Trunker
Release 3.8.3
Official Documentation

Last updated Tuesday, April 24, 2001
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Warning - This version of trunker may make major changes to your data files. It is highly recommended that you save a copy of them in a safe place before using this program. You have been warned!

Origins

Some time ago there appeared on USENET a program and its source code that provided the rudimentary ability to decode Motorola Type I, II, and IIi trunking radio system data. This program is a major enhancement to that program, and is also in the "public domain" with no guaranteed support (only grassroots voluntary support.) It is totally free, and anyone attempting to make commercial use of it ought to get legal advice first. (I have heard an opinion from a scanner manufacturer that since we are not making a 2-way radio system with the patent, there is nothing Motorola can do legally... but I am not a lawyer, and I'd prefer not to finance one...)

Credits

This program, with its rich set of features, was made possible by a world-wide team of contributors who assisted by collecting data on existing systems, providing interface information for various types of scanners, testing beta versions, developing features, and offering feature suggestions. Special thanks are due IBM for making patents available on the WWW for all to share.

Changes from Release 3.8.2 to Release 3.8.3

This is a maintenance release aimed at resolving a number of user complaints:

Complaint	Method of Addressing Complaint
Trunker is deleting my radio IDs in hybrid banks	Pruning of duplicate IDs will no longer take place for hybrid banks.
I have type II radio IDs that fall in a Type I or IIi bank. Type II radio IDs in that bank are being deleted.	Set TYPE2LURK=1 in trunker environment
When I am in HOLD mode on a group, and use the 'i' command, trunker doesn't pre-populate the radio ID in the edit screen	Fixed.
I know there is information about alternate data channels in some OSW streams. Can trunker tell me about data frequencies that are seldom used?	Trunker will mark an alternate data channel with a 'a' flag unless 'd' is present already.
I'm not seeing site/neighbor information for VHF systems.	Fixed.
I'd like to have information such as the connect tone saved in the .sys file so when someone gives me their files I know more about the system.	The description information will now appear as a comment field in the saved xxxxSYS.txt field.

Please note that in the following documentation, underlining indicates changes from release 3.8.2.

Features

With a single scanner connected to a data slicer, the Motorola Trunked Radio System's control channel can be monitored and interpreted. Data is collected and displayed showing critical operating parameters of the trunking system, such as whether it is a simulcast or multiple-node configuration, the frequencies being used by the monitored repeater (calculated automatically for 800 MHz systems (both "normal" and "splinter" arrangements) and 900 MHz systems, and manually for other frequency ranges), active group and individual calls, patches between multiple talk groups, and pages between individual radios.

See scenario below for non-800 MHz band plans or splinter arrangements

With the addition of a second scanner, a user can track conversations on trunked systems as they move from frequency to frequency.

While monitoring the system with the second scanner and watching the display, one can type identifying annotations of talk groups, multi-group patched calls, and individual radio IDs using Trunker's command menus, and those annotations will be saved in data files. Along with the text description of the ID, Trunker allows the priority and color to be set while Trunker is running. By using special values in the color field, it is also possible to have the selected color blink on-and-off for emphasis, as well as to request a speaker tone or 'beep' be emitted when the group, radio, or multi-group patch is active.

Automatically detect type-II banks within a type-II or Hybrid system based on control channel data, and for identified type-II banks, interpret the status bits of group calls, provide special handling for emergency calls, and suppress tracking of encrypted conversations.

Automatically detect the use of a type-II radio within a type-I bank for Type IIi/Hybrid systems.

Allow the user to edit data files to indicate the size code/fleet mapping of type-I banks, and for those banks, displaying both the originating radio ID (and any annotations) and the Bank, Fleet, and Sub Fleet components of the group ID.

Allow the user to edit data files to establish a system of display colors and monitoring priorities for managing the display and tracking of active calls, such that certain groups, patches, or radios may be suppressed, others allowed, and yet others may be allowed to preempt active conversations of a lesser priority. It also allows certain talk groups to be suppressed unless certain radio IDs are utilizing those talk groups, so that a county-wide shared channel can be ignored unless personnel from one's own organization or region are using that talk group.

Allow the user to 'hold' onto an active group call, patched multi-group call, or individual call to better identify the group or radio ID, or to avoid missing some interesting traffic.

Allow a user to 'manually' enter a hold for a specific Group ID or Multi-Group Patch ID, whether or not the ID is active at the time.

Logging of pages and the groups participating in multi-group patches, both to a scrolling screen window and (optionally) to a data file.

Extended logging (optional) of radio affiliations with talk groups to the screen and optionally to a data file.

Allow the user to edit a data file to provide a customized mapping between a frequency identifier and actual frequency in MHz, so that non-standard mappings may be described and UHF/VHF configurations may be tracked.

Allow the user to identify a special type of trunked radio system that broadcasts part of the call data as being associated with the repeater input frequency and part of the call data as associated with the repeater output frequency (such as the 400MHz system in London, UK and most UHF/VHF systems), providing the mapping of input to output frequency identifier, so the two halves of the call data can be processed together and properly interpreted.
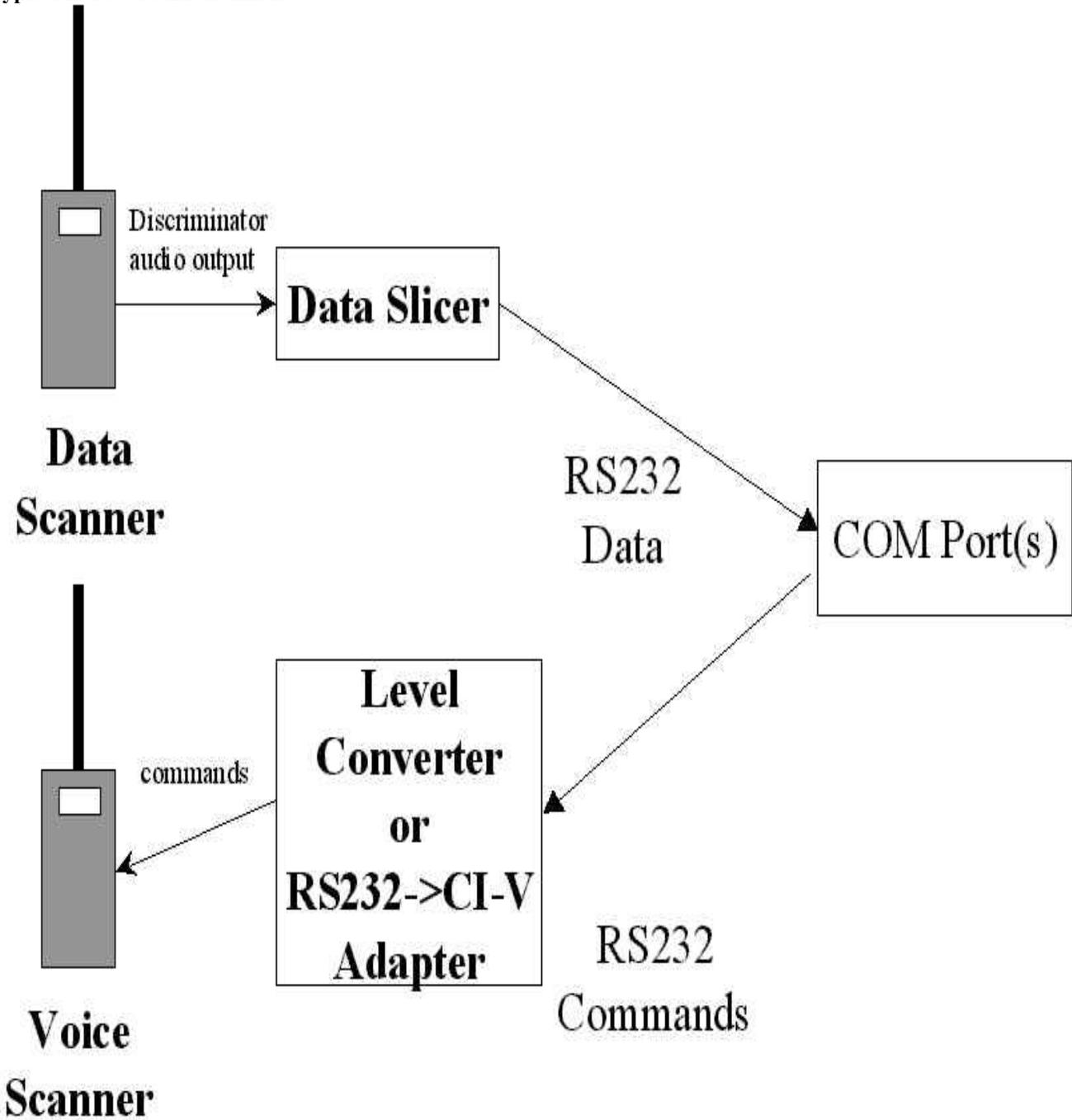
Allow the user to describe the desired operating configuration for Trunker (and its related programs) via multiple environment variables or a single environment variable that contains the name of a file from which it should extract its settings.

Supports an in-memory database capacity limited only by memory availability. Changes to the database made with the 'I', 'P', and 'G' commands may be saved to disk with the 's' command or the 'q' option in the 'esc' sub-menu.

Non-Features

Although may users have requested it, there is not and will not be a feature (provided by me) to allow you to 'hold' on a specific radio by typing in its ID. If you really insist on this capability, my advice is to make use of the priority scheme to implement it. Hard core fanatics may want to consider their own source modification but don't expect me to 'buy it back'. (nrf)

Typical Hardware Environment:

Discriminator
audio output

Data Slicer

**Data
Scanner**

RS232
Data

COM Port(s)

commands

**Level
Converter
or
RS232->CI-V
Adapter**

RS232
Commands

**Voice
Scanner**

Trunker and Commercial Trunking Radios

For those who already own a commercially available trunking scanner, Trunker can still provide helpful information for using that scanner. Four areas that may be valuable include:

Frequency Determination:
The trunk tracking scanners presently on the market require that the user enter all frequencies into the scanner for proper operation. One can find uncataloged trunked systems in their area, use Trunker to identify the frequencies, then load those frequencies into the scanner for monitoring. Without Trunker, the second-most practical way to do this is to try to locate the data channel frequency in some type of frequency database and correlate it to associated voice frequencies. As a recent Monitoring Times article demonstrates, this method does not necessarily expose all the frequencies used by the system, since they may have a different license and/or licensee.

Talk Group Determination:
Information about existing talk groups is critical to effective use of the trunking scanners. Trunker assists the identification of groups by allowing online annotation and displaying the raw identifier in Hex to simplify determination of bank/fleet maps. Once the function of groups is identified, desirable ones can be loaded into the trunking scanner's 'scan' banks, and undesirable ones can be added to the trunking scanner's lockout list. Trunker can also be used to log infrequently used talk groups which can be added to your scan list to help you 'catch' them.

Tracking other Frequency Bands:
With the recent release of the BC245XLT scanner, this capability is now available in reasonably priced off-the-shelf scanners. However, UHF/VHF systems can have up to 3 channel ranges each with a different offset and step size, and the 245 only supports a single range.

Tracking Individual Calls:
Since the currently available trunk tracking scanners are based on a 'Group' concept, they do not track individual calls. Trunker recognizes both Group and Individual IDs, thus allowing one to track radio traffic that the existing (inexpensive) commercial scanners are unable to follow. For those who do not yet own a commercially available trunking scanner, Trunker can assist one in learning about how trunked systems operate and if they are used frequently enough to warrant purchase of an additional scanner.

Trunker and Non-Motorola Systems:
A variant of Trunker called ETRUNK.EXE is also available for GE/Ericsson trunked systems. It shares the same user interface, features, and file formats as TRUNKER.EXE.

Use of System ID (SysId) as Primary Identifier
Since Trunker keeps a set of data files for each trunked system it monitors, it identifies them with a special field called the 'System ID' that is periodically broadcast by each system. It uses the SysId value to name data files and detect when the input scanner has moved on to another system. Since this SysId value is sent at intervals, it would be possible for some of the groups or IDs from the new trunked system to make their way into the previous system's data files. To avoid this, if Trunker senses a change of SysId field, it will not auto-save the data files from the previous system. The appropriate way to change systems and still have data saved is to use the 's' command to save the current system's data, then allow the scanner to search until the next trunked data channel is located.

The data files for a given system will be named with this SysId value. For example, if a system's ID is 1b27, files will be created with the names:

File Name	Data enclosed
1b27sys.txt	frequencies and bank map
1b27page.txt	paging, group patch, and affiliation log
1b27ids.txt	information on radio IDs
1b27grp.txt	information on group IDs
1b27Ptch.txt	information on multi-group patches

Networked Radio Systems
Larger trunked systems have a feature that allows a radio system to span a broad geographic area by supporting an array of radio nodes. Each of several repeaters in the large geographic area will be assigned its own set of frequencies distinct from nearby repeaters in the system. However, each repeater will broadcast the same SysId field and work from the same database of Group and Radio IDs. Trunker mimics this behavior and allows the frequencies from each repeater to be saved in a separate file, yet uses the common database of Group and Radio IDs.

In addition to the above file names, you will see a file for each of the repeaters in the system that you have monitored. Example file names would be:

    1b27C6.txt   frequencies for Repeater Node 6
    1b27C8.txt   frequencies for Repeater Node 8
    ...

Note that if these files are used for a given system, the xxxxSYS.TXT file be over-written with a 3-line version containing ONLY the System Title, Bank Map, and Band Plan. This allows the Bank Plan from the last used repeater to be propagated to an new repeater file that is created. Sometimes, various repeaters may have a different band plan, especially with plans '8' and 'S'.

Also, after Trunker was widely disseminated, it was brought to our attention that this numbering scheme was 'off by one', with the user version starting at one instead of zero.

A Comment About Hybrid/IIi Systems
Trunker will now detect the use of a type-II radio within a bank designated as type-I. When this occurs, Trunker will revise the bank letter for that bank to lower case (H becomes h) to indicate its use for both types of radios. Trunker will attempt to display the true type-II id of the radio instead of its type-I alias when possible. However, limited accuracy of the received control signal can make this impossible. Although Hybrid and type IIi systems are different in the appearance of the data stream, Trunker classifies them in the same way and provides the same treatment for the banks utilizing mixed radio types.

Environment Variables Used by Trunker
Rather than requiring that many command line arguments be used for parameters that are relatively static, Trunker uses environment variables. In addition, because most systems tend to run out of environment memory unless tunable parameters are changed, Trunker supports the use of a single variable containing a file name in which the rest of the variables may be placed.

It is Highly Recommended that you set only the TRACKENV variable and put the rest in a text file! Problems caused by variable settings not 'taking' dominate the trouble reports for this version of Trunker and you can avoid many problems by using this approach!

The following table shows the variables used by Trunker:

Variable Name	Use	Allowed Values
TRACKENV	The preferred method for passing variables to Trunker is to place a file name in this variable. The file would contain all the following variables in a NAME=VALUE format. (The "set " command normally used in a .BAT file is not needed.)	Any valid text file name. Example: set TRACKENV=c:\trackenv.bat
TRACKSCANPORT	The port to which the second, tracking scanner is connected	COM1, COM2, COM3, COM4
TRACKSCANBAUD	The baud rate at which commands are to be sent to the second, tracking scanner for jumping between audio channels. The scanner must accept the same setting.	300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

TRACKSCAN	The type of scanner used for audio tracking. (Allowable: PCR1000, R10, R7000, R7100, R8500, AR8200, AR8000, AR5000, AR2700,AR3000, AR3000A, KENWOOD, KENWOOD9600, FRG9600, BC895, BC245, OPTO (OS456, OS535), OPTOCOM, NONE)	(For CI-5/CI-V based radios, please see the Table of Addresses at the end of this document!)
TRACKSLICERPIN	Pin for input from the Data Slicer. If this is incorrect, the proper setting can be determined from within Trunker using the 'C'onfig menu.	CTS, DSR, DCD
TRACKSLICERPORT	The com port to which the data slicer is connected (via the input lead specified in the TRACKSLICERPIN variable.)	COM1, COM2, COM3, COM4
TRACKSCANPARK	Set this variable to a frequency that normally has no traffic, or which you would want to monitor if no trunked traffic is active. Trunker will switch to this frequency when no calls are present or none of the active calls have a priority <= 50. By specifying this value, you can eliminate the possibility that Trunker will park on a frequency that has an active conversation but which you do not want to monitor.	example: 854.0000 or any other frequency reachable by the scanner without changing from NFM mode Some users report problems with frequencies less than 100 MHz for this variable with BC895XLT as the controlled scanner.
NOEMERGENCY	Set this variable if you wish to suppress special processing of Emergency calls. At least one Trunker user reported that on their trunked system an emergency button might stay uncleared for hours!	1 to enable this option
TRACKDIGITAL	Set this variable if you want Trunker to follow digital and encrypted calls instead of treating them as un-scannable	1 to enable this option
TRACKSLICERMODE	Indicates whether the input should be inverted or not. Usually INVERT for inverting data slicer circuits. Trial and error may be necessary to determine the proper setting. If you used the /I flag with Trunker 3.42 or higher, this should be set to NORMAL. However, some Trunker users report having to reverse this option for UHF systems. If this setting is incorrect, it can be temporarily adjusted using the 'C'onfig menu.	NORMAL, INVERT
TYPE2LURK	Type II radios overlap type I banks. Don't remove them from the data file.	1 to enable this option
FILTERLOG	When selected, limits logging of data for radios/groups/patches to those items with priority <= the Threshold setting	1 to enable this option
NEWRADIO	When in SEEKNEW mode, treats new/prty=0 radios as if they had this priority. This can help you pick up radios that only seem to participate in I-calls.	a number between 0 and 99
NEWGROUP	When in SEEKNEW mode, treats new/prty=0 groups as if they had this priority	a number between 0 and 99
TRACKCOLORS	Allows you to adjust the colors used by Trunker. Includes a list of exactly six colors. These colors are designated (in order of appearance) background - used for the base screen color behind the text quiet - used for field labels, dividers, and annotations during the delay interval normal - used for field values active - used when a frequency is active warn - used for warning messages like poor %acc error - used for error messages An example usage (close to default values): TRACKCOLORS=0,2,7,14,14,4	a comma-separated list of exactly six color numbers, between 0 and 31. This allows the 16 colors listed below (0..15) + 16 for blinking (or equivalent representation on your specific display card.)

Command Line Arguments

None - if you provide any, a list of environment variables will be printed out.

Getting Started

First, identify which signal lead (DSR, CTS, or DCD) the slicer signal is wired to, then edit a .txt file containing your environment variables. A good way to check your data slicer and determine its configuration is a freeware program called SLICER.EXE. Once you know which pin is used, set up the configuration. First, create a global file that contains the variable settings you want for Trunker. It is best to use this file rather than put 'set' commands in autoexec.bat because it is easy to exceed the limits on environment space. Here is a sample "TRACKENV.TXT":

```
TRACKSLICERPORT=COM1
TRACKSLICERPIN=CTS
TRACKSLICERMODE=INVERT
TRACKSCANPORT=COM1
TRACKSCAN=AR8000
TRACKSCANPARK=854.0000
NEWRADIO=10
NEWGROUP=8
FILTERLOG=1
```

Next, refer to this file via a SINGLE variable setting in AUTOEXEC.BAT. Assuming this file's name is c:\trackenv.txt, place the following line in AUTOEXEC.BAT and reboot:

```
set TRACKENV=C:\TRACKENV.TXT
```

Running Trunker in a DOS window (on a fast WINDOWS system) or under DOS, you should see a 43-line Trunker display:
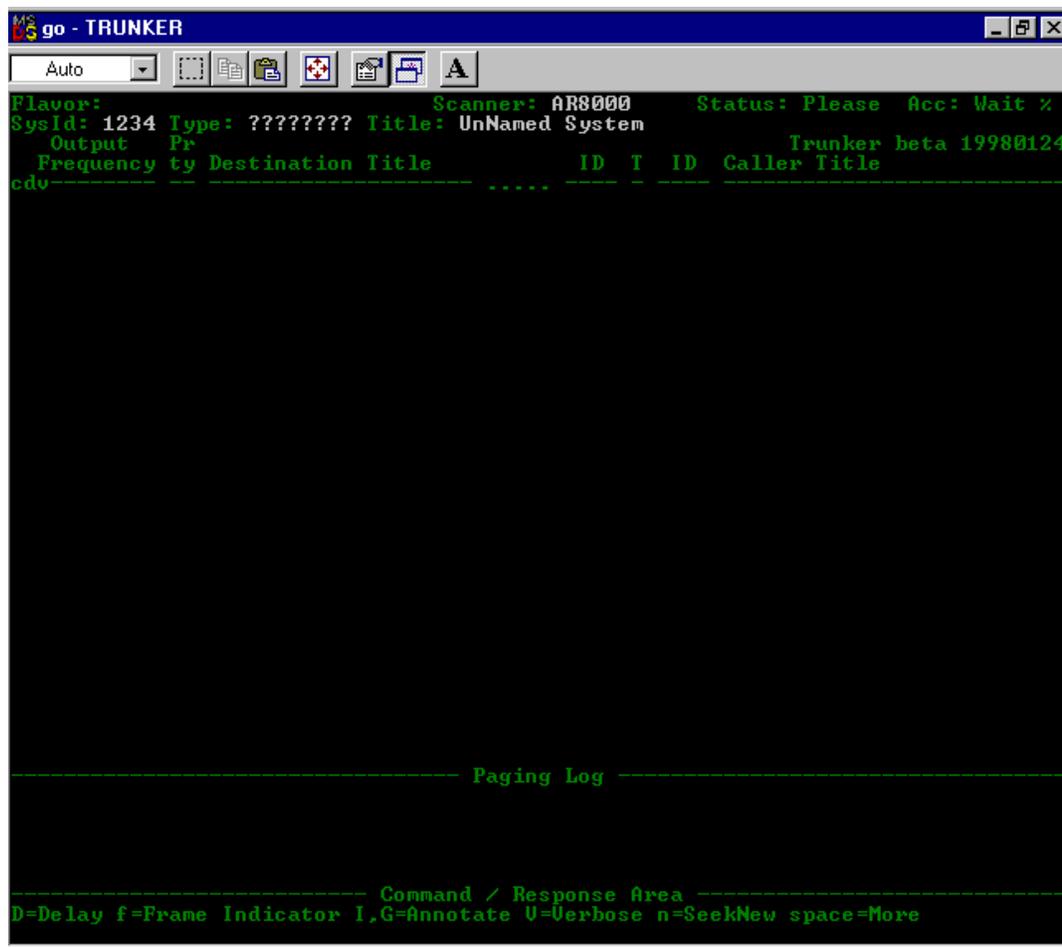
Next, tune the input scanner to the data channel of the trunked system to be analyzed. After several seconds, the display should look something like this:

If, after 10-20 seconds, you see a status field of wantCTS, for example, it means that the TRACKSLICERPIN variable is incorrect. You can use the 'c' command to enter the CONFIGURATION menu, which will allow you to select the various input pins and polarities to find the correct settings. Once you have identified these, you can go back and change the values of TRACKSLICERPIN and TRACKSLICERMODE for subsequent runs. Some Trunker users have noted that the normal/invert modes may need to be set on a system-by-system basis!

At this point, Trunker has determined many of the key parameters of this system. Since a call is in progress, Trunker is beginning to identify the voice frequencies in use. The system ID is 1f3e, and that code will be used to name the .txt files Trunker saves. This system either has a single repeater site, or multiple sites that all broadcast simultaneously on the same frequencies. The call in progress shows that the first bank (of 8) is a Type-II bank. This is saved in the 1f3eSYS.TXT file with the string MAP=2???????. The current call is for group (decimal) 3536 (or hex 0DD0 or Motorola Style 0DD). If one were to annotate this group by typing g0dd0Police Dispatch<return>, the line would read:

v857.2375* 49 Police Dispatch   #0dd0 G ----

Once Trunker sees traffic on all of the active voice frequencies and identifies the data channel frequency, the list will look something like this:

```
Type II 97.3 Hz                 Scanner: AR8000          Status: Hi-Qual Acc: 83.0%
SysId: 1f3e Type: 2???????      Title: UnNamed System
Output   Pr                                              Trunker <version>
Frequency ty Destination Title              ID T  ID   Caller Title
cdv-------- -- ------------------- ..... ---- - ---- --------------------------
 v856.7625*49 ?                             #0730 G 149e ?
 v857.2375
 v857.7625 49 ?                             #0a90 G 206c ?
 v858.2375
 v858.7625 49                               #0110 G 13e9 ?
d 859.7625
```

If you edit the flat files produced by Trunker (either offline via text editor or database system or online with the 'g', 'i', and 'p' commands,) adjusting priorities and colors, you can get a display something like this:

```
Type II 97.3 Hz                 Scanner: AR8000          Status: Hi-Qual Acc:  85.3%
SysId: 1f3e Type: 22222222       Title: Warren County SmartNet-II
Output   Pr                                              Trunker <version>
Frequency ty Destination Title              ID      T      ID      Caller   Title
cdv-------- -- ------------------- ..... ---- - ---- --------------------------
c v856.2375
  v856.7625*01 Mutual Aid                   #0590   G      14ec    B P      Mutual Aid ???
  v857.2375
 dv857.7625 06 WCCC Primary                 #0170   G      1c04    P P      Waynesville 1/2William
  v858.2375
 dv858.7625 08 M F Springboro 2101          #16b6   I      16a9    M F      Springboro 2103 Car
  L859.2375
 dv859.7625
  L860.2375
 dv860.7625
```

Referring to the next (color) screen shot, the police entries are blue, the fire / public safety entries red, and any shared group (mutual aid) magenta. I've distinguished between nearby organizations (bright blue or bright red) and less interesting ones (dark blue, dark red.) You can also see from this example that it is possible to re-arrange the frequencies in the xxxxSYS.TXT file and Trunker will maintain that ordering. I have manually added the frequencies with the 'L' in the voice column, indicating that the system is licensed to use those frequencies. However, should the system ever actually use them, Trunker will substitute a 'v' for that column, and I would then know that they have been placed in service. Finally, note that many systems change data channel frequencies daily or at random, so you will not necessarily have four 'd' entries at first. You may have to search for the data channel on another day, first checking the known voice frequencies, then trying other frequencies within the pattern.

Here is a (partial) live screen shot of Trunker in action, monitoring the Warren County, Ohio system:

Usage Scenarios
Gathering information on local trunked systems

With your scanner locked onto the data channel to be investigated, start Trunker. Once Trunker locks in on the signal, it will show the system ID and begin to collect information. If Trunker has already seen that system, it will retrieve the data files previously saved and note the use of the current frequency as a data channel. As there is activity on the system, it will step through the voice channels available. In order to fully collect information on the system, it may be necessary to find the system's data channel again on a number of days until all of them have been found (a maximum of four frequencies are used). If you want to look up the licensee for the system, wait until the CWID channel appears (a 'c' in column 1), then monitor that frequency until the callsign is heard. In larger systems, the first channel is often not used for voice traffic, so the only way to find the CWID channel is through the data channel "diagnostic" command.

Handling Bandplans for 900MHz Systems, Splinter 800MHz Arrangements, and Custom Mappings
By default, Trunker will interpret frequency assignments according to a "standard" 800MHz map. Use the following process to initialize the xxxxSYS.TXT file for 900MHz, UHF systems, splinter 800MHz arrangements, or other systems that do not conform to the standard mappings:

With no xxxxSYS.TXT file in the current directory, start Trunker.
Once the SysId appears, stop Trunker with the 'q' command.
Edit the xxxxSYS.TXT file. Note the accuracy of the data channel entry to determine if a splinter arrangement is required.
Delete all frequency entries.

Add one of the following lines to the file, in uppercase and beginning in column 1, or edit one if it exists already:

PLAN=8   for US 800MHz frequency plan
PLAN=S   for Splinter 800 MHz plan (Trunker shows the data channel 12.5kHz higher than the true frequency)
PLAN=9   for US 900MHz frequency plan
PLAN=0   for all other plans including UHF, VHF and custom 800/900

Save the file.

Run Trunker again and accumulate frequencies until the list is stable.

Stop Trunker with the 'q' command.

Edit the xxxxSYS.TXT file as appropriate, replacing any hex values with the frequencies you have determined are appropriate. This may require searching a database of frequency assignments etc. If you set PLAN=8 or PLAN=9, or PLAN=S, most of the frequencies will be computed already by Trunker. If your system uses non-standard mappings, it will be necessary to edit any incorrect lines. If you must edit the lines, it is critical to maintain the exact spacing including the first three special characters and the F8.4 format.

Special step only for systems that broadcast both the input and output frequencies (Especially UHF/VHF Systems): notice when pairs of frequencies are energized in synchrony at the beginning of a conversation, and record those pairings. Then move the input frequency to the 'input frequency' column of the output frequency's entry, and delete the line for the input frequency. For example, if 0x015 and 0x207 are related, and 0x207 represents 407.05, carefully change the file entries:

From:
[blank][blank]v0x015[3 blanks],15,ffff,103
[blank][blank]v0x207[3 blanks],207,ffff,102
To:
[blank][blank]v407.0500,207,15

Analyzing Group Assignments
While using one scanner to monitor the data channel with Trunker, simultaneously monitor the frequencies it has exposed with a second scanner (or better yet, if you have a supported scanner, hook it up and use the tracking feature.) By simultaneously listening and watching, one can associate the conversation (especially unit designations) with a specific voice ID, and collections of users doing a particular activity (such as fire dispatch) with a group ID. Using the 'G' and 'I' commands, one can quickly add information to Trunker's database in real-time.

To get a comprehensive list of groups and IDs, it is also possible to let Trunker run for days as necessary. For this to work, the scanner that is monitoring the data channel must be programmed with all of the data frequencies Trunker exposes and set up with proper squelch etc. so when the data channel changes frequency, the scanner will skip to the new one. Once one has identified a group as having a specific function, Trunker will automatically annotate any new radios as having used that group the first time the radio was seen. One can than fine-tune the xxxxIDS.TXT file online with the 'i' command to set priority, color and title, or offline with a text editor. Over time, should radio IDs get re-used, it is easy to notice a discrepancy in the display and update the annotation without stopping Trunker.

Recommended settings for this mode include Delay, not Verbose, and seekNew. If you use the audio scanner in trunk-tracking mode while using these settings, the program will give highest priority to the unknown group IDs to assist in identification. Once you have identified a group or user, you can use the 'I' or 'G' command to note its use and set its priority to a non-zero value, preventing future jumps to that group or user unless it is associated with call to a group or individual with a scannable priority.

The recommended approach for analyzing a new system is to first monitor the talk groups with the 'Verbose' option turned off and 'seekNew' turned on. Once you have the majority of talk groups identified, prioritized, and colored, then turn on the 'Verbose' mode. At this point, as each new radio is identified, since the talk groups are already annotated, each radio will then be assigned a text string noting the first talk-group it is seen on. As you see a white radio entry, you can then update its text string, priority, and color as appropriate. The seekNew option only seeks to new GROUPS so these new radios will not interfere with your monitoring process.

Handling Multi-Group Patch Calls
Sometimes a multiple group call is set up from one of the trunked system consoles. Each 'Patch' as it is referred to by Trunker, has a unique patch id and a list of associated group IDs. While that patch is being broadcast over the data channel, any calls by one of the participating groups' radios will be processed specially (based on the low 8 bits of the group ID known as 'flags'.) The text associated with the patch will appear with a 'P' in the T(ype) column. You can edit that text with the 'P' command after you enter the hex Patch ID. If you have not edited a Patch record, the patch record will take on most of the characteristics of the participating group with the best priority. If the patch occurs in a Type I bank, you will instead see the Group ID and Radio ID of one of the participating members, but you can see the list of participants in the Log window (and the xxxxpage.txt file if disk Logging is turned on.)

A Note about Automatic Annotation and Saving of Groups and IDs
Two features of Trunker are intended to support the collection of data about the users and groups in the trunked system. Automatic Annotation will update user radio ID records with the name of the talk group where the radio last appeared. In this version, the annotation will look something like this:

[#0170]WCCC Primary

This annotation is what would appear if the display format was HEX, and the radio in question last used group 0170(hex) titled "WCC Primary". When the display mode is changed, these annotations will be modified to contain a decimal code.

The scanning behavior for newly discovered radios and groups are modified by the value of environment variables NEWRADIO and NEWGROUP, respectively, as well as the setting of the SEEKNEW option.

2-Scanner Trunk-Tracking with a Supported Scanner
The audio scanner can be used to track the channels based on priority by hooking the TxD lead through a level converter to the serial input of the scanner. The scanner should be hooked up prior to starting Trunker. Trunker will put it into VCO mode, set the step, and drive it with the proper frequencies. Assuming one has already identified groups and IDs, and would not want to snap to new ids, you probably don't want the seekNew option set. The Delay and Verbose settings could be used according to user preference. Note that the equivalent of 'locking out' groups or IDs is accomplished by setting the priority for the groups and IDs greater than 50.

Detailed Documentation
Meanings and Possible Values of Key Fields (Field Names):

<none, used to be Flavor>

Values	Meaning
old Type I	This is an older Type-I system that is limited in function. It does not broadcast the types of data words that would be necessary to support multicast or networked operation. It will normally take 10-30 seconds for the system ID to be determined for this type of system since the ID is not broadcast very often.
Type I	Normal Type I system, only has feature set recognized by Type I radios.
Type II	Normal Type II system, may be single site or Multicast, and may serve type I radios, Type II radios, or a mixture of both. May be a Type IIi system but trunker has not observed any evidence of IIi behavior.
Type IIi	A Type II system where one or more banks are Type 1 and a Type 2 radio has been detected masquerading as a Type I radio.
Type II Astro	A Type II system with ASTRO features.
Type xxx NetCap	System is capable of being part of a multiple-site network, where each repeater would have its own set of frequencies. This value may appear momentarily before Trunker observes an indication of the existence of neighboring nodes/sites.
Type xxx Netwkd	This networkable site has broadcast information about its peers so is believed to be part of a networked system.

Status

Values	Meaning
DX Rcv	Accuracy of the data words received is <= 80%. A stronger signal would improve performance of Trunker.
Hi-Qual	A received data accuracy > 80% indicates Trunker will monitor this system effectively
sig?inv	A signal appeared at the requested input pin but either is not present (check input scanner) or the invert option needs to be reversed
wantCTS wantDSR wantDCD	The selected pin does not have a signal on it. Check connection or try other input pins until you identify where your slicer applies the signal

.

T (call type)

Values	Meaning
G,H	Group call - any radio affiliated with that group receives the audio as a 'broadcast'. 'H' indicates a hybrid call where a Type-II radio is accessing a Type-I bank.
I,F	Individual or other call - radio traffic not related to a 'Group' broadcast
E (blinking red)	Emergency call - A radio user affiliated with this group has pressed the EMERGENCY button and has not yet reset it. Unless the 'NOEMERGENCY' variable is set, the appearance of this type of call will be accompanied by a long, medium-pitch speaker tone.
A	All Talk Groups
P	Patch - multiple groups are logically associated and all radios affiliated with all groups in the Patch can hear the sender as a 'broadcast'
M	Multi-Select - multiple repeaters are participating in the call, one for each associated talkgroup
g	Encrypted group call
e (blinking red)	Encrypted emergency call.
a	Encrypted ATG
p	Encrypted Patch
m	Encrypted multi-select
Gd, gd, Ed, ed, Ad, ad, Pd, pd, Md, md, Id, Fd	The small 'd' next to one of the above letters indicates a digital call.

Type

Values	Meaning
????????	Trunker has not seen evidence that any of the banks are Type-II, and the flat file has not been modified to specify any Type-I banks.
'2' in a column	That bank has been observed to be a Type-2 bank, or the flat file has been edited to request that Trunker treat it that way.
a letter between 'A' and 'N' in a column	That bank is to be interpreted as a Type-1 bank. See the Fleet Map Table below. *** These are NOT the Motorola Bank Size Codes ***
a letter between 'a' and 'n' in a column	That bank is a Type-1 bank in which Type-2 radios sometimes participates using special command signals that are part of a Type IIi system.

PLAN

Values	Meaning

8	800 MHz "Standard" plan - varied -
	    for fnum = 0 through 0x2CF, 851.0125 + .025*fnum,
	    for fnum = 0x2D0 through 0x2F7, 848.0000 + .025*fnum
	    for fnum = 0x32F through 0x33F, 846.6250 + .025*fnum
	    for fnum = 0x3C1 through 0x3FE, 843.4000 + .025*fnum
	    for fnum = 0x3BE, 868.9750

S	800 MHz "Splinter" plan - varied -
	    for fnum = 0 through 0x257, 851.0000 + .025*fnum,
	    for fnum = 0x258 through 0x2cf, 866.0125 + .025*(fnum-0x258)
	    for fnum = 0x2D0 through 0x2F7, 866.0000 + .025*(fnum-0x2d0)
	    for fnum = 0x32F through 0x33F, 867.0000 + .025*(fnum-0x32f)
	    for fnum = 0x3C1 through 0x3FE, 867.4250 + .025*(fnum-0x3c1)
	    for fnum = 0x3BE, 868.9750

9	900 MHz "Standard" plan - 935.0125 + .0125*fnum, fnum is 0 through 0x1DE
0	non-standard - new frequencies appear in hex, and must be edited for customized mapping.

Requirements

Trunker 3 is intended to run under MS-DOS. Although it has been shown to run under Windows-95 and Windows-98, no assurances are made of compatibility or fitness for use. Those attempting to try should use `Full Screen' mode and disable CPU-burning screen savers. A reduction of about 5-10% in accuracy can be expected because of interrupt service latency under Win95/98. The emulated UARTS in some multifunction system board ICs lock up under the high interrupt rates present with the data slicer signal. It does not seem to be a problem under MS-DOS

One must understand that decoding and interpreting data at 3600 bits-per-second and looking up records for thousands of groups and radio IDs places a certain demand on a CPU. Please don't feel slighted if your 386 or 486 system can't handle the demands of Trunker.

Data Files
Trunker 3 generates and later reads four or more data files, with names based on the 16-bit SysId value:

xxxxSYS.TXT	The system information. (xxxx is the hex SysId value.) This file contains a line in which the user may label the system, a line in which the bank types / fleet mappings are specified, and a long-term history of the frequencies utilized by this system.
xxxxCn.TXT	The equivalent of the SYS file for an individual repeater node in a networked system.
xxxxPAGE.TXT	A running log of detailed information may optionally be logged in this file. The exact contents are adjusted with the 'o' menu, and include, among other things, information about patches, affiliations, system diagnostics, emergency signals, call alerts, and broadcasts of neighboring nodes.
xxxxIDS.TXT	A CSV file containing all of the individual IDs found on the system, with associated priority, color, and text label.
xxxxGRP.TXT	A CSV file with identical format to xxxxIDS. TXT, but providing information for the groups utilized on the system.
xxxxPTCH.TXT	A CSV file with identical format to xxxxIDS. TXT, but providing information for the multi-group patches observed on the system. Any changes to the annotation for these patches with the 'p' command will be saved in this file.

Keystroke Options
While Trunker is running, keystroke commands control various operating parameters and saving of data. When the data files are saved, the current settings of toggled options (NVDXLF) are saved in the xxxxSYS.TXT file. The keystrokes are:

A frame-sync indicator may be turned on and off	'f' key
A delay-hold may be applied to groups after they become inactive so one can note the group id or allow the conversation to be tracked over a gap of a couple seconds	'd' key
Verbose mode that shows the destination Group or ID as well as the Source ID, or non-verbose mode that only shows the destination	'v' key
Save data files	's' key
Exit sub-menu.	\<esc\> or 'q' keys
Option sub-menu	'o' key
Enter into the data set the label text, priority, and color associated with a group, radio, or patch	'g', 'p', or 'i' keys
seekNew mode: snaps new users to highest priority for rapid identification	'n' key
Enter a hold mode for the currently scanned conversation. This could be either a Group call, Multi-Group Patch call, a call involving a pair of Individuals, or a single-individual, depending on the current display at the time the 'h' key is used, regardless of its priority or digital status. Hitting 'h' while holding will return to search mode ('h' key.) You can also enter hold mode with the "up arrow" or "down arrow" keys. In this case, the call immediately above or below the current call will be selected for hold mode. Repeatedly hitting up arrow or down arrow will move the 'hold' from active call to active call, so you can have more control over which calls you hear.	'h' key Up/Down Arrow Keys
Manually enter a hold mode, where you can type in an arbitrary Group ID, whether or not the ID is active at present. As with the normal hold mode, the 'h' key will halt the manual mode and return search mode. Note that this key is different from the capitalized version!	'm' key
Manually enter a hold mode, where you can type in an arbitrary Multi-Group Patch ID, whether or not the patch is active at present. As with the normal hold mode, the 'h' key will toggle the mode back to search mode. Note that this key is different from the lowercase version!	'M' key
Enter a configuration sub-menu in which you can experiment with the slicer pin selection and mode (normal/invert)	'c' key
Use the 'T' key to set the 'audio scanning threshold' to a value different from 50 - any group/id with prty <= the threshold will be eligible for audio scanning, any greater priority will be suppressed.	'T' key

Any other commands will appear in the menu. This is not necessarily an exhaustive list.

Note that the menu may take more than one line, so the 'space' key will switch between menus. A particular menu item need not appear to be accessible - the keystrokes will work whether the particular item is visible or not.

Notes on Editing Trunker Records

When you enter the 'G', 'P', or 'I' key, you will be prompted for the group, patch, or radio ID (in hex or decimal depending on the current format setting.) Type in the hex(or decimal as appropriate) radio, group, or patch ID. Do NOT try to type in a textual Type 1 Group Annotation, such as "3 02-12". For a Multi-Group Patch, type in the 4 or 5 character patch ID, as seen on the displayed call or observed on the paging/patch log window.

After typing the last character of the ID, or hitting ENTER or TAB after less than 4(or 5) characters, Trunker will display the current data record. You may edit the Title, Priority, and Color fields. To move to the next field, use the TAB key. To move within a field use the left and right arrow keys. Backspace is destructive, and the Insert and Delete keys function in the normal manner. You may either abort the current update with the <escape> key at any time, or commit the changes without tabbing through the remaining fields by using the ENTER key. Also, the Right Arrow key can be used to skip from the last column of a field to the first column of the next, but you cannot go back with the Left Arrow key.

When you reach the 'color' field, a colorized prompter will appear on the bottom line of the screen to help you select the proper color code. You can add 16 to the value shown for blinking, and/or add 32 to the value for a 'beep' from the speaker. Note that whatever color is the background color will not be seen in that menu, since it 'blends in' to the background.

Screen Areas-Channel Status Area

This area of the screen contains static data about the frequencies used by the system, and real-time information about the current state of the various frequencies. 43-line mode is used to allow the full 28 (27 voice + 1 CWID) frequencies to be displayed. Only those frequencies actually used for voice, data, or CWID are retained in the xxxxSYS.txt file. In the channel area, the first three columns carry flags about the particular frequencies:

C: this channel gave out the CW callsign.
D: this channel was at one time the data channel
A: this channel may at some point be used as an alternate data channel
V: this channel has at one time carried voice connections. A different letter may be put in this column to allow unused frequencies to be maintained in the file.

Once the frequency is actually used, Trunker will change this column to 'v'.
Each frequency identified (possibly in past sessions as saved in the xxxxSYS.txt file) is color coded:

Dark Green or "Quiet" color you specify:	frequency not presently active or is emitting the CW callsign.
Light Green or "Active" color you specify:	frequency is active for voice.
DarkGrey:	frequency is currently the data channel.

Subsequent columns include:

Prty:	the priority assigned the conversation, based on the composite of caller/destination priority. (A low priority is 'better'.)
"*":	this frequency is the current one which the Audio Scanner has been told to monitor, if you are using that feature.
Destination Title:	usually, the name (and color) assigned to the group in use by editing the xxxxGRP.txt file. For a private call, this will be the name and color assigned to the called individual unit in the xxxxIDS.txt file.
ID:	ID information, depending on the type of bank being displayed. For a Type II or unknown type bank, just the hex or decimal value of the talk group will appear. For a Type II bank, flag nibble will be set to zero. For a Type I bank, the Bank#, Fleet#, and SubFleet # are shown, for example: "3 02-12" for Bank 3, Fleet 2, SubFleet 12, followed by the group ID in hex or decimal for direct entry into the 'G' command.
T:	either "G" for a group call, "I" for a Individual Call, "P" for a patched call among multiple groups (the best priority group will be shown followed by "etc.",) "A" for "All Talk Group", "E" for Emergency Call, "M" for Multi-select, and "D" for Digital or encrypted calls
ID:	The hex or decimal id of the last radio keyed up. In group calls, this may sometimes be inaccurate if another group member keyed-up before the previous member's disconnect tone was sent out. Us this ID for entry into the 'T' command.
Caller Title:	the name (and color) assigned to the individual, if known, as specified in the xxxxIDS.txt file. (see note in previous paragraph)

Command/Response Area
This zone consists of two lines, the first for prompting, and the second for displaying the results of the last entered annotation request.

Fleet Map Table
NOTE: These are NOT the Motorola Bank Size Codes!

Size	Use Letter*	Banks	Fleets	Sub's	ID's	*(upper case for Type I, lower case for IIi or Hybrid banks)
S-0	2	1	n/an/an/a	Type-II Bank		
S-1	A or a	1	128	4	16	
S-2	B or b	1	16	8	64	
S-3	C or c	1	8	8	128	
S-4	D or d	1	1	16	512	
S-5	E or e	1	64	4	32	
S-6	F or f	1	32	8	32	
S-7	G or g	1	32	4	64	
S-8	H or h	1	16	4	128	
S-9	I or i	1	8	4	256	
S-10	J or j	1	4	8	256	
S-11	K or k	1	2	16	256	
S-12	L or l	2	1	16	1024	spans 2 banks(0-1,2-3,etc.) Trunker does not 'enforce'! Typical use is ??LL????
S-13	M or m	4	1	16	2048	spans banks 0-3 or 4-7 where used. Trunker does not 'enforce'. Typical use is MMMM???? or ????MMMM.
S-14	N or n	8	1	16	4096	spans all banks when used. Trunker does not 'enforce'. The only use for this code is NNNNNNNN.

Sample Data Files

xxxxSYS.TXT

System Label on first line
MAP=222C2222   bank size map
PLAN=8   800MHz 'Standard' US Band Plan
DISPOSITION=...   per-system settings from 'option' sub-menu
OPTIONS=NVDf   per-system settings from 'main' menu
c v854.8875,9b,ffff,323   first 3 columns are flags, then freq. in MHz, then 'channel #'
 v855.1875,a7,ffff,333   4th column is 'input frequency' hex for certain
 v856.3125,d4,ffff,3f   UHF systems which emit input frequency codes. last is hit counter
 v856.4125,d8,ffff,1dd2
 v857.3125,fc,ffff,22f3
 v857.4125,100,ffff,3303
 v858.3125,124,ffff,12
 v858.3625,126,ffff,f3
 dv859.3125,14c,ffff,1333
 dv859.4125,150,ffff,1223
 dv860.3125,174,ffff,3ac3
 dv0x320   ,320,ffff,11a   this one is unknown or suppressed by user

xxxxGRP.TXT,xxxxIDS.txt,xxxxPTCH,txt
;VER=3

;ID_hex,COLOR_dec,PRIO_dec,TITLE_str,LASTNOTED_hex,HITS_hex,USAGE_hex,ID_dec,ID_str,LASTNOTED_m
m/dd/yyyy,LASTNOTED_hh:mm
 00b0,1,99,"Franklin/Springb. '2'",3a0066ee,547927bb,1c,176,#00B0,11/01/2000,13:54
 00d0,4,99,"Springboro Primary",3a006447,231552c5,1e,208,#00D0,11/01/2000,13:43
 00f0,4,99,"fire springboro",3a004ed2,19337641,0,240,#00F0,11/01/2000,12:11

Detailed Specification of File Format for Groups, Radios, and Patches

Field	Format	Contents	Example
ID_hex	Hex Number 0..ffff	Entity ID - Radio, Talkgroup, or Patch #	00b0
COLOR_dec	Decimal 0..63	Color to be assigned to this entity's descriptive text while it is on a call	9
PRIO_dec	Decimal 0..99	Priority to be given this entity for selecting it for monitoring. If zero, behavior depends on the setting of SEEKNEW, NEWRADIO, and/or NEWGROUP	6
TITLE_str	Quoted String	Label for that group/id/patch, usually typed in via g/i/p commands or auto-annotated for radios.	"WCC Primary"
LASTNOTED_hex	32-bit Hex	Timestamp (UNIX time_t) for the last time this entry appeared as part of an actual call	39fe26a5
HITS_hex	32-bit Hex	A counter proportional to the air time of the associated entity	547923f3
USAGE_hex	Hex Number 0..3f	6 individual bits indicating participation of this entity in a particular type of conversation: #01 Emergency Call #02 DES Encrypted Call #04 Astro or other Digital Call #08 Encrypted Astro or other Digital Call #10 Phone Patch <EDACS only> #20 Digital Phone Patch <EDACS only>	3 - participated in an emergency call and/or a DES encrypted call (could have been both at once)
ID_dec	Decimal Number 0..65535	Decimal equivalent of the first field	368
ID_str	non-quoted string	String representation of the ID. For type 1, could contain fleet/subfleet info	#0170 (hex type 2) 368 (decimal type 2) 3 02-12 (type 1 block/fleet/subfleet)
LASTNOTED_mm/dd/yyyy	Date String 10/14/2000...present	Date the entity last participated in a call	10/14/2000
LASTNOTED_hh:mm	Time String 00:00..23:59	Time the entity last participated in a call	07:34

xxxxPAGE.TXT

Oct 14 01:42:20   [#0170]WCCC Primary #1D76 Af->#0170 WCCC Primary
Oct 14 01:46:45 Add2MSEL id #1067, group #0677(Fire Primary (!2))
Oct 14 01:47:18 MSEL id #1067 closed.
Oct 14 01:47:29   [#0170]WCCC Primary #16CF Af-> #0170 WCCC Primary
Oct 14 01:49:11 [#0A50]Franklin Firegroun #16E9 Af-> #0A50 Franklin Fireground

xxxxMSG.TXT
(this file is optional and requires knowledge of the radio system setup and reporting procedures)
;columns are: s for status or m for message,number,text
s,1,place text here for status #1
s,2,place text here for status #2
...
s,8,place text here for status #8
m,1,responding
m,2,on the scene
m,3,returning available
m,4,returning unavailable
...
m,16,place text here for message #16

Notes On Data Content
Priorities are numbers ranging from 0 to 99, with only those less <= 50 (or the current Threshold) triggering 'Tracking'.
Color values are as follows
(a colorized prompter will help you choose a color when you get to that field while using the 'p', 'i', or 'g' commands)
(add 16 for the `flashing' attribute, and/or add 32 for an alert 'tone'):

Color	Decimal Value
BLACK (not visible with default background color)	0
BLUE	1
GREEN	2
CYAN	3
RED	4
MAGENTA	5
BROWN	6
WHITE	7
DARKGRAY	8
LIGHTBLUE	9
LIGHTGREEN	10
LIGHTCYAN	11
LIGHTRED	12
LIGHTMAGENTA	13
YELLOW	14
BRIGHTWHITE	15
for blinking,	add 16
for beep,	add 32

CI-V/CI-5 Radio Addresses Used by Trunker

Radio	Hex Address	Decimal Address
Optoelectronics OS456/OS535/OPTOCOM	80	128
Icom R10	52	82
Icom R8500	4A	74
Icom R7100	34	52
Icom R7000	8	8

Etrunk

Release 3.8.1 Documentation

Last updated Monday, December 11, 2000
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Origins

Some time ago there appeared on USENET a program and its source code that provided the rudimentary ability to decode Motorola Type I, II, and IIi trunking radio system data. That program was nurtured and refined by a number of contributors. Then, a rudimentary program for decoding Ericsson/GE data channels was posted (anonymously) to USENET. That rudimentary program was used to investigate further the parts of the data stream necessary to adapt Trunker to Ericsson/GE systems. This document represents the results of merging those two efforts. 80% of the code and features are common to both Trunker and Etrunk.

Current Feature Status

This software provides a rudimentary implementation of Trunker for Ericsson/GE systems. It differs from the Motorola Trunker in the following ways:

Because E/GE system IDs are limited in size and not necessarily unique in an area, it may be necessary to run ETRUNK from a different directory for each system you monitor.
ETRUNK does not recognize complex call types (more than 2 user IDs and/or more than one group ID.)
While ETRUNK works on a single-channel E/GE system, where a single frequency alternates between control channel and voice channel, the 'delay' feature is not functional for those systems.
Unlike Trunker, ETRUNK does not yet adapt to multiple repeater sites for the same networked system. It will recognize that it is monitoring a networked system, but will not swap out the repeater files the way Trunker does.
Because E/GE systems do not utilize standard bandplans, it is necessary to manually identify all frequencies associated with the E/GE system and update ETRUNK's data files with the LCN to Frequency mapping.
This version of ETRUNK now supports Affiliation logging. (Thanks to Wayne for figuring out the decoding!) Note that not all radios will affiliate, and to see this information it is necessary to adjust the settings in the 'option' sub-menu for 'affiliations' so they will show up on the 'screen', be logged to 'disk', or 'both'.
This version of ETRUNK now supports "Patches" where multiple groups are aliased to a common (temporary) group ID for broader dissemination of information and cross-unit cooperation. Please note that to see these you have to utilize the 'options' sub-menu and change the handling of 'patches' from the default value of 'none' to "screen", "disk" or "both" to see specific information about what groups are participating in the patch.
There are now 4800bps E/GE systems out there. To access these systems, it will be necessary to run a different executable (ETRNK48.EXE.) Sorry, but ETRUNK cannot automatically toggle over to 4800 bps.

Even with this reduced feature set, a user of ETRUNK should be able to monitor a E/GE system, collect information about talkgroups and radio IDs, and track both individual and group calls.

Please Start by Reading the Motorola (Trunker) Documentation

Etrunk is so much like Trunker, please start by reading the Trunker document, then see subsequent sections about how ETRUNK may be different...

ETRUNK and Commercial Trunking Radios

When ETRUNK was initially released, there was no affordable commercial scanner that could track E/GE systems. There is now custom software available for the Optoelectronics OPTCOM radio. In addition, there has been an announcement of an upcoming Uniden product that is claimed to track these systems. However, ETRUNK lets you do so now with your existing scanners.

Use of System ID (SysId) as Primary Index

Like its partner, Trunker, ETRUNK uses a system identifier to associate data files with trunked systems. Since these identifiers may not be unique within a geographical area, it may be necessary to keep a working directory for each unique E/GE system you monitor, and it will probably not be practical to jump from one system to the next without stopping Etrunk.

Networked Radio Systems

Larger E/GE systems share group and radio IDs. Support for networked systems is not presently available. Each repeater in the system is treated as a separate system. Until ETRUNK can distinguish between repeaters, it will be necessary to switch the proper xxxxSYS into the directory with the common group and radio data files. In some cases, a given networked system will re-use the same System ID values in different states. As a result, sharing the same group/radio data files among networked cells can be difficult.

Handling Bandplans for Each E/GE System

No standard bandplan is available to map LCNs to frequencies. A manual approach is required to determine the frequencies and update the ETRUNK data file.

1.   With no xxxxSYS.TXT file in the current directory, start ETRUNK.
2.   Once all of the LCNs associated with the system appear on screen, exit ETRUNK with the 'Q' command.
3.   Edit the xxxxSYS.TXT file. Change all of the hex frequencies (e.g. 0x001...0x007) with the corresponding frequency in a F8.4 format (e.g. 855.0200).
4.   Save the file.
5.   Run ETRUNK again and monitor or track the system as desired.

Here is a sample xxxxSYS.TXT file for a E/GE system:

Clinton County, Ohio E/GE System
MAP=00000000 PLAN=0
v866.2375,1,ffff
dv866.7250,2,ffff
v867.2250,3,ffff
dv867.7250,4,ffff
v868.1875,5,ffff

Meanings and Possible Values of Key Fields, where different from Trunker

Field Name	Values	Meaning
Flavor	E/GE System	System has either a single repeater or multiple repeaters all simultaneously broadcasting on the same frequencies
	E/GE Networked	This networkable site has broadcast information about its peers so is believed to be part of a networked system.
	E/GE Single Channel	A special type of system for outlying areas that uses a single radio frequency for both the control stream and the audio signals.
Type	00000000	ETRUNK forces a bank map of all zeros. Type-1 or Type-2 maps do not apply to EDACS systems.
PLAN	0	All E/GE systems must be manually frequency-mapped

Requirements

ETRUNK only operates effectively under MS-DOS at this time.
One must understand that decoding and interpreting data at 9600 bits-per-second and looking up records for thousands of groups and IDs places a certain demand on a CPU. Please don't feel slighted if your 386 or 486 system can't handle the demands of ETRUNK.

Quality of Signal

If you cannot achieve sufficiently good reception to reach 90% accuracy on the data channel, you will be losing information and may have difficulty receiving the audio as well. The E/GE version of Trunker provides a spinner in addition to the blinking '@' sign; both show up when you turn on the 'F'rameIndicator command. If things are working well the spinner should reach a vertical position every second. Slower progress means quality is degraded, perhaps by trying to run ETRUNK under Windows, or because of poor radio reception. Under degraded conditions, ETRUNK will lose some calls and may not show calling radio IDs.