*
- A *channel* or *frequency* is considered locked if
 - the group containing it is locked
 - its [Set Lockout](#) field is set to *Locked Out* or *Temporary L/O*


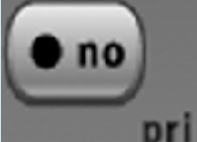


Key operation in Scan mode

Special keys

- Turn the **SELECT-VOLUME-SCROLL** knob to change the direction of the scan.
- While monitoring a channel, tap the **SELECT-VOLUME-SCROLL** knob to resume scanning.
- **FUNCTION** + turn the **SELECT-VOLUME-SCROLL** knob to select a system. The scanner starts scanning at the system you select here.
- **FUNCTION** + tap **MENU** to edit the current system.

Keypad controls

Key Name (2nd operation) Action on:	 Hold (Close call)	 1 (Search 1)	 2 (Search 2)	 3 (Search 3)
Tap	Enter Hold mode.	Disable the systems or sites assigned to this system/site Quick Key (SQK). Tap again to enable.		
Press & hold	Scan the current system only. Press & hold again to return to normal scan.	NA	NA	NA
FUNCTION + Tap	Toggle Close Call modes.	Disable the groups or channels assigned to this group Quick Key (GQK). Tap again to enable.		
FUNCTION + Press & hold	Enter Close Call Only mode.	NA	NA	NA
Key Name (2nd operation) Action on:	 Scan (Search)	 4 (IF exchange)	 5 (Volume offset)	 6 (Display mode)
Tap	Resume scanning.	Disable the systems or sites assigned to this system/site Quick Key (SQK). Tap again to enable.		
FUNCTION + Tap	When scanning a conventional system, display the Quick Search prompt (enter Search mode). When scanning a trunked system: Switch between ID Scan and ID Search.	Disable the groups or channels assigned to this group Quick Key (GQK). Tap again to enable.		
Key Name (2nd operation) Action on:	 Lockout	 7 (Attenuation)	 8 (Reverse freq.)	 9 (Modulation)

Tap	Temporarily lock out the current channel, frequency, or location (until you turn the scanner off).	Disable the systems or sites assigned to this system/site Quick Key (SQK). Tap again to enable.		
Double tap	Permanently lock out the current channel, frequency, or location.	NA	NA	NA
Press & hold	Unlock all channels, groups, and frequencies in the current system.	NA	NA	NA
FUNCTION + Tap	Temporarily lock out the current system, site, or search range (until you turn the scanner off).	Disable the groups or channels assigned to this group Quick Key (GQK). Tap again to enable.		
FUNCTION + Double tap	Permanently lock out the current system or site.	NA	NA	NA
FUNCTION + Press & hold	Unlock all items regardless of type.	NA	NA	NA
Key Name (2nd operation) Action on:	 Backlight (Power, Lock)	 No (Decimal, Priority)	 0 (Weather)	 Yes (Enter, GPS)
Tap	Turn on the LCD backlight.	Alert the scanner to a 2-digit quick key entry. The next two digits you press will be treated as a single SQK number. During a system	Disable the systems or sites assigned to this system/site Quick Key (SQK). Tap	Edit the current channel.


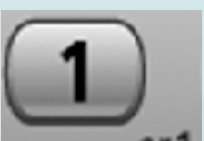
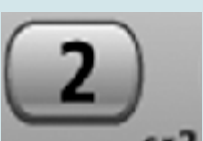

		message: Cancel the message and exit that screen.	again to enable.	
Press & hold	Turn the scanner on or off.	NA	NA	NA
FUNCTION + Tap	Lock or unlock the keypad.	Toggle Priority mode.	NA	Enter GPS mode.
FUNCTION + Press & hold	NA	NA	NA	Store the currently location information.



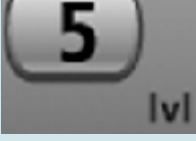

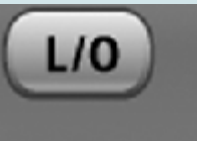

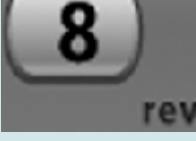

Key operation in Search mode





Special keys

- Turn the **SELECT-VOLUME-SCROLL** knob to change the direction of the search.
- While monitoring a channel, tap the **SELECT-VOLUME-SCROLL** knob to resume searching.
- In Custom Search mode, **FUNCTION +** turn the **SELECT-VOLUME-SCROLL** knob to select a custom search range. The scanner starts at the custom search range you select here.
- **FUNCTION+** tap **MENU** to go to the *Search for...* menu.
- During a Quick Search, **FUNCTION+** tap **MENU** to go to the *Srch/CloCall Opt* menu.

Keypad controls

Key Name (2nd operation) Action on:	 Hold (Close call)	 1 (Search 1)	 2 (Search 2)	 3 (Search 3)
Tap	Enter Hold mode.	Disable the custom search range assigned to this Quick Key (SQK). Tap again to enable.		
FUNCTION + Tap	Toggle Close Call modes.	Start the search range assigned to this Search Key.		
FUNCTION + Press & hold	Enter Close Call Only mode.	NA	NA	NA
Key Name				

(2nd operation) Action on:	 srch Scan (Search)	 ifx 4 (IF exchange)	 lvl 5 (Volume offset)	 disp 6 (Display mode)
Tap	Switch to Scan mode.	Disable the custom search range assigned to this Quick Key (SQK). Tap again to enable.		
FUNCTION + Tap	Resume searching.	When monitoring a channel, switch to intermediate frequency (IF).	NA	Toggle the available displays.
Key Name (2nd operation) Action on:	 Lockout	 att 7 (Attenuation)	 rev 8 (Reverse freq.)	 mod 9 (Modulation)
Tap	Temporarily lock out the current frequency (until you turn the scanner off).	Disable the custom search range assigned to this Quick Key (SQK). Tap again to enable.		
Double tap	Permanently lock out the current frequency.	NA	NA	NA
Press & hold	Unlock all frequencies in in the seach range and in Close Call checks.	NA	NA	NA
FUNCTION + Tap	Review the list of locked out IDs.	Toggle the attenuator state for the current search range.	NA	Change the modulation.
FUNCTION + Press & hold	NA	Toggle the attenuator state for all search ranges.	Show the reverse frequency for the current frequency. (The scanner returns to the current frequency when you release the	NA

			key.)	
Key Name (2nd operation) Action on:	 Backlight (Power, Lock)	 No (Decimal, Priority)	 0 (Weather)	 Yes (Enter, GPS)
Tap	Turn on the LCD backlight.	During a system message: Cancel the message and exit that screen.	Disable the custom search range assigned to this Quick Key (SQK). Tap again to enable.	Store the current frequency.
Press & hold	Turn the scanner on or off.	NA	NA	NA
FUNCTION + Tap	Lock or unlock the keypad.	NA	Change the WX Alert Priority options.	Enter GPS mode.
FUNCTION + Press & hold	NA	NA	Switch to Weather mode.	NA

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Edit Talk Group ID

All Talk Group IDs must be in the proper format for each system type.

Motorola Type I Systems

Enter the Talk Group ID in the following format:

BFFF - SS

- B = Block # (1 digit)
- F = Fleet # (2-3 digits)
- S = Sub-Fleet # (1-2 digits)

Press the decimal key to enter the hyphen.

(If you try to enter a hexadecimal TGID for a Type I system, the scanner treats the entry as a decimal number.)

Motorola Type II Systems

- Decimal format: Enter the TGID in numbers only, up to 5 digits
- Hexadecimal format: up to 3 characters

Select the first Hex character (0 through F), then move the cursor to the right and select the second character. Press yes when you're finished.

P25 Single Frequency Systems or Standard System Trunk Site

- Decimal format: Enter the TGID in numbers only, up to 8 digits
- Hexadecimal format: up to 4 characters

Select the first Hex character (0 through F), then move the cursor to the right and select the second character. Press yes when you're finished.

EDACS Wide or Narrow Systems

AFS format

Enter the Talk Group ID in the following format:

AA - FFS

- A = Agency # (00 - 15)
- F = Fleet # (00 - 15)
- S = Sub-fleet # (0 - 7)

Press the decimal key to enter the hyphen.

Enter 0 for the SubFleet # to treat it as a wildcard (any SubFleet within that Fleet). You can enter 000 for the Fleet # and SubFleet # to treat them both as wildcards as long as the Agency # is not 00.

I-Call system (Motorola, P25, or EDACS)

Enter the Talk Group ID in the following format:

i{ID number}

Press the decimal key to enter the lower-case i, then enter the ID number.

LTR systems

Enter the Talk Group ID in the following format:

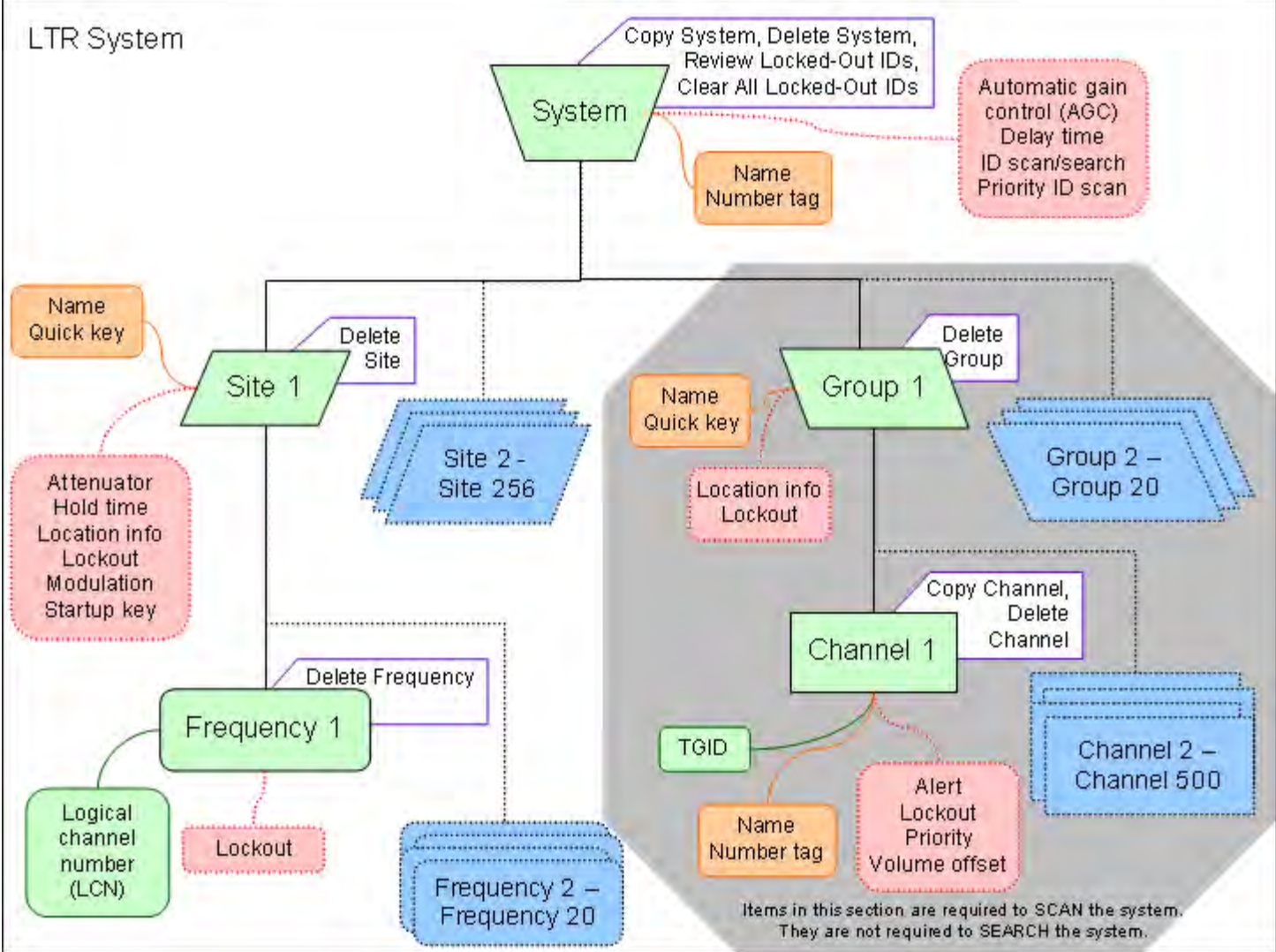
AHHUUU

- A = Area Code (0 or 1)
- H = Home repeater (01 - 20)
- U = User ID (000 - 254)

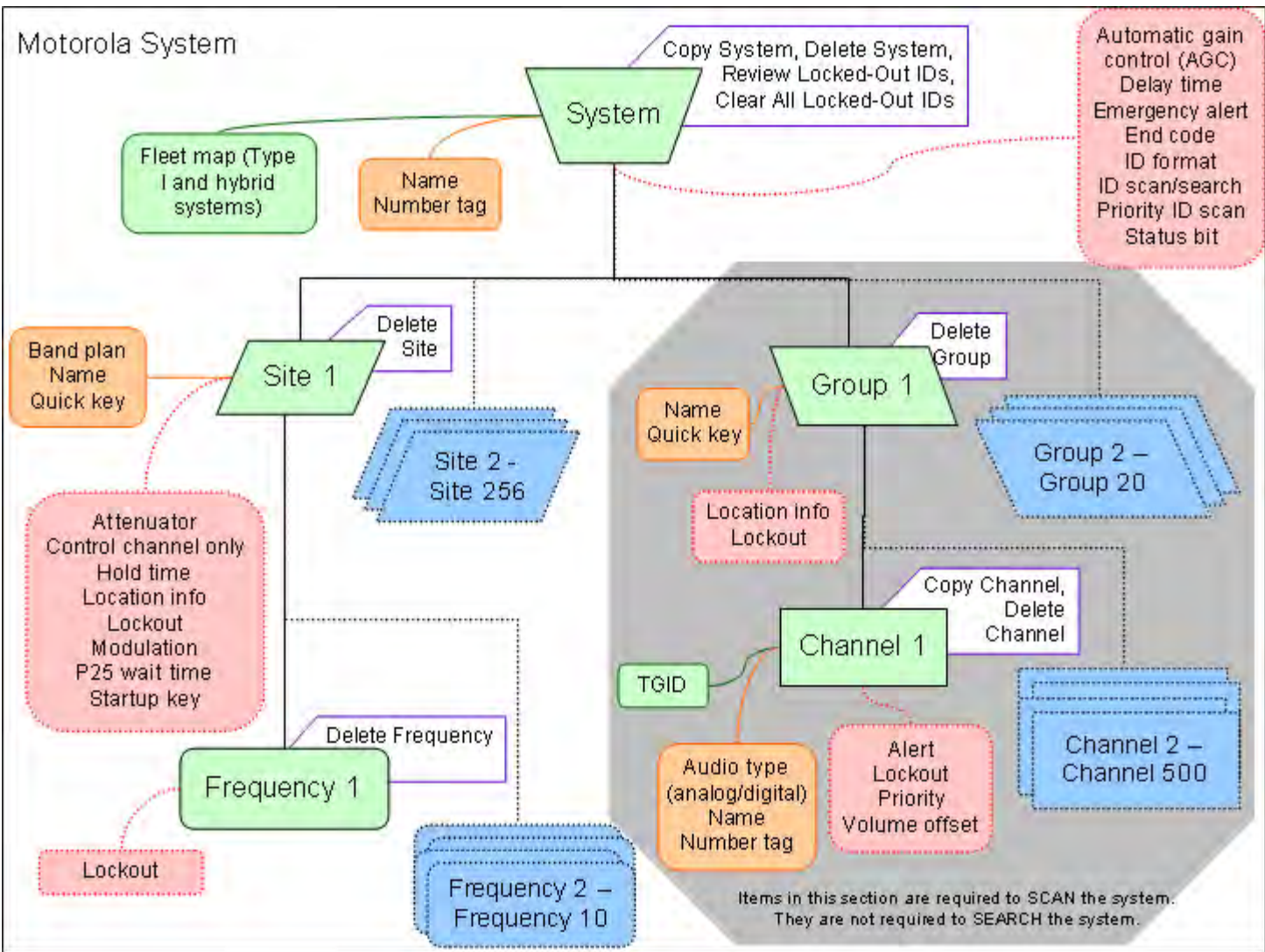
[Go to Channel menu](#) / [Go to System menu](#) / [Go to main menu](#)

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LTR System



Motorola System



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Edit Band Plan

(Motorola systems only) The scanner prompts you to choose one of the two standard band plan types: *800/900 Standard* or *800 Splinter*. Choose *Custom* if you need to create your own band plan.

Creating a custom band plan

You will need to create a custom band plan for a Motorola VHF and UHF system. When you select *Custom*, the scanner prompts you for the following information:

Band plan number

Select one of the 6 available band plan numbers, from *Band Plan 1* through *Band Plan 6*.

Set Base Freq

1. Input the lower limit of the band frequency.
2. Input the upper limit of the band frequency.

(See [Calculating upper base frequencies](#) for more information.)

Set Offset

Enter the offset.

Set Spacing

Select the number of kHz between each channel. Your options are:

5.00	6.25	10.00	12.50	15.00	18.75	20.00	25.00
30.00	31.25	35.00	37.50	40.00	43.75	45.00	50.00
55.00	56.25	60.00	62.50	65.00	68.75	70.00	75.00
80.00	81.25	85.00	87.50	90.00	93.75	95.00	100.00

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Single-Frequency P25 Trunked Systems

Single-frequency P25 systems are almost identical to [standard P25 systems](#), except they only have one site per system and the system can use a P25 network address. Here is a [conceptual layout diagram](#) of a single-frequency P25 system.

Programming a Single-Frequency P25 System

To program a single-frequency P25 system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create a system

1. Go to the [Program System](#) menu and choose *New System*.
2. The scanner will prompt you for the System Type. Select *P25*.
3. When the scanner prompts you confirm, tap **YES**.
4. The scanner creates the system with a default name. Select [Edit Name](#) if you want to change it.
5. If you need to change any of the system properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

System properties

(All of these options can be found under the [Program System](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Network address (Edit Sys Option#P25 NAC Option) Number tag (Edit Sys Option#Set Number Tag)
Optional	Automatic gain control (AGC) (Edit Sys Option#Set Audio AGC) Delay time (Edit Sys Option#Set Delay Time) ID format (Edit Sys Option#Set ID Format (DEC/HEX) or (AFS/DEC)) ID scan/search (Edit Sys Option#ID Scan/Search)
Available operations	Copy system Delete system Review Locked-Out IDs (Edit Sys Option#Rvw ID:Srch L/O)

Create exactly 1 site

Each single-frequency P25 system must contain exactly 1 site.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Site](#) menu and select *New Site*.
3. Select the [Set Frequencies](#) menu and enter the frequencies for this site.
4. If you need to change any of the site properties, you can do that now.
Unless a property is *Required*, you can operate the system without changing the default settings.

Site properties

(All of these options can be found by selecting the site name under the [Edit Site](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	Frequencies (Set Frequencies)
Recommended	Name (Edit Name) Number tag (Set Number Tag) Quick key (Set Quick Key)
Optional	Attenuator (Set Attenuator) Hold time (Set Hold Time) Location information (Set LocationInfo) Lockout (Set Lockout) Startup key (Set Startup Key)
Available operations	Delete Site

Programming a system for Scanning

Once you create the system and site, you can [Search](#) the system with no problems. However, if you want to [Scan](#) the system, you'll need to program the required elements in following order ([click here for information on using the menu](#)):

Create at least 1 channel group

Each P25 system can contain up to 20 channel groups, and any system you want to scan must contain at least 1 channel group.

1. On the [Program System](#) menu, select the system you just created.
2. Go to the [Edit Group](#) menu and select *New Group*.
3. If you need to change any of the channel group properties, you can do that now. Unless a property is *Required*, you can operate the system without changing the default settings.

Channel group properties

(All of these options can be found by selecting the group name under the [Edit](#)

[Group](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	None
Recommended	Name (Edit Name) Quick key (Set Quick Key)
Optional	Location information (Set LocationInfo) Lockout (Set Lockout)
Available operations	Delete Group

Create at least 1 channel in each group

Each trunked system can contain up to 500 channels in each group, and all groups must contain at least 1 channel.

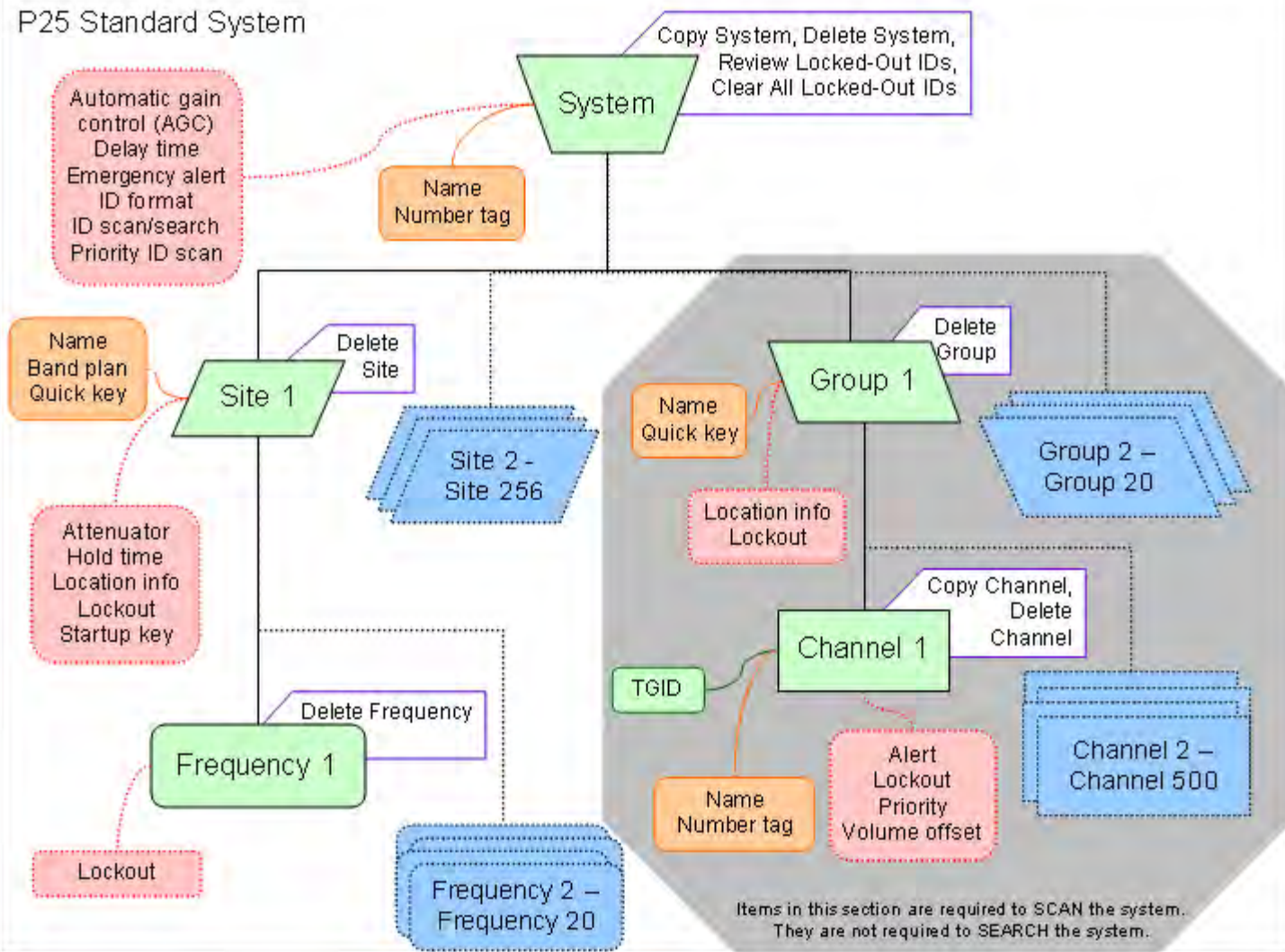
1. On the [Edit Group](#) menu, select the channel group you just created.
2. Go to the [Edit Channel](#) menu and select *New Channel*.
3. Input the [Talk Group ID \(TGID\)](#) for this channel.
4. If you need to change any of the channel properties, you can do that now.
Unless a property is *Required*, you can operate the system without changing the default settings.

Channel properties

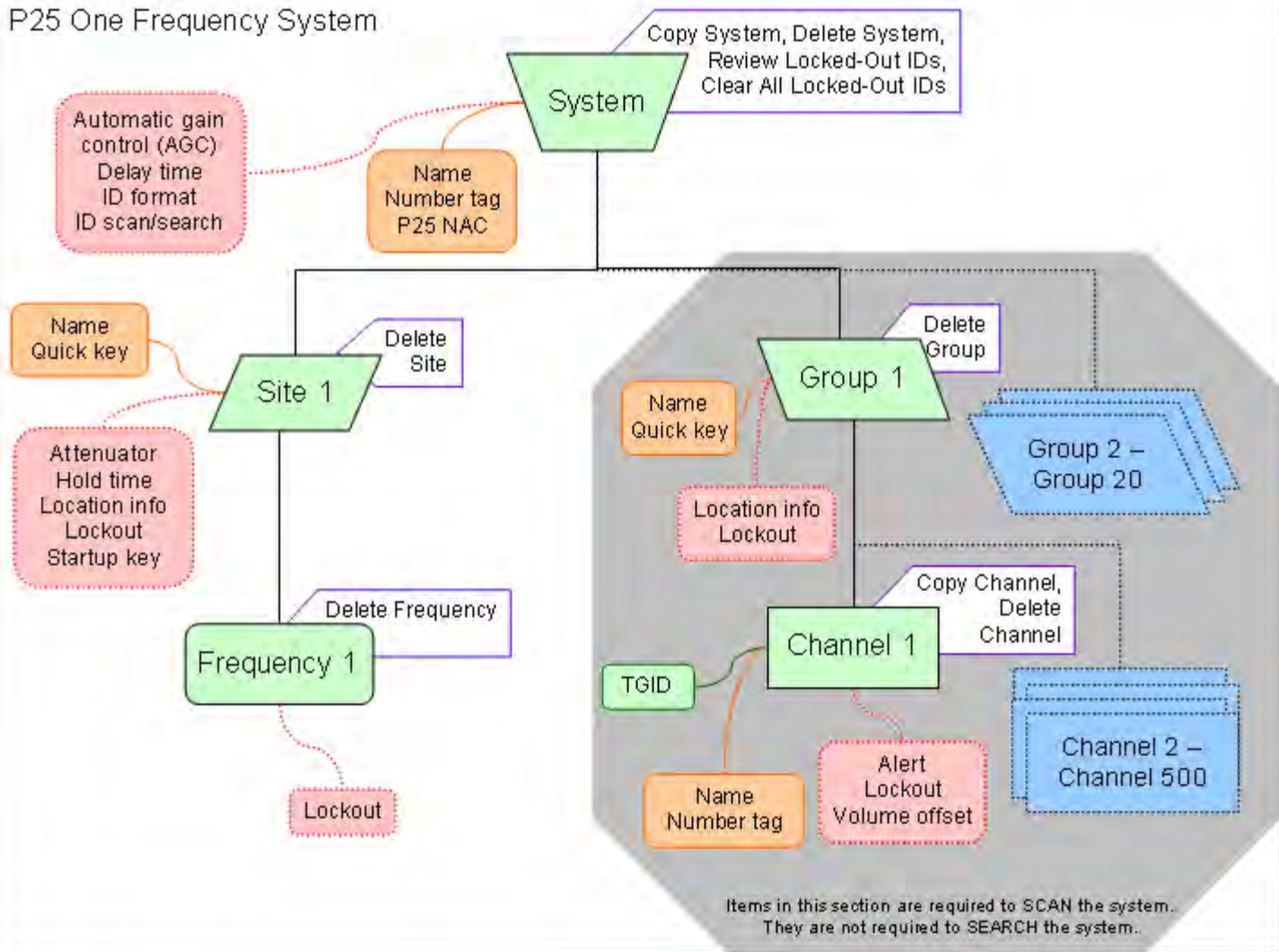
(All of these options can be found by selecting the channel name under the [Edit Channel](#) menu. If necessary, the sub-menu and the exact option name are listed beside each property.)

Required	TGID (Edit Talk Group ID)
Recommended	Name (Edit Name) Number tag (Set Number Tag)
Optional	Alert (Set Alert) Lockout (Set Lockout) Volume Offset
Available operations	Copy Channel Delete Channel

P25 Standard System



P25 One Frequency System



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Introduction to SAME messages

Hazard alerts are transmitted with Specific Area Message Encoding (SAME) data, which includes:

- Nature of the alert
- Hazard level
- Affected counties
- Expiration time

Receivers that can decode the SAME data can filter alerts by area and/or hazard level and show details about the alert on a display. For a table of all the alerts and the code meanings, [click here](#).

FIPS Codes

The US National Weather Service uses 6-digit Federal Information Processing System (FIPS) codes to issue hazard alerts in specific areas. You can choose which areas you want to hear alerts for by programming the appropriate FIPS codes into your receiver: the receiver only sounds the alert tone if an incoming FIPS code matches one of the areas you entered.

Each county (or parish, etc.) is designated by a 5-digit FIPS code; parts of a county are marked by a section code inserted at the front:

Code	Country area
0	Entire County (default)
1	Northwest
2	North Central
3	Northeast
4	West Central
5	Central
6	East Central
7	Southwest
8	South Central

- Very few counties are large enough to use the section code; most counties just code all hazards as 0 for the entire county.
- If you use 0 for the section code, you will receive all alerts for that county regardless of the transmitted section code (because the entire county includes all sections of the county).
- If you use any other section code, you will only receive alerts for that section and entire county alerts. For example, if you program the section code as 5 (Central), you will receive alerts transmitted with section code 0 and section code 5. You will not receive alerts that are transmitted with section codes 1 through 4 or 6 through 9.

For a complete index of the FIPS codes used in SAME broadcasts, see the [United States and Territories Table](#) at the National Weather Radio website, or call **1-888-NWR-SAME (1-888-697-7263)** for a voice menu.

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Calculating upper base frequencies

Custom Band Plans (800 Custom, VHF, UHF) require that you enter both a lower and an upper base frequency value. Here's how to determine these values.

The *Lower Base Frequency* (or *Base*) is always the base frequency as provided in the RRDB. The *Upper Base Frequency* is calculated from the following formulas:

For sites with a single band plan:

$$Base + ((759 - Offset) * Step)$$

Where:

- *Base* = the lower base frequency listed in RRDB.
- *Offset* = the offset for this entry.
- *Step* = the step for this entry.

For sites with multiple band plans:

$$Upper\ Base_n = Base_n + (Offset_{n+1} - 1 - Offset_n) * Step_n$$

Where:

- *Base_n* is the lower base frequency for the entry.
- *Offset_{n+1}* is the Offset for the next band plan (for the last table, use 760)
- *Offset_n* is the offset for this band plan
- *Step_n* is the step for this band.

For example:

Custom Frequency Table

Entry	Base	Spacing	Offset
A	155.4150	15.0	380
B	157.2000	12.5	436
C	157.4700	15.0	454

Plugging these values into our formula, we get:

For entry A:

$$\text{Upper Base}_A = \text{Base}_A + (\text{Offset}_B - 1 - \text{Offset}_A) * \text{Step}_A$$

$$\text{Upper Base}_A = 155.415 \text{ MHz} + (436 - 1 - 380) * 15\text{kHz}$$

$$\text{Upper Base}_A = 155.415 \text{ MHz} + 55 * 0.015 \text{ MHz}$$

$$\text{Upper Base}_A = 155.415 \text{ MHz} + 0.825 \text{ MHz}$$

$$\text{Upper Base}_A = \mathbf{156.240 \text{ MHz}}$$

For entry B:

$$\text{Upper Base}_B = \text{Base}_B + (\text{Offset}_C - 1 - \text{Offset}_B) * \text{Step}_B$$

$$\text{Upper Base}_B = 157.200 \text{ MHz} + (454 - 1 - 436) * 12.5 \text{ kHz}$$

$$\text{Upper Base}_B = 157.200 \text{ MHz} + 17 * 0.0125 \text{ MHz}$$

$$\text{Upper Base}_B = 157.200 \text{ MHz} + 0.2125 \text{ MHz}$$

$$\text{Upper Base}_B = \mathbf{157.4125 \text{ MHz}}$$

For entry C:

$$\text{Upper Base}_C = \text{Base}_C + (\text{Offset}_{C+1} - 1 - \text{Offset}_C) * \text{Step}_C$$

$$\text{Upper Base}_C = 157.470 \text{ MHz} + (760 - 1 - 454) * 15 \text{ kHz}$$

$$\text{Upper Base}_C = 157.470 \text{ MHz} + 305 * 0.015 \text{ MHz}$$

$$\text{Upper Base}_C = 157.470 \text{ MHz} + 4.575 \text{ MHz}$$

$$\text{Upper Base}_C = \mathbf{162.045 \text{ MHz}}$$

([Click here](#) to download a spreadsheet that will do all the math for you.)

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Close Call

The Close Call (CC) feature searches for signals that are stronger than other signals on the band (indicating the transmitter is probably somewhere close by). This menu lets you change the operation settings of the close call feature; you can change the overall close call options through the [Srch/CloCall Opt](#) menu.

Close Call Only

Search the selected bands for close call hits; the scanner stops all other scanning for a close call only search.

CC Auto Store

Start a close call search. When a close call hit is detected, the scanner stores that frequency in the system named *Close Call* in the *Found Channels* group. The scanner saves found channels until it reaches the number set in the *Max Auto Store* setting on the [Srch/CloCall Opt](#) menu.

Hits with Scan

The scanner stores the 10 most recent close call hits to a temporary system; you can set the options for this temporary system, just like you can for permanent systems. The scanner deletes the 10 saved frequencies in this temporary system when you turn the power off. If you want to save the any of these frequencies permanently, you need to store them to a programmed system or use the CC Auto Store feature.

Set Quick Key

Assign this system or site to a Quick Key so you can easily enable or disable it during scanning. Enter a number from 0 to 99; tap **NO** (the decimal point) if you don't want to assign this system or site to a Quick Key. (For more information, see [Quick Keys](#).)

Set Number Tag

Assign a number to this system or channel that you can use to tune directly to a specific channel. Choose a number from 0 to 999. (For more information, see [Number Tags](#).)

Set Lockout

Decide whether you want to lock out a system, site, or channel so the scanner will ignore it during Scan and Search modes. If you lock out a system or site, all channels within that system or site will be locked out. Choose one of the following options:

- *Unlocked*: The system, site, or channel is not locked out.
- *Temporary L/O*: The system, site or channel is locked out until you turn the scanner off and back on.
- *Lockout*: The system, site, or channel is permanently locked out.

Set Hold Time

Set the minimum number of seconds the scanner should spend checking this system or site even if there is no traffic on any channel. (The scanner always checks each channel in a system or site once even if the hold time is set to 0 seconds.) Select the number of seconds from 0 through 255 (2 is the default).

Set CC Mode

Choose whether scanner runs close call checks in the background, while you're performing other scans or searches. (The scanner never runs close call checks when you're in weather mode or tone-out mode.)

- *Off*: The scanner does not run close call checks in the background.
- *CC DND*: The scanner runs close call checks every 2 seconds, but it will not leave an active channel for a close call check. The scanner run close call checks while you are monitoring a transmission.
- *CC Pri*: The scanner runs close call checks every 2 seconds, even if the current channel is active. The scanner runs the close call check even while you are monitoring a transmission.

Set CC Override

Choose *On* if you want the scanner to stop its current operation and automatically jump to the frequency when it detects a close call hit. Choose *Off* if you want the scanner to alert you to the close call hit and prompt you to change frequency; if you choose not to change frequency, the scanner times out and returns to its previous operation.

Set CC Alert

Decide whether the scanner triggers an alert tone and light when it detects a close call hit. (Compare this to the system setting [Emergency Alert](#), which triggers a tone and light when a Talk Group contains an emergency flag.) The available options for [Set Alert Tone](#) and [Set Alert Light](#) are common to both types of alerts.

Set Alert Tone

Set Alert Light

Set CC Pause

Choose how long you want the scanner to pause on a close call hit before going

back to its previous operation; this setting only applies when the Set CC Override feature is turned off. Choose a pause time of 3, 5, 10, 15, 30, 45, or 60 seconds. If you want the scanner to wait for your input whenever it detects a close call hit, select Infinite.

Set CC Bands

Choose whether you want the scanner to search for close call hits on the frequency bands listed below. Select each band you want to search, then press YES to turn that band *On*. The scanner only searches for close call hits on bands that are turned on.

- *VHF Low 1* : 25.0000 - 53.9800 MHz
- *VHF Low 2* : 54.0000 - 107.9000 MHz
- *Air Band* : 108.0000 - 136.9916 MHz
- *VHF High 1* : 137.0000 - 224.9800 MHz
- *VHF High 2* : 225.0000 - 319.9500 MHz
- *UHF* : 320.0000 - 512.0000 MHz
- *800 MHz +* : 763.0000 - 775.9875, 793.0000 - 823.9875, 849.0125 - 868.9875, 894.0125 - 960.0000, and 1240.0000 - 1300.0000 MHz

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Priority Scan

Introduction

Priority mode has two "sub modes" (similar to Close Call and Close Call Only):

- In *Priority Scan* mode, the scanner pauses the current operation at a designated interval to check for activity on any unlocked channels set as priority channels. After the priority channel check is complete, the scanner resumes the previous operation.
- In *Priority Plus Scan* mode, the scanner stops the current operation and only checks the priority channels.

Priority Scan menu

Use the *Priority Scan* menu to control how Priority mode operates:

Set Priority

Choose one of the following priority scan methods:

- *On*: Enter Priority Scan mode; also, the scanner performs a normal priority scan whenever you enter Priority mode in the future.
- *Plus On*: Enter Priority Plus Scan mode; also, the scanner performs a priority plus scan whenever you enter Priority mode in the future.
- *Off*: Exit Priority mode, and do not go into Priority mode in the future.

Set Interval

Decide how many seconds you want the scanner to wait between priority channel checks. Enter a number between 1 and 10 seconds. (This setting is used in normal priority scans only.)

MaxCHs/Pri-Scan

Decide how many priority channels the scanner checks during each interval. Enter a number between 1 and 100. If the number of priority channels is greater than the number you enter here, the scanner divides them into groups. For example, if you set the maximum channels to 20 and there are 100 priority channels, the scanner checks those 100 channels in groups of 20 and takes a total of 5 intervals to complete the priority scan.

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Program Location

The *Program Location* menu lets you create and edit points of interest (*POI*), intersections (*Dangerous Xing*), and roads (*Dangerous Road*). The available settings vary for each location type.

POI

Edit Name

Enter a name or edit the existing one. Names can be 16 characters long, and they can contain upper and lower case letters, punctuation, and spaces. Turn the **SELECT-VOLUME-SQUELCH** knob to choose the character you want, then press **6** (right cursor) to move the cursor to the next character.

Set Type

When you create a location, the location is created as the type you are currently viewing (POI, Dangerous Xing, or Dangerous Road). If you want to change the location type, you can select the new location type here.

When you change the location type, the scanner goes back to the *Program Location* menu. Select the new location type to edit this location; the scanner resets the available options based on the new location type.

Set Alert

This menu lets you configure whether the scanner triggers an alert tone and light when you approach this location.

Set Alert Light

This setting is exactly the same as its counterpart on the system, site, and channel menus. Click on the setting for a complete explanation.

Set Alert Tone

Choose one of the available alert tones for this POI:

- *Alert 1:*

```
1047 Hz for 125 ms / Silence for 50 ms / 1047 Hz for 125 ms /  
Silence for 50 ms / 1319 Hz for 125 ms / Silence for 50 ms /  
1568 Hz for 125 ms / Silence for 175 ms / 1319 Hz for 125 ms /  
Silence for 50 ms / 1568 Hz for 125 ms / 1568 Hz for 125 ms
```

- *Alert 2:*

1047 Hz for 200 ms / Silence for 200 ms / 1760 Hz for 250 ms /
Silence for 100 ms / 1397 Hz for 250 ms

- **Alert 3:**

2093 Hz for 125 ms / Silence for 50 ms / 1976 Hz for 125 ms /
Silence for 50 ms / 2093 Hz for 125 ms

- **Alert 4:**

1319 Hz for 25 ms / Silence for 50 ms / 1397 Hz for 25 ms /
Silence for 50 ms / 1175 Hz for 25 ms / Silence for 50 ms /
1319 Hz for 25 ms

- **Off** (No alert tone sounded).

If you select an alert tone, the scanner prompts you to select the volume level (*Level 1* through *Level 15*) you want to the alert tone to use; leave the volume at *Auto* to have the scanner sound the alert tone without changing the volume.

Set LocationInfo

Enter the latitude and longitude for this location.

Set Range

Enter how far out from this location you want the scanner to alert you. You can configure the scanner to sound an alert tone and flash a light when you reach the radius entered here. The scanner treats the number you enter here as miles or kilometers depending on the value you selected in the *Set Unit* field in the *Set GPS Format* menu (under the main [Settings](#) menu). Enter a range from 0.05 through 4.0 mi/km, in 0.05 mi/km steps.

Set Lockout

Decide whether you want to lock out this location so the scanner no longer checks it.

Choose *Unlocked* (default), *Temporary L/O* (the location is locked out until you turn the scanner off and back on), or *Lockout* (the location is locked out until you change this setting).

Delete Location

Delete this location and its settings, including any alert settings.

New Location

Create a new location.

Dangerous Xing and Dangerous Road menus

(The settings and available options for dangerous crossings and dangerous roads are exactly the same.)

Edit Name

Enter a name or edit the existing one. Names can be 16 characters long, and they can contain upper and lower case letters, punctuation, and spaces. Turn the

SELECT-VOLUME-SQUELCH knob to choose the character you want, then press **6** (right cursor) to move the cursor to the next character.

Set Type

When you create a location, the location is created as the type you are currently viewing (POI, Dangerous Xing, or Dangerous Road). If you want to change the location type, you can select the new location type here. When you change the location type, the scanner goes back to the *Program Location menu*. Select the new location type to edit this location; the scanner resets the available options based on the new location type.

Set Alert Volume

Activate the alert tone for this location. Select the volume level (*Level 1* through *Level 15*) you want to the alert tone to use, or select *Auto* to have the scanner sound the alert tone without changing the volume. If you don't want the scanner to sound an alert as you approach this location, select *Off*.

The tone pattern varies depending on what type of location this is:

- Dangerous Xing alert tone:

```
1175 Hz for 250 ms / Silence for 50 ms / 1319 Hz for 50 ms /  
Silence for 50 ms / 1397 Hz for 250 ms
```

- Dangerous Road alert tone

```
1568 Hz for 250 ms / Silence for 50 ms / 1760 Hz for 50 ms /  
Silence for 50 ms / 1976 Hz for 250 ms / Silence for 50 ms /  
2093 Hz for 50 ms / Silence for 50 ms / 1047 Hz for 250 ms
```

Set Alert Light

This setting is exactly the same as its counterpart on the system, site, and channel menus. Click on the setting for a complete explanation.

Set LocationInfo

Enter the latitude and longitude for this location.

Set Heading

Decide whether the scanner alerts you of this Dangerous Xing or Road each time you approach it or only when you are traveling in a particular direction. To make the alert direction-dependent, select the direction from the list; select *All Range* to be alerted regardless of your direction.

Set Speed Limit

Decide whether the scanner alerts you of this Dangerous Xing or Road each time you approach it or only when you are traveling above a certain speed. To make the alert speed-dependent, enter the speed limit for this location; leave the speed limit

blank to be alerted regardless of your speed. The scanner treats the number you enter here as miles or kilometers depending on the value you selected in the Set Unit field in the Set GPS Format menu (under the main Settings menu). Enter a range from 0 through 200 mi/km, in 1 mi/km steps.

Set Lockout

Decide whether you want to lock out this location so the scanner no longer checks it.

Choose *Unlocked* (default), *Temporary L/O* (the location is locked out until you turn the scanner off and back on), or *Lockout* (the location is locked out until you change this setting).

Delete Location

Delete this location and its settings, including any alert settings.

New Location

Create a new location.

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Search and Store

With this feature, the scanner searches a system and saves any frequencies it finds activity on. When the scanner detects activity on a frequency, it verifies that the frequency has not already been stored, then adds the frequency to the *Found Channels* group. (Since these frequencies are stored with individual systems, you must have at least one programmed system to use the Search and Store feature.)

The scanner displays a list of all programmed systems. Select the system you want to search and add found channels to. The options you have depend on the type of system you select:

- If the system you selected is a **conventional system**, the scanner prompts you to select a custom search or a preset service search range.
- If the system you selected is a **trunked system**, the scanner prompts you to select a site within that system. The scanner searches the site for active Talk Groups and stores the Talk Group ID to the *Found Channels* group. (If the site you selected is locked, the scanner automatically unlocks it and begins the search.)
- If the system you selected is an **EDACS SCAT system**, the scanner displays an error message: the search and store feature can't be used on EDACS SCAT systems.

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Search for...

Use this menu to start a search, to change the options for the three different types of searches, and program the 3 search keys.

Service Search

Start a search of one of the 12 preset service bands. Choose from *Public Safety, News, HAM Radio, Marine, Railroad, Air, CB Radio, FRS/GMRS/MURS, Racing, FM Broadcast, Military Air, or Special.*

Edit Service

This menu lets you change the default settings for the 12 preset service bands. Select the service you want to edit from the list, then set the following options:

Set Delay Time

Set the number of seconds the scanner should wait after a transmission stops before moving on to the next channel. Select *0, 1, 2 (default), 5, 10, or 30 seconds.*

To have scanner leave the channel after a designated number of seconds whether the transmission stops or not, select one of the negative values. Choose *-10* seconds to have the scanner leave the channel after 10 seconds even if the transmission is still going on; choose *-5 seconds* or *-2 seconds* to have the scanner leave after 5 seconds or 2 seconds, respectively.

Set Attenuator

Turn on attenuation to reduce the signal strength by 20 dB. You can turn on attenuation for individual frequencies and channels or for entire sites. If you turn on attenuation for a site, all frequencies within that site will be attenuated.

Set Audio AGC

Turn on Automatic Gain Control (AGC) for this system. When you activate this feature, the scanner automatically adjusts the volume for each channel based on the signal strength. You can turn on the gain control for *Analog* and *Digital* signals separately.

To change the settings for the audio AGC, see [Settings#Adjust Audio AGC](#).

P25 Waiting Time

On channels that contain a mix of analog and digital signals (i.e., where the *Audio Mode* is set to *All*), it is possible to have *false decode* problems caused by digital noise at the beginning of transmissions. To prevent this, a user-configurable P25 wait time (from 0 to 1000 ms) has been added.

During the wait time, the scanner evaluates the received signal; if it detects P25 data, the scanner opens squelch immediately. If it does not detect any P25 data, the scanner opens squelch as soon as the wait time expires.

Note: Any analog transmissions on this channel will lose the first part of the transmission, up to the wait time you set here.

Select the number of milliseconds (after the start of a transmission) the scanner should wait while checking for P25 data. Choose a number from 0 through 1000 ms in 100 ms increments. The scanner only applies the wait time setting to Conventional or Motorola (non P25) systems, and only when the channel's *Audio Mode* setting is *All*.

Search with Scan

Custom Search

Start a search of the 10 custom search ranges.

Edit Custom

This menu lets you program the ten custom search ranges. Select the custom search you want to edit from the list, then set the following options:

Edit Name

Enter a name or edit the existing one. Names can be 16 characters long, and they can contain upper and lower case letters, punctuation, and spaces. Turn the **SELECT-VOLUME-SQUELCH** knob to choose the character you want, then press **6** (right cursor) to move the cursor to the next character.

Edit Srch Limit

Change the range of frequencies covered by this custom search. The scanner prompts you to input the lower frequency limit and then the upper frequency limit.

Set Delay Time

Set the number of seconds the scanner should wait after a transmission stops before moving on to the next channel. Select 0, 1, 2 (default), 5, 10, or 30 seconds.

To have scanner leave the channel after a designated number of seconds whether the transmission stops or not, select one of the negative values. Choose -10 seconds to have the scanner leave the channel after 10 seconds even if the transmission is still going on; choose -5 seconds or -2 seconds to have the scanner leave after 5 seconds or 2 seconds, respectively.

Set Modulation

Select what type of modulation the scanner should use for this frequency or channel. (Only the modulation types available for this frequency or channel are displayed.)

Auto	The scanner uses the default modulation type for this frequency's band.
AM	The scanner treats the frequency as an AM band.
NFM	The scanner treats the frequency as a Narrowband FM band.
FM	The scanner treats the frequency as an FM band.
WFM	The scanner treats the frequency as a Wideband FM band.
FMB	The scanner treats the frequency as an FM broadcast band.

Set Attenuator

Turn on attenuation to reduce the signal strength by 20 dB. You can turn on attenuation for individual frequencies and channels or for entire sites. If you turn on attenuation for a site, all frequencies within that site will be attenuated.

Set Step

Select the number of kHz between each channel. Choose *5.0*, *6.25*, *7.5*, *8.33*, *10.0*, *12.5*, *15.0*, *20.0*, *25.0*, *50.0* or *100.0 kHz*. Select *Auto* to use the default step for this band.

Set C-Ch Only

If you activate this feature, you can monitor this system by programming only the control channel (instead of programming the control channel and all the voice channels).

Set MOT BandPlan

If this custom search is a Motorola system, you need to select a band plan, just like you do when you program a Motorola system for scanning. See [Edit Band Plan](#) for more information.

Set Audio AGC

Turn on Automatic Gain Control (AGC) for this system. When you activate this feature, the scanner automatically adjusts the volume for each channel based on the signal strength. You can turn on the gain control for *Analog* and *Digital* signals separately.

To change the settings for the audio AGC, see [Settings#Adjust Audio AGC](#).

P25 Waiting Time

On channels that contain a mix of analog and digital signals (i.e., where the *Audio Mode* is set to *All*), it is possible to have *false decode* problems caused by digital noise at the beginning of transmissions. To prevent this, a user-configurable P25 wait time (from 0 to 1000 ms) has been added.

During the wait time, the scanner evaluates the received signal; if it detects P25 data, the scanner opens squelch immediately. If it does not detect any P25 data, the scanner opens squelch as soon as the wait time expires.

Note: Any analog transmissions on this channel will lose the first part of the transmission, up to the wait time you set here.

Select the number of milliseconds (after the start of a transmission) the scanner should wait while checking for P25 data. Choose a number from 0 through 1000 ms in 100 ms increments. The scanner only applies the wait time setting to Conventional or Motorola (non P25) systems, and only when the channel's *Audio Mode* setting is *All*.

Search with Scan

Search and Store

Search a stored system and save the frequency information of any active channels.

Set Search Key

The scanner has three one-touch search keys (number keys **1**, **2**, and **3**) that you can assign to any saved search range.

1. Select the search key you want to program (*Search Key 1* through *Search Key 3*).
2. Select the search range you want to assign to this key. The search range can be a service search, a custom search, a tone-out search, or a band scope search.
3. Press **YES** to confirm the selection.

Once you assign a search range to a key, you can start the search just by pressing and holding the appropriate key.

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Search with Scan

Set Quick Key

Assign this system or site to a Quick Key so you can easily enable or disable it during scanning. Enter a number from 0 to 99; tap **NO** (the decimal point) if you don't want to assign this system or site to a Quick Key. (For more information, see [Quick Keys](#).)

Set Startup Key

Assign this system or site to a Startup Key so you can lock or unlock it during power up. Enter a number from 0 to 9; tap **NO** (the decimal point) if you don't want to assign this system or site to a Startup Key. (For more information, see [Startup Keys](#).)

Set Number Tag

Assign a number to this system or channel that you can use to tune directly to a specific channel. Choose a number from 0 to 999. (For more information, see [Number Tags](#).)

Set Lockout

Decide whether you want to lock out a system, site, or channel so the scanner will ignore it during Scan and Search modes. If you lock out a system or site, all channels within that system or site will be locked out. Choose one of the following options:

- *Unlocked*: The system, site, or channel is not locked out.
- *Temporary L/O*: The system, site or channel is locked out until you turn the scanner off and back on.
- *Lockout*: The system, site, or channel is permanently locked out.

Set Hold Time

Set the minimum number of seconds the scanner should spend checking this system or site even if there is no traffic on any channel. (The scanner always checks each channel in a system or site once even if the hold time is set to 0 seconds.) Select the number of seconds from 0 through 255 (2 is the default).

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Set Alert Tone

Choose one of the 9 different tone patterns for the scanner to use for the alert tone:

Alert 1	4000 Hz for 50 ms » Silence for 20 ms » 4000 Hz for 50 ms » Silence for 20 ms » 4000 Hz for 50 ms
Alert 2	800 Hz for 50 ms » Silence for 20 ms » 1050 Hz for 50 ms » Silence for 20 ms » (repeat twice)
Alert 3	800 Hz for 50 ms » Silence for 20 ms » 1050 Hz for 50 ms » Silence for 20 ms » 4000 Hz for 100 ms
Alert 4	120 Hz for 10 ms » 800 Hz for 10 ms » 1200 Hz for 10 ms (repeat 5 times)
Alert 5	1200 Hz for 150 ms
Alert 6	1200 Hz for 70 ms » Silence for 50 ms » 1200 Hz for 70 ms
Alert 7	2000 Hz for 200 ms » Silence for 10 ms » 800 Hz for 150 ms (repeat 3 times)
Alert 8	500 Hz for 40 ms » Silence for 10 ms » 500 Hz for 40 ms » Silence for 10 ms » 500 Hz for 40 ms
Alert 9	2400 Hz for 70 ms » Silence for 20 ms » 3000 Hz for 70 ms » Silence for 70 ms (repeat twice)
Off	No alert tone sounded.

If you select an alert tone, the scanner prompts you to select the volume level (*Level 1* through *Level 15*) you want the alert tone to use; leave the volume at *Auto* to have the scanner sound the alert tone without changing the volume.

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Tone A and Tone B Settings

You can configure the scanner to search for tones in several different ways, based on the values you enter for Tone A and Tone B:

Tone A setting	Positive number	Tone B Setting	Positive number
Operation	Monitor the channel for two-tone pages only. The scanner opens squelch and displays the tone information when the following occur: <ol style="list-style-type: none"> 1. The scanner detects a tone that matches the value you set for Tone A. 2. The tone is at least 250 ms long. 3. Within 500 ms, the scanner detects a second tone that matches the value set for Tone B. 4. The second tone is at least 100 ms long. 		
Tone A setting	Positive number	Tone B Setting	0.0 Hz
Operation	Monitor the channel for single-tone pages only. The scanner opens squelch and displays the tone information when the following occur: <ol style="list-style-type: none"> 1. The scanner detects a tone that matches the value you set for Tone A. 2. The tone is at least 1.25 seconds long and not more than 3.75 seconds long. 		
Tone A setting	0.0 Hz	Tone B Setting	Positive number
Operation	Monitor the channel for group tones only. The scanner opens squelch and displays the tone information when the following occur: <ol style="list-style-type: none"> 1. The scanner detects a tone that matches the value you set for Tone B. 2. The tone is at least 3.75 seconds long. 		
Tone A setting	0.0 Hz	Tone B Setting	0.0 Hz
	Monitor the channel for two-tone pages, single-tone pages, and group tones. This tone out search mode works as follows:		

Operation

1. All detected tones are compared to the three criteria listed above.
2. If the tone meets any one of the criteria, the scanner checks to see if this tone frequency is already saved to a tone out channel with the same frequency, modulation, and attenuator settings.
3. If the detected tone matches a saved tone, the scanner opens squelch.
4. If the detected tone does not match any saved tones, the scanner opens squelch, flashes the tone information on the display, and asks if you want to save the tone information.

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Tone-Out for...

Tone-Out Standby

Check the tone out channels for paging tones, according to each channel's individual settings.

Tone-Out Setup

This menu lets you configure the 10 tone-out channels. Select the channel you want to edit from the list, then set the frequency, tone, and other options for that channel.

Edit Name

Enter a name or edit the existing one. Names can be 16 characters long, and they can contain upper and lower case letters, punctuation, and spaces. Turn the **SELECT-VOLUME-SQUELCH** knob to choose the character you want, then press **6** (right cursor) to move the cursor to the next character.

Set Frequencies

Use this menu to program frequencies for this Tone Out channel.

Set Tone

This menu lets you configure the type of tone out search. Select the tone you want to edit (*Edit Tone A* or *Edit Tone B*), then set the frequency for that tone. Enter a frequency between 250 Hz and 3500 Hz, or set the frequency to 0 Hz. (See [Tone A and Tone B Settings](#) for more information.)

Set Delay Time

Set the number of seconds the scanner should wait after a transmission stops before moving on to the next channel. Select *0*, *1*, *2* (default), *5*, *10*, or *30 seconds*. To have the scanner wait for your input before moving on to the next channel, select *Infinite*.

Set Alert

Decide whether the scanner triggers an alert tone and light when it detects a tone on this channel. (Compare this to the system setting [Emergency Alert](#), which triggers a tone and light when a Talk Group contains an emergency flag.) The available options for [Set Alert Tone](#) and [Set Alert Light](#) are common to both types of alerts.

[Set Alert Tone](#)

[Set Alert Light](#)

Set Audio AGC

Turn on Automatic Gain Control (AGC) for this Tone-Out channel. When you activate this feature, the scanner automatically adjusts the volume for the channel based on the signal strength.

To change the settings for the audio AGC, see [Settings#Adjust Audio AGC](#).

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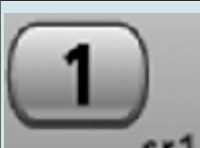
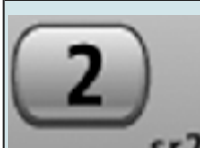
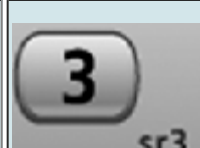
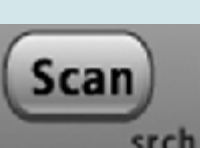
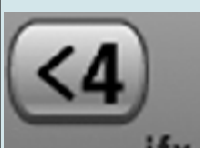






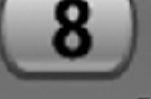





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Hold mode

Hold mode lets you edit the current frequency, system, site, or channel. You can access these functions by using the different key operations:

Key operation in Hold mode

Key Name (2nd operation) Action on:	 Hold (Close call)	 1 (Search 1)	 2 (Search 2)	 3 (Search 3)
Tap	Enter Hold mode.	Enter the number on the key		
FUNCTION + Tap	Enter Close Call mode.	NA	NA	NA
FUNCTION + Press & hold	Enter Close Call Only mode.	Start the Quick Search assigned to this key.		
Key Name (2nd operation) Action on:	 Scan (Search)	 4 (IF exchange)	 5 (Volume offset)	 6 (Display mode)
Tap	Enter Scan mode.	NA	NA	NA
FUNCTION + Tap	Enter Search mode.	Switch to an alternate intermediate frequency to avoid interference.	Change the volume offset for the current signal.	Rotate through the three available display modes.
Key Name				

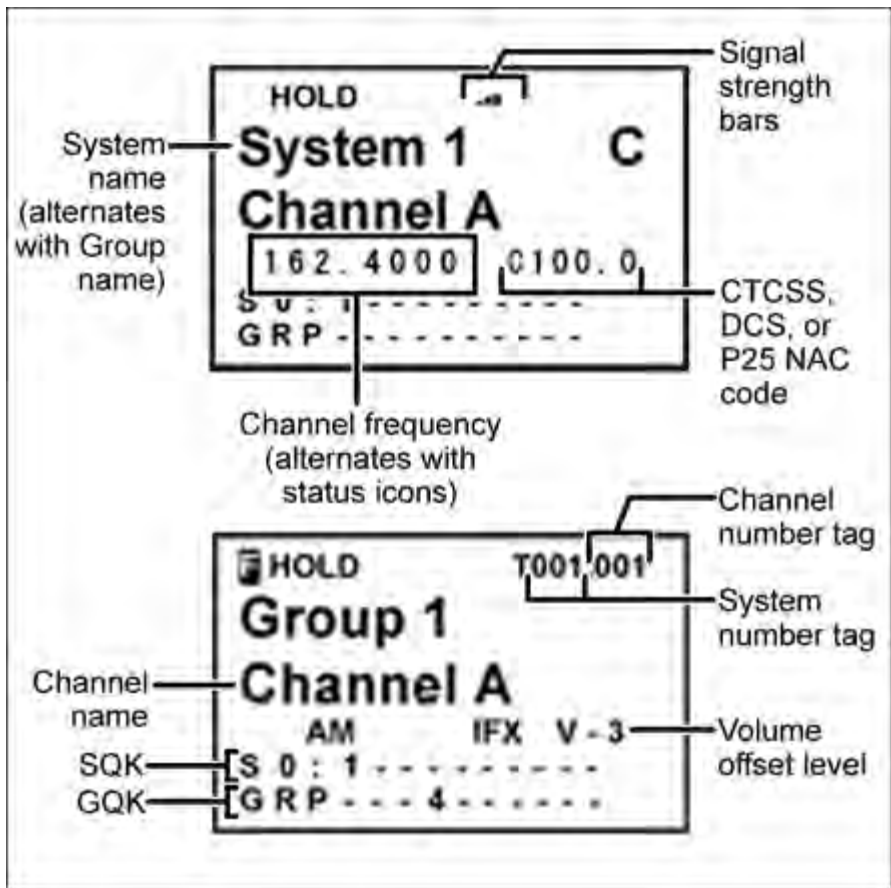
(2nd operation) Action on:	 Lockout	 7 (Attenuation)	 8 (Reverse freq.)	 9 (Modulation)
FUNCTION + Tap	NA	Toggle the attenuator state for the current signal.	NA	Change the modulation type.
FUNCTION + Press & hold	Unlock all items regardless of type.	Toggle the attenuator state for all signals.	Switch to the reverse repeater frequency of the current signal.	NA
Key Name (2nd operation) Action on:	 Backlight (Power, Lock)	 No (Decimal, Priority)	 0 (Weather)	 Yes (Enter, GPS)
Tap	Turn on the LCD backlight.	During a system message: Cancel the message and exit that screen.	NA	Save the current frequency into memory.
Press & hold	Turn the scanner on or off.	NA	NA	NA
FUNCTION + Tap	Lock or unlock the keypad.	Turn Priority scan on or off.	Change the weather alert priority setting.	Enter GPS mode.
FUNCTION + Press & hold	NA	NA	Enter Weather mode.	NA

Reading the displays in Hold mode

The display information in Hold mode varies depending on the type of system the scanner is Holding on.

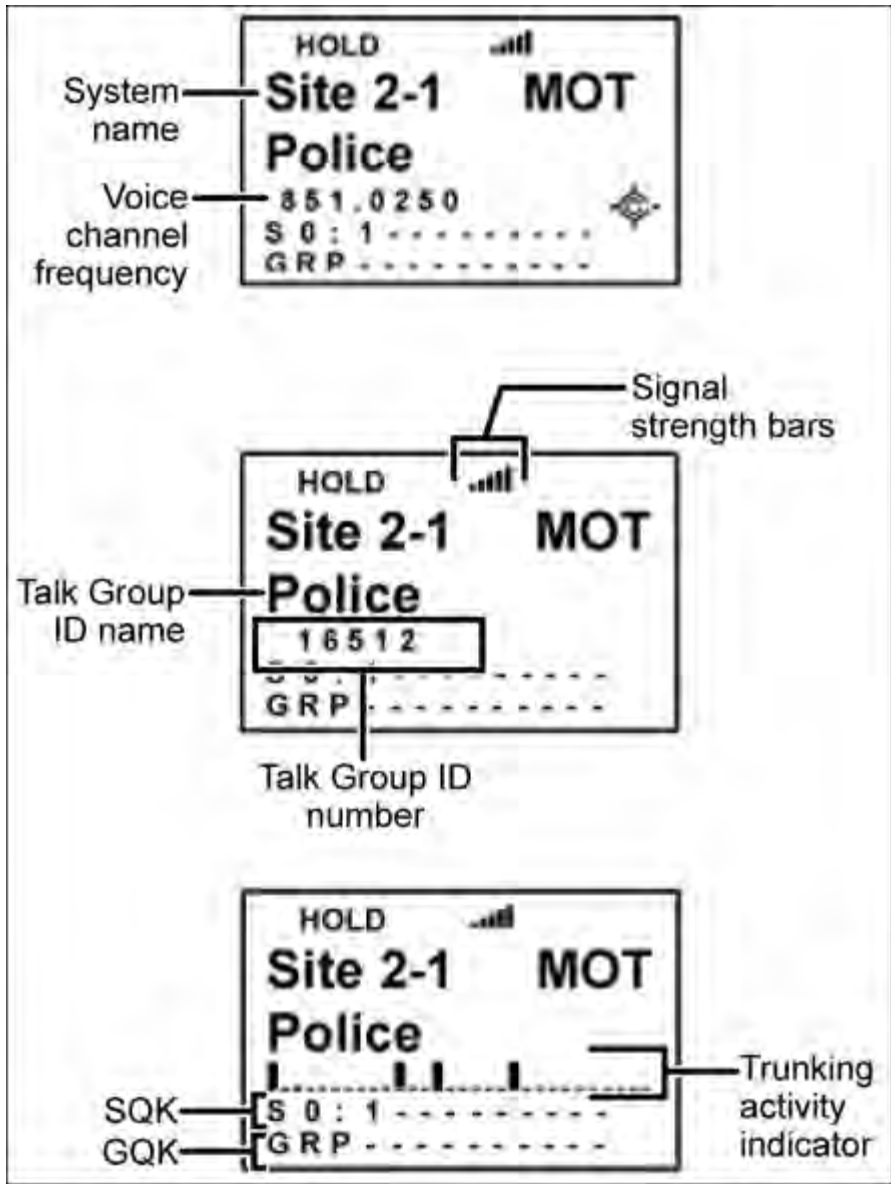
Conventional system display

When the scanner is holding on a conventional system, it displays the following screens:



- To see the alternate information on the display at the top, cycle through the display modes.
- To see the display at the bottom of the diagram, tap **FUNCTION**.
- For an explanation of System and Channel Number Tags, see [Number Tags](#).
- For an explanation of the volume offset level, see [Volume Offset](#).

Trunked system display



Service search with scan hold display



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Motorola fleet maps

Preset Fleet Maps

The scanner contains 16 pre-programmed fleet maps you can select. The table below gives the size code for each block of the preset fleet maps:

Block number	0	1	2	3	4	5	6	7
Preset 1	11	11	11	11	11	11	11	11
Preset 2	4	4	4	4	4	4	4	4
Preset 3	4	4	4	4	4	4	12	
Preset 4		12	4	4	4	4	4	4
Preset 5	4	4	12		4	4	4	4
Preset 6	3	10	4	4	12		12	
Preset 7	10	10	11	4	4	4	4	4
Preset 8	1	1	2	2	3	3	4	4
Preset 9	4	4	0	0	0	0	0	0
Preset 10	0	0	0	0	0	0	4	4
Preset 11	4	0	0	0	0	0	0	0
Preset 12	0	0	0	0	0	0	0	4
Preset 13	3	3	11	4	4	0	0	0
Preset 14	4	3	10	4	4	4	12	
Preset 15	4	4	4	11	11	0	12	
Preset 16	3	10	10	11	0	0	12	

Custom Fleet Maps

To program a custom fleet map, select *Custom* under the *Edit Fleet Map* option.

Then, select the appropriate size code for each block. Remember, not all size codes are available for all blocks:

Block	Valid Size Codes
Block 0	0 - 14
Block 1	0 - 13 (14 not valid)
Block 2	0 - 13 (14 not valid)
Block 3	0 - 13 (14 not valid)
Block 4	0 - 13 (14 not valid)
Block 5	0 - 12 (13, 14 not valid)
Block 6	0 - 12 (13, 14 not valid)
Block 7	0 - 11 (12, 13, 14 not valid)

How Fleet Maps Work

Blocks

Talk Group IDs can range from 0 to 65,535. To make it easier to handle this many IDs, the system divides the TGID range into 8 equal *blocks*:

Block	Starting ID	Ending ID
Block 0	0	8191
Block 1	8192	16383
Block 2	16384	24575
Block 3	24576	32767
Block 4	32768	40959
Block 5	40960	49151
Block 6	49152	57343
Block 7	57344	65535

Size Codes

Each block is assigned a *size code* based on the way the control channel sends the TGID data. Note that codes 12, 13, and 14 take up more than one block:

Size Code	Fleet / SubFleet / ID	Number of Blocks Needed
0	(as Type II ID)	1
1	128 / 4 / 16	1

2	16 / 8 / 64	1
3	8 / 8 / 128	1
4	1 / 16 / 512	1
5	64 / 4 / 32	1
6	32 / 8 / 32	1
7	32 / 4 / 64	1
8	16 / 4 / 128	1
9	8 / 4 / 256	1
10	4 / 8 / 256	1
11	2 / 16 / 256	1
12	1 / 16 / 1024	2
13	1 / 16 / 2048	4
14	1 / 16 / 4096	8

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Settings

Use this menu to configure global options for the following scanners:

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Set Backlight

This menu lets you configure the display and key backlight.

Set Mode

Choose how you want the backlight to operate:

10 sec	The scanner keeps the backlight on for 10 seconds after the last operation.
30 sec	The scanner keeps the backlight on for 30 seconds after the last operation.
Squelch	The scanner turns on the backlight when a signal breaks squelch.
Keypress	The scanner turns on the backlight when you press a key.
Infinite	The scanner leaves the backlight on all the time.

Set Dimmer

Select the brightness of the backlight. Your options are high (brightest), middle, and low (dimpest).

Set Color

Select the color of the backlight. Your options are blue, red, magenta, green, cyan, yellow, and white.

Adjust Key Beep

Select the volume level (Level 1 through Level 15) you want the keybeep to use, or select *Auto* to have the scanner sound the keybeep without changing the volume. If you don't want the scanner to beep when you press the keys, select *Off*.

Battery Option

This menu lets you configure the advanced battery control features:

Set Battery Save

Turn the battery save feature on or off.

Set Charge Time

Enter the amount of time you want the battery to draw power while charging.

Adjust Audio AGC

Configure how the scanner handles the *Automatic Gain Control (AGC)* for Analog and Digital signals:

Parameter	Definition	Analog settings	Digital settings
Response Time	How frequently the AGC factor updates. Decrease this value to make AGC respond faster (but this could result in “pumping”). Increase this value to make AGC respond more slowly.	-4 to +6 (default=0)	-8 to +8 (default=0)
Reference Gain	The reference level that AGC attempts to adjust the volume to. If digital and analog volumes don't match, adjust this parameter.	-5 to +5 (default=0)	-5 to +5 (default=0)
Gain Range	The total dynamic range of the AGC adjustments. A larger value allows a wider variation in volume.	0 to 15	NA

Adjust Contrast

Select one of the 15 available contrast levels for the display. As you scroll through the options, the display adjusts to the highlighted contrast level; press **YES** when you see the display contrast you want to use.

Set C-CH Output

Choose how you want the scanner to handle control channel data:

- *Off*: The scanner will not output the control channel data.
- *On*: The scanner will output the control channel data.
- *Extend*: The scanner will output the control channel data along with any description.

Set GPS Format

Configure how the scanner displays position coordinates, time, and units during GPS operation:

Set POS Format

Select how the scanner displays longitude and latitude:

- *DMS: DDD° MM' SS.ss*: Display coordinates in degrees (DDD), minutes (MM), and seconds (SS.ss).
- *DEG: DDD.ddddd*: Display coordinates as decimal degrees.

Set Time Format

Select 12H for 12-hour (am/pm) time format or 24H for 24-hour time format.

Set Time Zone

Set the number of hours your local time zone differs from universal time (GMT/UTC). Select from -14 hours to +14 hours in half-hour (0.5 h) increments.

Set Unit

Select the unit used for distance: mile or kilometer (km).

Set Serial Port

Set the baud rate for the scanner's serial port. Choose from *4800, 9600, 19200, 38400, 57600, or 115200* bps; select *Off* to disable the serial port.

Band Defaults

Use this menu to change the default modulation and frequency step or spacing used for each band. The scanner displays the list of available bands in the following format:

```
{Frequency} : {modulation type} / {step}
```

Select the frequency band you want to edit. The scanner prompts you for the following information:

Set Modulation

Select the type of modulation you want the scanner to use as the default for this band: AM, Narrowband FM (NFM), FM, Wideband FM (WFM), or FM broadcast (FMB).

Set Step

Select the number of kHz between each frequency or channel step: 5.0, 6.25, 7.5, 8.33, 10.0, 12.5, 15.0, 20.0, 25.0, 50.0, or 100.0 khz.

P25 LP Filter

This setting lets you set the scanner to apply a software filter that removes the 4kHz tone you can hear on some P25 systems. Note that turning on this setting increases the CPU load and could slightly degrade P25 decode performance on some systems.

See Scanner Info

This menu lets you see detailed information about the memory and firmware.

% Memory Used

See the percent of overall memory used (*Memory Used*) along with the number of programmed *Systems*, *Sites*, and channels (*CHN*) and the percent of available memory positions used for each.

Firmware Version

See the firmware version (*Version*) and the serial number (*SN*) of the scanner.

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Srch/CloCall Opt

This menu lets you set general options for how the scanner operates in Search and Close Call modes.

Freq Lockouts

- *Rvw Search L/O*: This option displays a list of all locked out frequencies. To unlock any frequency on the list, just select it and press **YES**.
- *Unlock All*: This option removes the locks on all frequencies at once.

Broadcast Screen

Choose whether you want the scanner to screen out common broadcast bands and ignore hits on these bands. You can screen out signals on 5 preset bands and up to 10 custom bands. The preset bands are:

- *Pager*
- *FM* (88.1000 - 107.9000 MHz)
- *UHF TV* (470.0000 - 512.0000 MHz)
- *VHF TV* (54.0000 - 72.0000, 76.0000 - 88.0000, and 174.0000 - 216.0000 MHz)
- *NOAA WX* (161.6500, 161.7750, 162.4000, 162.4250, 162.4500, 162.4750, 162.5000, 162.5250, 162.5500, and 163.2750 MHz)

Your options for broadcast screening are listed below:

Set All Band On

Turn on screening for all broadcast bands and ignore any hits on these frequencies.

Set All Band Off

Turn off screening for all broadcast bands, and treat hits on these frequencies the same as any other band.

Set Each Band

Turn screening on or off for each band individually. The scanner displays the bands listed above. Select the band you want to change, then press **YES** to toggle the setting.

Program Band

Create up to 10 custom bands that you want the scanner to screen out hits on.

1. Select a custom band slot (Band 1 through Band 10).
 2. When the scanner prompts you, input the lower frequency limit.
 3. When the scanner prompts you, input the upper frequency limit.
 4. Once you create the custom band, turn screening on or off the same way you did for the preset bands.
-

Tone/Code Search

Choose whether the scanner searches an active frequency for CTCSS/DSC tones (*CTCSS/DSC Search*), P25 NAC codes (*P25 NAC Search*), or neither (*Off*). (The scanner ignores this setting in AM, WFM, and FMB bands.)

Repeater Find

If you turn this feature on, whenever the scanner detects a signal on a common repeater input frequency, it automatically searches for that signal on the output frequency. If it finds the signal on the output frequency, the scanner displays *Repeater Found* and switches to monitor the output frequency.

Max Auto Store

Enter the maximum number of hits you want the scanner to store during Search and Store mode or Close Call Auto Store mode. When the number of stored hits reaches the number you enter here, the scanner stops storing hits. Enter a number from 1 to 256.

Set Delay Time

Set the number of seconds the scanner should wait after a transmission stops before moving on to the next channel. Select 0, 1, 2 (default), 5, 10, or 30 seconds.

To have scanner leave the channel after a designated number of seconds whether the transmission stops or not, select one of the negative values. Choose -10 seconds to have the scanner leave the channel after 10 seconds even if the transmission is still going on; choose -5 seconds or -2 seconds to have the scanner leave after 5 seconds or 2 seconds, respectively.

Set Attenuator

Turn on attenuation to reduce the signal strength by 20 dB. You can turn on attenuation for individual frequencies and channels or for entire sites. If you turn on attenuation for a site, all frequencies within that site will be attenuated.

Set Audio AGC

Turn on Automatic Gain Control (AGC) for this system. When you activate this feature, the scanner automatically adjusts the volume for each channel based on

the signal strength. You can turn on the gain control for *Analog* and *Digital* signals separately.

To change the settings for the audio AGC, see [Settings#Adjust Audio AGC](#).

P25 Waiting Time

On channels that contain a mix of analog and digital signals (i.e., where the *Audio Mode* is set to *All*), it is possible to have *false decode* problems caused by digital noise at the beginning of transmissions. To prevent this, a user-configurable P25 wait time (from 0 to 1000 ms) has been added.

During the wait time, the scanner evaluates the received signal; if it detects P25 data, the scanner opens squelch immediately. If it does not detect any P25 data, the scanner opens squelch as soon as the wait time expires.

Note: Any analog transmissions on this channel will lose the first part of the transmission, up to the wait time you set here.

Select the number of milliseconds (after the start of a transmission) the scanner should wait while checking for P25 data. Choose a number from 0 through 1000 ms in 100 ms increments. The scanner only applies the wait time setting to Conventional or Motorola (non P25) systems, and only when the channel's *Audio Mode* setting is *All*.

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Startup Keys

Startup Keys let you change the lockout state for several systems, sites, and search ranges all at the same time. When you activate the Startup Key, the scanner checks all systems, sites, or search ranges and locks or unlocks them according to these rules:

- If any systems, sites, or search ranges *do not have* a Startup Key assigned, the scanner does not change their locked/unlocked state (i.e., if they are unlocked, it leaves them unlocked).
- If any systems, sites, or search ranges *do have* an assigned Startup Key, the scanner compared the assigned Startup Key to the one you activated:
 - If a system's Startup Key *does not match* the one you activated, the scanner *locks* that system.
 - If a system's Startup Key *matches* the one you activated, the scanner *unlocks* that system and enables all of its Quick Keys.

Assigning Startup Keys

- Multiple systems, sites, and search ranges can share the same Startup Key.
- Startup Keys range from 0 to 9.
- If you do not want a system, site, or search range to be affected by any Startup Keys, enter the decimal point for the Startup Key (this is the default setting).

To a conventional system:

1. Open the [Program System](#) menu.
2. Select the system you want to assign the Startup Key to.
3. Select [Edit Sys Option](#), then select [Set Startup Key](#).
4. Enter the Startup Key you want to use for this system.

To a trunked system:

1. Open the [Program System](#) menu.
2. Select the system you want to assign the Startup Key to.
3. Select [Edit Site](#), then select the site you want.
4. Select [Set Startup Key](#), then enter the Startup Key you want to use for this site.

To a service search range:

1. Open the [Search for...](#) menu.
2. Select [Edit Service](#), then select the service search range you want to assign the Startup Key to.
3. Select [Search with Scan](#), then select [Set Startup Key](#).
4. Enter the Startup Key you want to use for this search range.

To a custom search range:

1. Open the [Search for...](#) menu.
2. Select [Edit Custom](#), then select the custom search range you want to assign the Startup Key to.
3. Select [Search with Scan](#), then select [Set Startup Key](#).
4. Enter the Startup Key you want to use for this custom search range.

Using Startup Keys

To activate a Startup Key:

1. Turn the scanner off.
2. Press & hold the number key that corresponds to the Startup Key while you power the scanner on. (e.g. To activate Startup Key configuration # 2, press & hold **2** on the number pad while turning the scanner on.)
3. Continue holding the number key until the scanner display shows the number of the Startup Key configuration (In the example above, the display shows *Startup Config. Key No. 2*).

For example, say you have 4 systems programmed according to the table below:

Assigned Startup Key	State
3	Locked
None (.)	Unlocked
None (.)	Locked
9	Unlocked

Here is the result if you power on the scanner while you press and hold **3**:

Assigned Startup Key	Previous state	Resulting state
3	Locked	Unlocked
None (.)	Unlocked	Unlocked (no change)
None (.)	Locked	Locked (no change)
9	Unlocked	Locked

Here is the result if you power on the scanner while you press and hold **5**:

Assigned Startup Key	Previous state	Resulting state
3	Locked	Locked
None (.)	Unlocked	Unlocked (no change)
None (.)	Locked	Locked (no change)
9	Unlocked	Locked

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WX Operation

This menu lets you configure how the scanner operates in Weather (WX) mode and Weather Alert (WX Alert) mode.

Weather Scan

Start a normal weather scan. In normal weather scan mode, the scanner does not react to alert tones on weather channels.

Weather Alert

Choose how you want the scanner to filter any alerts it detects on the weather channels:

Alert Only

The scanner responds to all alert tones detected on the weather channels, regardless of region or hazard level. When an alert is detected, the scanner sounds an alert siren and opens squelch on the weather channel.

SAME 1 through SAME 5

Choose one of 5 programmable regions to filter alerts by. The scanner only responds to alerts that affect the selected region you select here, and only if the hazard level is an Advisory, a Watch, or a Warning. When an alert is detected, the scanner sounds an alert siren, displays available information (hazard level, type, etc.) on the screen, and opens squelch on the weather channel.

All FIPS

The scanner responds to alerts regardless of region, but only if the hazard level is an Advisory, a Watch, or a Warning. When an alert is detected, the scanner sounds an alert siren, displays available information (hazard level, type, etc.) on the screen, and opens squelch on the weather channel.

Program SAME

You can pre-program up to 5 regions for filtering hazard alerts, then select one of these regions on the Weather Alert menu. The scanner will only respond to alerts in the selected region.

Edit Name (SAME)

Enter the name you want to use for each region. The default names are SAME 1 through SAME 5.

Edit County

Enter the designated FIPS code for up to 8 counties. To edit a FIPS code, select it from the list. Use the number keypad to enter the 6-digit code, and press YES when you're finished. If you don't enter all 6 digits, the scanner can't store the code and displays it as "-----" on the county list.

(See [Introduction to SAME messages](#) for more information.)

Set Delay Time

Set the number of seconds the scanner should wait after a transmission stops before moving on to the next channel. Select *0*, *1*, *2* (default), *5*, *10*, or *30 seconds*.

To have scanner leave the channel after a designated number of seconds whether the transmission stops or not, select one of the negative values. Choose *-10* seconds to have the scanner leave the channel after 10 seconds even if the transmission is still going on; choose *-5 seconds* or *-2 seconds* to have the scanner leave after 5 seconds or 2 seconds, respectively.

Set Attenuator

Turn on attenuation to reduce the signal strength by 20 dB. You can turn on attenuation for individual frequencies and channels or for entire sites. If you turn on attenuation for a site, all frequencies within that site will be attenuated.

Set Audio AGC

Turn on Automatic Gain Control (AGC) for this system. When you activate this feature, the scanner automatically adjusts the volume for each channel based on the signal strength. You can turn on the gain control for *Analog* and *Digital* signals separately.

To change the settings for the audio AGC, see [Settings#Adjust Audio AGC](#).

WX Alt Priority

Select *On* if you want the scanner to check the weather channels in the background during Scan, Search, or Close Call mode. The scanner can't run Weather Alert Priority check in Search and Store, Close Call Auto Store, or Tone-Out modes.

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Weather mode

Since the 10 NOAA weather channels now cooperate with the FCC and DHS to alert you of other hazards besides weather, it's important to understand how weather mode works:

- Weather channels cannot be locked out.
- The scanner does not run close call checks in the background while monitoring the weather channels.
- *Normal weather scan* treats the weather channels like any other channel: the scanner cycles through the channels, pausing whenever it detects a signal. In normal weather scan, the scanner does not react to alert tones on these channels.
- With a *Weather alert scan*, the scanner checks the weather channels for alert tones and only opens squelch when it detects one. You can program the scanner to filter alerts by region through the Weather Alert menu.
- With a *Weather alert priority scan*, the scanner checks the weather channels every 5 seconds when you are in scan or search mode or close call mode. Weather alert priority scan does not function in the search and store modes ([Search and Store](#) or [Close Call Auto Store](#)) or in [Tone Out mode](#).

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Wired Clone

This feature allows you to copy all the settings from one scanner to the other:

1. Use the included data cable to connect the two scanners.
2. On the scanner you want to copy from, go to the *Wired Clone* menu and select *Master*.
3. On the scanner you want to copy to, go to the *Wired Clone* menu and select *Slave*.

The master scanner checks to make sure the slave is properly connected and ready to receive, then begins the data transfer. **Do not disconnect the data cable or turn off either scanner during the transfer.**

When the transfer is finished, both scanners display a *Complete* message. Reboot the slave scanner to load the new settings.

All settings and data saved on the Slave scanner will be erased!

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CEA Specific Area Message Encoding (SAME) Event Codes

Received Code	Event Name	Event Level	Short Name (Scanner Display)
ADR	Administrative Message	Advisory	Admin Message
AVA	Avalanche Watch	Watch	Avalanche
AVW	Avalanche Warning	Warning	Avalanche
BHW	Biological Hazard Warning	Warning	Biological
BWW	Boil Water Warning	Warning	Boil Water
BZW	Blizzard Warning	Warning	Blizzard
CAE	Child Abduction Emergency	Advisory	Child Emergency
CDW	Civil Danger Warning	Warning	Civil Danger
CEM	Civil Emergency Message	Warning	Civil Emergency
CFA	Coastal Flood Watch	Watch	Coastal Flood
CFW	Coastal Flood Warning	Warning	Coastal Flood
CHW	Chemical Hazard Warning	Warning	Chemical Hazard
CWW	Contaminated Water Warning	Warning	Contam. Water
DBA	Dam Watch	Watch	Dam Break
DBW	Dam Break Warning	Warning	Dam Break
DEW	Contagious Disease Warning	Warning	Contagious
DMO	Practice/demo	Advisory	System Demo
DSW	Dust Storm Warning	Warning	Dust Storm
EAN	Emergency Action Notification	Warning	EMG Notify
EAT	Emergency Action Termination	Advisory	EMG End
EQW	Earthquake Warning	Warning	Earthquake
EVA	Evacuation Watch	Watch	Evacuate Note
EVI	Immediate Evacuation	Warning	Evacuate Note
FCW	Food Contamination Warning	Warning	Food
FFA	Flash Flood Watch	Watch	Flash Flood
FFS	Flash Flood Statement	Advisory	Flash Flood
FFW	Flash Flood Warning	Warning	Flash Flood
FLA	Flood Watch	Watch	Flood
FLS	Flood Statement	Advisory	Flood
FLW	Flood Warning	Warning	Flood
FRW	Fire Warning	Warning	Fire
FSW	Flash Freeze Warning	Warning	Flash Freeze
FZW	Freeze Warning	Warning	Freeze
HLS	Hurricane Statement	Advisory	Hurricane
HMW	Hazardous Material Warning	Warning	Hazardous
HUW	Hurricane Watch	Watch	Hurricane
HWA	High Wind Watch	Watch	High Wind
HWW	High Wind Warning	Warning	High Wind
IBW	Iceberg Warning	Warning	Iceberg
IFW	Industrial Fire Warning	Warning	Industrial Fire

Received Code	Event Name	Event Level	Short Name (Scanner Display)
LAE	Local Area Emergency	Advisory	Local EMG
LEW	Law Enforcement Warning	Warning	Law Enforcement
LSW	Land Slide Warning	Warning	Land Slide
NAT	National Audible Test	Advisory	National Audible
NIC	National Information Center	Advisory	National Info
NMN	Network Notification Message	Advisory	Network Message
NPT	National Periodic Test	Advisory	Nation Periodic
NST	National Silent Test	Advisory	Nation Silent
NUW	Nuclear Power Plant Warning	Warning	Nuclear Plant
POS	Power Outage Advisory	Advisory	Power Outage
RHW	Radiological Hazard	Warning	Radiological
RMT	Required Monthly Test	Advisory	Monthly
RWT	Required Weekly Test	Advisory	Weekly
SMW	Special Marine Warning	Warning	Special Marine
SPS	Special Weather Statement	Advisory	Special WX
SPW	Shelter In-place Warning	Warning	Shelter
SVA	Severe Thunderstorm Watch	Watch	Thunderstorm
SVR	Severe Thunderstorm Warning	Warning	Thunderstorm
SVS	Severe Weather Statement	Advisory	Severe WX
TOA	Tornado Watch	Watch	Tornado
TOE	911 Telephone Outage Emergency	Advisory	911 Phone Outage
TOR	Tornado Warning	Warning	Tornado
TRA	Tropical Storm Watch	Watch	Tropic Storm
TRW	Tropical Storm Warning	Warning	Tropic Storm
TSA	Tsunami Watch	Watch	Tsunami
TSW	Tsunami Warning	Warning	Tsunami
TXB	Transmitter Backup On	Advisory	TX Backup On
TXF	Transmitter Carrier Off	Advisory	TX Carrier Off
TXO	Transmitter Carrier On	Advisory	TX Carrier On
TXP	Transmitter Primary On	Advisory	TX Primary On
VOW	Volcano Warning	Warning	Volcano
WFA	Wild Fire Watch	Watch	Wild Fire
WFW	Wild Fire Warning	Warning	Wild Fire
WSA	Winter Storm Watch	Watch	Winter Storm
WSW	Winter Storm Warning	Warning	Winter Storm
* * A	Unrecognized Watch	Watch	Unrecognized
* * E	Unrecognized Emergency	Advisory	Unrecognized
* * S	Unrecognized Statement	Advisory	Unrecognized
* * W	Unrecognized Warning	Warning	Unrecognized