Scanner Programming: Man-Machine Interface

Getting The Most From The New Uniden Scanners

by Paul Opitz

Editor's Note: No doubt about it, scanners have changed dramatically over the past few years; they're smaller, feature-packed and truly remarkable engineering marvels. But they're also more complicated in many aspects, and in many cases, they can be downright frustrating. Paul Opitz (aka "UPMan") is the Product Manager for Scanner, GMRS, CB, and emerging products at Uniden America Corporation. He is the architect of the Dynamic Memory system used in Uniden's latest generation of Trunking scanners. Paul will be helping us with the technology in use today, and give us some much-needed insight into making this new breed of scanner more user friendly over the coming months.

Uniden's current crop of scanners uses a radically new programming method. The Dynamic Memory system used in the BC246T, SC230, BCD396T, and BR330T is very different from the banked scanners we've been using for decades. To get the most out of these scanners, you need to unlearn a few old concepts, then learn a couple of new ones. Over the next couple of articles, we're going to look at how to use the latest scanner technology to get the most out of these new scanners.

This month, we'll introduce some new terminology (see box) and dive right into programming with what has traditionally been the simplest thing to program: conventional channels.

So, Systems contain Channel Groups which hold our Channels. You can assign a Quick Key to a system, and a Group Quick Key to a channel group. Sounds simple enough…

Planning Our System

I cannot emphasize enough the need to do a little homework before you sit down to program the scanner. Programming is pretty straightforward, if you know in advance what you need to program. I use several major internet resources to collect my planning information.

For conventional systems, there are many resources including www. scannermaster.com, (home of Police Call), and the FCC's website at www.fcc.gov.

To keep our example simple, let's program a system with channels full of stuff we're all familiar with. We'll make a system called "Common Channels," assign it to QK 0 and set up 4 channel groups: FRS as GQK 1, GMRS as GQK 1, MURS as GQK 2, and CB as GQK 3.

See the "Planning" sidebar for all the information we collected to accomplish our task. To keep things a little easier, I've only listed the first 5 channels for each group.

Putting it All Together

I'm going to assume that you have the Owner's Manual for your scanner. So, refer to the manual for such things as how to set alpha tags, and the specific menu sequence to change settings (each scanner is slightly different). I'm also assuming that you delete all other information from the scanner before you start. You can make a backup, first, using a free utility from Butel (www.butel.nl), if you want to be able to restore settings, later.

Power the scanner, and press MENU. The very first option, "Program Systems" is the one we want, so give the scroll control a tap. The scanner now displays the name of one of the systems in the scanner. Give the scroll control a twist and select "New System."

The scanner asks what type of system you want to program. We want "Conventional" for these channels so select that option and tap the scroll control.

Now, you need to set the system-level settings. These settings are the System Name ("Common Channels"), Quick Key ("0"), System Hold Time (this determines the minimum time the scanner will spend scanning this system before moving on to any other enabled systems), Channel Delay (this determines how long the scanner pauses after a transmission before resuming scanning), and Data Skip (which you should usually turn off).

Next, we need to create a channel group to hold our first set of frequencies. Select "Channel Groups," then select "New Group" to create this group. Name it "FRS" and set the channel group-level settings which includes Group Name ("FRS"), Quick Key ("1"), and Lockout (we'll leave the group unlocked).

Finally, we are actually to the point where we can enter our channel information. Select "Channels," then select "New Channel" to create the first channel. You are prompted to enter

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VOCABULARY

First, let's purge a word from our vocabulary: "Bank." Instead, we will use System which is a group of channels and settings that are related by function, geography, or type. All channels in a system must be of the same type.

Channels are settings that define a specific user. For conventional systems, a channel consists of frequencies, alpha tags, CTCSS/DCS tones, and other associated settings. For trunked systems, a channel consists of Talk Group ID's, alpha tags, and other associated settings.

Quick Keys (QK) are keys that let you quickly select a system or group of systems. You can assign multiple systems to the same key, giving you the same functionality of combining trunked and conventional systems into one bank on banked scanners.

Group Quick Keys (GQK) are keys that let you quickly select a group or groups of channels within a system.

Scroll Control is the rotary encoder knob on the top of the radio used to access many features and settings.

the frequency for the channel (start with 462.5625, which corresponds to FRS Channel 1). Then, use the next menu selections to set the channel Name ("FRS 1"), Lockout (we'll leave all the channels unlocked), Alert (which you can turn on if you want the scanner to alert you with beeps when the channel becomes active), Modulation (which you can leave at AUTO for FRS, which will select NFM for this band), Attenuation (turn on only if you get strong-signal interference in your area), CTCSS/DCS (leave turned off), Step (which you can leave at the default), and Priority.

Repeat the above for all the FRS channels, then create the groups for GMRS, MURS, and CB and populate those channels, as well.

Of course you could have done all of this much faster and easier using software in your PC, but we'll leave that for a future time.

Scanning The Results

Let's see how the scanner behaves with this programming. Press SCAN. The scanner should start scanning through the channels you programmed in. "0" appears on the "SYS" line at the bottom of the scanner (indicating that Quick Key 0 is enabled), and 1, 2, and 3, appear on the "GRP" line (indicating that channel groups 1, 2, and 3 in the current system are enabled). Press 0 – the scanner displays "All Locked" because you've turned off all the programmed systems.

Press 0 again to turn the system back on, then hold F and press

1, 2, and 3, in turn. As you press each button, the corresponding channel group number turns off. When you press 3, the scanner again displays "All Locked" because there are no channels enabled for scanning. Press F+1, 2, 3 again to turn the groups back on.

If you have multiple systems stored in the scanner, operation is a little less straightforward. Enabling/disabling systems works about the same, but to enable/disable a channel group, you must first be sure that the scanner is scanning that group. If it is not, after you press F, you need to scroll to select that system before pressing the channel group quick keys.

Programming For Trunked Systems

Previouly we've looked at how to plan and program conventional channels into one of Uniden's latest scanners using Dynamic Memory. Now, we'll take it a step further and look at what you need to do to set up a Trunked Radio system in the BC246T, BR330T, BCD996T, or BCT15. Note that these last two models are still in development, so there could be some differences when they finally get in our hands, but the basic idea will remain the same.

As with a conventional scanner, a trunked scanner contains system information (things like the system name, system hold time, and, very important, the system frequencies). The system also has channel groups that hold the information about channels you want to listen to.

Unlike conventional scanners, where a channel contains frequency information, a trunked system's channels contain information about the Talk Groups on the system you want to listen to. If you don't know how a trunked radio works, take a moment to read the sidebar "A Quick Trunking Tutorial."

Planning Our Approach

Again, even more important than with conventional systems, planning is critical when setting up a trunked system. There are several Internet resources for finding information about trunked radio systems, but by far the most extensive is found in the Database area of http://www.RadioReference.com. I'll use information from this site to create an example of programming frequencies from the Arlington, Texas area into my scanner.

Here's what you need to find out about your target area:

System Type: The main types of Trunking systems are Motorola, EDACS, and LTR. There are subtypes; for example, Motorola 800 MHz, 900 MHz, VHF, UHF, and P25 are all possible system types. You can find the system type by looking at the top part of the system's webpage shown in **Figure 1**. The system type identified here is Motorola Type II and, since all the frequencies are in the 800-MHz band, we can tell that this is an 800-MHz Type II system.

System Frequencies: These are clearly listed, as shown in **Figure 1**. For Motorola systems, you only really need the frequencies in red or blue (the possible control channels). For other systems, you will need all the frequencies and their LCN (logical channel numbers); these are indicated on the website by a small number preceding the system frequency as shown below for the Irving, Texas EDACS system. (See **Figure 2**.)

Talk Group IDs (TGIDs): Identify which groups you want to listen to. It isn't necessary to program in every ID (unless you're interest includes listening to the water department and dogcatcher). Each system type uses a different format for TGIDs. For Motorola systems, you need the decimal format for

whatever "flavor" of Motorola you're monitoring. **Figure 3** shows the data for Arlington FD and PD.

That's it for *collecting* information, now let's organize for our scanning needs. Say I want to be able to independently turn on/off scanning for FD/EMS and for each PD district, I would then create six channel groups as follows:

FD/EMS
Group Quick Key: 1

Channel	Tag
53520	FD Dispatch
53552	EMS 1

PD North
Group Quick Key: 2

Channel	Tag
53968	North PD Dispatch
54128	North PD T/A

PD West
Group Quick Key: 3

Channel	Tag
54000	West PD Dispatch
54160	West PD T/A

PD East
Group Quick Key: 4

Channel	Tag

| 54032 | East PD Dispatch |
| 54192 | East PD T/A |

PD South
Group Quick Key: 5

Channel	Tag
54064	South PD Dispatch
54224	South PD T/A

Putting It All Together

Okay, we've collected, planned, and organized, so now it's time to turn on the scanner and load up the system. Again, some details could vary by model, so make liberal use of the Owner's Manual to find out how to enter alpha tags, the specific menu sequence, and so on.

Power the scanner and press MENU. The very first option, "Program Systems," is the one we want, so give the scroll control a tap or press E. The scanner now displays the name of a system programmed into your scanner. Scroll back one to "New System" and press scroll or E to select it.

The scanner asks what type of system you want to program. From our planning above, we know that this is a Motorola 800 Standard system, so select that option and tap the scroll control.

Now, you need to program in the system-level settings. These settings are the system name ("Arlington TRS"), System Options (such as the Quick Key, Hold Time, etc. we learned about last time), and most importantly for a trunked system, the System Frequencies. Scroll to "Set Frequencies" and follow the prompts to enter all the frequencies for the system. Note that for Motorola systems you only have to enter the Control Channels, but if you opt to enter only these you need to turn on the "Control Channel Only system option.

Now, use the same method we used last month for *conventional* systems to create channel groups and enter channel information for this system (select "Edit Group," create a new group, and create channels in that group).

While tedious (entering alpha tags does take some time), since we prepared by learning about our target system and organizing our data before we started programming, this was pretty simple. It also shows off some of the big advantages of Dynamic Memory.

With a banked scanner, even though a bank might have 100 channels for frequencies, since you could only enter one

Figure 1. Find the system type by looking at the top part of the system's webpage.

Figure 2. You'll need all the frequencies and their LCN (logical channel numbers), which are indicated on the website by a small number preceding the system frequency.

A Quick Trunking Tutorial

So-called conventional systems are easy to set up and scan, because each frequency in the system typically carries traffic for a single agency or group within an agency. But, while simple, using a discrete frequency for every user group results in either many frequencies to cover all agencies in an area, or the lumping together of agencies onto single frequencies, which could mean that the radio frequency resource is in use by Agency A when Agency B also needs the frequency.

Trunking solves this problem by using a pool of frequencies that is shared by many agencies. The basic concept that lets this work is that any particular agency is typically using a frequency less than 10 percent of the time. With a trunked system, one channel acts as a control channel to assign a frequency to an agency (or, in trunking parlance, a Talk Group) when it needs one, then returns the frequency to the open pool when the agency no longer needs it.

Here's how it works for a typical call. A user in Talk Group A presses PTT on his or her radio. This sends a request to the control channel to assign a frequency. The channel grant for that talk group is then transmitted out on the control channel. This grant tells all the other radios assigned to Talk Group A to tune to the assigned frequency for the duration of the call. The original caller's radio then beeps, and the user can begin the transmission. While it sounds complicated, this all usually happens in a fraction of a second.

For a scanner to follow the traffic for a particular Talk Group, it needs to know the Talk Group ID (a number that identifies the talk group) and the system frequencies. You program in the Talk Group ID (TGID) and system frequencies. The scanner then listens to the control channel data until the TGID you're interested in is granted a channel. The scanner follows that channel grant to the appropriate frequency and you hear the conversation.

Arlington Fire Talkgroups

DEC	HEX	Zone	Description
53520	d11	1	Fire Dispatch
53552	d13	2	EMS 1
53584	d15	3	FIREGROUND
53616	d17	4	FIREGROUND
53648	d19	5	TRAINING
53680	d1b	6	ADMIN/SUPV
53712	d1d	7	EMS-2
53744	d1f	8	CH-8
53776	d21	9	CH-9 EMS Supv
53808	d23	10	CH-10 TALK
53840	d25	11	CH-11 (Arlington Memorial Hospital)
53872	d27	12	CH-12 (Medical Center of Arlington)
53904	d29	13	CH-13 Training
53936	d2b	14	CH-14
56496	dcb		Arlington Fire Alerting

Arlington Police Talkgroups

DEC	HEX	Zone	Description
53968	d2d	APD NORTH	Arlington Police North Dispatch
54000	d2f	APD WEST	Arlington Police West Dispatch
54032	d31	APD EAST	Arlington Police East Dispatch
54064	d33	APD SOUTH	Arlington Police South Dispatch
54096	d35	CIC 1	Arlington Police CIC Information
54128	d37	North T/A	Arlington Police North Talk-Around
54160	d39	West T/A	Arlington Police West Talk-Around
54192	d3b	East T/A	Arlington Police East Talk-Around
54224	d3d	South T/A	Arlington Police South Talk-Around
54256	d3f	Supervisors	Arlington Police Supervisory
54288	d41	VICE/NARC	Arlington Police Vice/Narc
54320	d43	CID	Arlington Police CID
54352	d45	TACT 1	Arlington Police Tac 1
54384	d47	TACT 2	Arlington Police Tac 2
54416	d49		Arlington Police Ops
54448	d4b		Arlington Police Ops
55088	d73	TACT 3	Arlington Police Tac 3 (Ballpark Details)

Figure 3. In this example, the data is for the Arlington FD and PD.

type of system per bank any unused channels were pretty much wasted. Also, since a banked scanner only has 10 banks, at most you can program and scan 10 systems at a time. With dynamic programming, though, the scanner's memory is completely freed up until you use a channel. A system could have a single channel (which would use up one memory) or 1,000 channels (using 1,000 memories), leaving the rest of the memory completely available for additional systems, up to the scanner's memory limit. It's a much more efficient use of memory.

Around The Corner!

Well, we've reached the end of this tutorial, look for future articles where I'll discuss some enhancements to the basic Dynamic Memory scheme that is being implemented on future models, which will make some advanced programming issues easier.

If you've got questions, please send them to me in care of *Popular Communications*, 25 Newbridge Road, Hicksville, NY 11801 or directly to popitz@uniden.com.