CT *by K1EA*

Table of Contents

Realtime Contest Logging Software
Version 9

CT_{by} *K1EA*

Manual prepared by

Bill Myers, K1GQ
and
Ken Wolff, K1EA

Editorial support by

Fred Hopengarten, K1VR
and
Bud Hippisley, K2KIR

Distributed by

XX Towers, Inc.
814 Hurricane Hill Road
Mason, NH 03048   USA

Orders	603-878-4600
Support	603-878-4200
BBS	603-878-1900 (28.8, N81)
FAX	603-878-1102

E-mail	kc1xx@kc1xx.mv.com
Web	http://www.contensting.com/ct/

DISCLAIMER OF WARRANTY

Introduction

CT is designed for real-time contest logging, featuring very fast dupe-checking and scoring, extensive data protection, and complete post-contest report generation. Version 9 supports these contests:

- CQ World-Wide DX Contest

- CQ World-Wide 160-Meter DX Contest

- CQ World-Wide WPX Contest

- ARRL International DX Contest, W/VE entrant

- ARRL International DX Contest, DX entrant

- ARRL 10-Meter Contest

- ARRL 160-Meter Contest

- ARRL November Sweepstakes

- ARRL June and September VHF QSO Parties

- ARRL VHF Sweepstakes

- ARRL Field Day

- European DX Contest, outside Europe entrant

- European DX Contest, inside Europe entrant

- All-Asian DX Contest, outside Asia entrant

- All-Asian DX Contest, inside Asia entrant

- IARU HF World Championship

- California QSO Party inside California

- WRTC, team entrant

Version 9 also contains DXpedition Mode, which logs CW, SSB, and RTTY QSOs on up to eleven bands. In addition to logging functions, the program can send voice and CW from the keyboard or from programmable memories, control an external voice keyer or the internal Digital Voice Processor™ (*DVP*)

by K1EA, set and recall frequency with certain ICOM, Kenwood, Yaesu and TenTec radios, interface with a packet TNC and the PacketCluster™ spotting protocol, and communicate with other computers running *CT*.

CT runs on color or monochrome IBM PCs or clones. Version 9 requires a hard drive, at least 2MB RAM, and an 80386 or above processor. *CT* handles up to 64,000 QSOs in a single log. Optional communication with external devices requires serial ports, and, for voice keyers other than the *DVP*, a parallel printer port.

Support and Updates

CT was written by Ken Wolff, K1EA, who continues to support the code. Ordering and support is provided by XX Towers, Inc. Contact information for XX Towers is given on page iii. If you are a registered *CT* user, you can call the BBS and download the latest update to your version. The BBS maintains latest updates for the current version, and for one version earlier. In addition, the most recent multiplier files are also available, as well as other files of interest to *CT* users through the BBS and the web site.

The BBS is available 24 hours per day. The log in settings for your modem are 28,800 baud, no parity, 8 data bits, no parity, 1 stop bit (N81).

The best way to communicate with K1EA and other *CT* users is the CT-User internet mail reflector. Bug reports are welcome, and we pay attention to them.

The price and registration fee to new users is $79.95 plus shipping and handling — U.S.A. $4.00, DX $8.00. The upgrade price for registered users of Version 8 is $44.95 plus shipping and handling. The price covers the current version, the current manual, and serious bug fixes for that version. Updates within a version without the manual are $10, including shipping and handling. VISA or MasterCard are accepted.

Using This Manual

The next chapter, *Quick Start*, is an overview for new *CT* users that briefly describes the steps needed to set up the hardware and software, and the basics for using the program. The next five chapters are detailed guides. *Hardware Installation* describes how to connect the components of a contesting system, including the computer, CW key line, *DVP*, radio, packet TNC, and other computers. *Software Installation* explains how to prepare the system environment for the program, and how to maintain the database files. *Startup and Initialization* shows how to start and stop the program, and how to set all of the configuration parameters. *Using CT* is the largest chapter, discussing all of the program capabilities. This chapter is organized into groups of related functions, ending with definitions of contest-specific features. *Utility Programs* explains other programs provided with *CT* that work with the specially-formatted log files. The final two chapters, *Function Keys and Command*

Reference and *Troubleshooting,* summarize the *CT* commands and special keystrokes, and address common problems in using the software.

CT has many functions, which are invoked either by pressing special keys or by typing special words (called *text commands*) into the callsign field. Throughout the manual, these special key combinations and words are printed in boldface. For example, **F8** refers to the function key labeled F8, **Alt–F8** means press both the Alt key and the F8 key, and **Sound** refers to the command for enabling the computer's speaker. The program is *not* case-sensitive. Capitalization and uppercase characters are used in this document only to improve readability.

Many of the files created by *CT* are named by appending specific suffixes to a base name that is defined when the program is started. For example, starting the program with the base name `CQCW91` results in the files `CQCW91.BIN`, `CQCW91.NOT`, and `CQCW91.ALL`, among others. The manual refers to the base name as *contest*. Two other special words are used frequently: *mycall* refers to your callsign, and *hiscall* refers to the callsign in the current logging line.

Computerese is difficult to avoid in the personal computer world. The typewriter typeface, shown above to list file names, is used to help you distinguish phrases that have literal meaning to the computer.

Computer files come in two general flavors, *text* and *binary.* Text files can be printed, and can be viewed and modified with any text editor or word processor, while binary files can only be understood by the programmer that created them. Some of the files provided with *CT*, and created by *CT*, are text files, so that you can print and change them. Others are binary files, which you should not attempt to modify. Generally, files with names that end in `EXE` or `BIN` are binary files and others are text files, but there are exceptions.

Note   Text files are often referred to as ASCII files.

Quick Start

CT is necessarily complex, because it interfaces with so many different devices, and because it knows the rules for so many different contests. This chapter provides a gentle overview of how to set up and use *CT*. Experienced users can scan this discussion and dive right in, setting aside the rest of the manual for occasional reference. New users should also read this chapter, and then study other chapters as necessary to more obtain detailed information.

Connecting the Hardware

The first step in preparing a *CT*-controlled contest station is installing the hardware units and interconnections. Here is a list of the possibilities.

Computer

You can get by with only a computer to do contest bookkeeping, but you will be missing out on many of *CT*'s most impressive features. Most external devices are interfaced to the computer via serial communication ports. If you have more than two of these devices, you most likely will need to add a serial port board or a multifunction board to your computer.

DVP — **The K1EA Digital Voice Processor**

The Digital Voice Processor is an optional hardware unit that installs inside your computer and connects to your microphone, headphones, transceiver microphone input, and transceiver headphone output. You can buy a cable matched to your transceiver to make the connections easily, or construct your own cable using information in the *DVP* Instruction Manual. The manual also discusses how to set the switches on the *DVP* board.

Voice Keyer Control

If you have an external voice memory keyer, you can start message playback using *CT* function keys, though an interface that connects to a printer parallel port. See *Voice Keyer Control* on page 20 for interface details.

CW Key Line

You can key your transmitter through either a serial communications port or a printer parallel port. A port used for this purpose cannot be shared with other devices, and a small external circuit must be constructed or purchased to convert between the computer voltage levels and the transceiver key line levels. See *CW Keying* on page 18 for suggestions.

Packet TNC

You can communicate with a packet radio TNC through a serial port, or you can use the PC•Packet Adapter internal TNC by DRSI. *CT* emulates a standard terminal with two windows for input and output, and recognizes the DX spotting format used by PacketCluster. If you happen to have a PacketCluster node at your station, you can connect directly to the node, through a serial

communication port, instead of using another TNC and radio to communicate with yourself.

Radios If your radio is computer-aware, *CT* can probably talk to it. Check the Information Sheet Radio popup menu to learn if your radio is supported. For most radios, *CT* can read the frequency and mode to determine information for your log, and can set the frequency for manual or automatic QSYs. *CT* can control up to two radios at once, through serial communications ports. See *Radios* on page 20 for details.

Antennas Some automatic antenna switching schemes select antennas depending on the current band. *CT* can provide band information to the antenna switch through a parallel port, as described in *Antenna Relay Control* on page 22.

Rotators Certain antenna rotators support computer interfaces. *CT* can set the antenna heading for up to two rotators, through parallel ports. *Rotators* on page 21 has the details.

CT Network Multi-transmitter stations can configure a multi-computer network. *CT* uses the network to pass time, logging and spotting information between all computers, and to provide a local chat mode between the operators. *CT* supports two nework topologies. The bus topology daisy-chains computers — the computers at each end of the bus require one serial communications port to connect to the network, and computers between the ends require two serial ports to connect to each neighbor. The star topology connects each computer to an external bug, and uses only one serial port on each computer. *CT Network* on page 22 describes how to set up and test a network.

Installing the Software The next step, after getting the hardware installed and wired up, is getting the software onto your computer's disk and establishing the appropriate operating system environment.

1 **Make a backup copy of your distribution diskette.**

   Use the backup diskette for the following steps, and keep the original in a safe place.

2 **Make a directory on your hard disk.**

   For these instructions the directory name is CT901.

3 **Copy the files from the distribution disk to the CT901 directory.**

   These files should now appear in the directory: DISK.ID, README.TXT, RELEASE9.TXT, INSTALL.EXE, and CT.001. Read the two TXT files to learn about special instructions and features that haven't yet been included in this manual.

4 Run the INSTALL **program.**

The installer asks where to install the files and then unpacks the archive, depositing these files on you hard disk in the directory you designated: CT.EXE, CTY.DAT, HISTORY.CTY, README.CTY, CQ2DXP.EXE, 8TO9.EXE, 9TO8.EXE, MASTER.DTA, CHK_TEN.EXE, FIX_MINE.EXE, MERGE.EXE, B2R9.EXE, R2B9.EXE, AR10.DAT, AR160.DAT, ARDXDX.DAT, CQ160.DAT, CQP.DAT, CQP1.DAT, FD.DAT, EXAMPLE.CFG, MULTI.CFG, CT.HLP, WAE-EU.TXT, SEC.DAT, COMTSR1.EXE, COMTSR2.EXE, COMTSR3.EXE, COMTSR4.EXE, SHARED.EXE, DIGI.EXE, DVPTSR.EXE, DVP.TXT.

5 Modify your AUTOEXEC.BAT **file.**

See *Installing on a Hard Disk* on page 25 for step-by-step instructions. You need to add the *CT* directory to the PATH variable, and define the CTPATH variable. The CTPATH variable allows you to keep your log files in a different directory than the *CT* directory. This organization makes it easier to update your software, and to backup or archive your contesting records. If you have the *DVP*, you also should define the DVPPATH variable.

6 Customize your batch files for using *CT*.

The batch files load and unload terminate and stay resident (TSR) programs for each communications device. See *Terminate-and-Stay-Resident Software* on page 25 for examples.

Configuring the Software

You need to give *CT* some information about yourself, about your contest entry, and about the communications hardware.

1 Prepare a *CT* configuration file.

Use a text editor to build a preferences file named CT.CFG in your program directory, starting with a copy of the EXAMPLE.CFG or MULTI.CFG files. These preferences preload the choices that you make in the Information Sheet and in Communications Setup when you start a new log. See *Configuration File* on page 35 for the file format. The configuration file is optional.

2 Run *CT* and complete the Information Sheet and Communications Setup.

Usually you only need to do this once per contest, because the information that you supply is the same for the duration of a contest. The preferences file can help make the process quicker for a new contest. If, for some reason, you need to restart *CT* in the middle of a contest, you can skip over the Information Sheet and Communications Setup using the -NOW option (see *Command Line Switches* on page 33).

Operating a Contest

Now you have everything connected and *CT* initialized, and you're ready for action. *CT* uses numerous windows on the screen to give you information. Generally speaking, you give instructions to *CT* by pressing special keys on the keyboard, or by typing special words into the callsign field on the logging line. You supply data to *CT* by typing on the keyboard using the normal alphanumeric keys and, in some cases, the punctuation keys. How *CT* reacts depends on the current mode. There are five modes, and you are always in one and only one of these modes: Logging mode, CW Keyboard mode, Packet Talk mode, Post-contest mode, and QSL mode. During the contest, you will be in Logging mode nearly all of the time. If you find *CT* is behaving strangely, check that you are in the right mode (see *Program Modes* on page 47).

Note   A word about keyboards. If you have a choice, go for the layout with 10 func-tion keys at the left side, rather than the layout with function keys across the top. You will use the function keys many times per QSO, and reaching the keys at the left is much easier than getting to the row across the top.

Throughout the contest, you use *CT* to record your QSOs and to give you information. The program fills in as much information as possible, to minimize the amount of data that you must enter. Depending on your hardware setup, the program can also automate sending the phone or CW exchange, including the other station's callsign, and can trade information with external sources such as packet spotting networks or an internal multi-transmitter network. The following sections give overviews of some of the most important functions.

Logging

The central activity in contesting is, of course, making QSOs. *CT* presents a fragment of your QSO record — your *log* — in the lower left area of the computer screen. The fragment is arranged to look like a familiar paper log form, with the more recent QSOs toward the bottom. To complete a QSO, you type a callsign in the callsign field on the bottom logging line, move the cursor to any other fields that require data entry and fill them in, then press the <**Enter**> key.

Note   The Enter key is sometimes called the Return key. The name on the key is enclosed in angle brackets in this manual so you won't confuse it with a CT text command. Keys that are clearly unambiguous don't have angle brackets.

When you press <**Enter**>, *CT* quickly examines what you have typed in the callsign field. If the text is all number digits and you have established a serial port connection to a radio, *CT* sets the radio to that frequency. If the text is all letters, *CT* checks to see if you have typed a text command, and if so, executes the command. Otherwise, the mixed text must be a callsign, and *CT* performs a set of actions that depend on the particular contest. For example, in the CQ World-Wide DX Contest, *CT* extracts the prefix, determines the country and zone,

inserts the zone in the zone field of the logging line, and marks the QSO as a new multiplier or duplicate as appropriate.

There are special keys for moving the cursor between fields and log lines. Numerous other keys support convenient editing of your log data. To learn these keys, first read about them in *Using CT* to get the general idea, then start operating. As you find yourself wishing it was easier to do something, such as jumping the cursor to the beginning of the callsign, look up the key sequence for doing it (**Ctrl–A**) and use it frequently. Soon, you won't have to think about it at all.

Checking Partial Callsigns

Sometimes you won't copy the other station's complete callsign right off. *CT* can help by showing you a list of all the calls you have already worked that contain the part that you did copy. Just type what you heard into the callsign field and run the Check Partial function by pressing **F8**. If you know that you are missing characters, replace them with the question mark.

Pressing **Shift–F8** or **F12** runs a more extensive Check Partial that looks for matches in both the log and a callsign database file named MASTER.DTA. This search takes more time to complete, but provides a more complete list of possible calls. Updates for the database file are available at the *CT* web site.

Checking Duplicate QSOs

One of the most onerous chores in the days before computer logging was cross-checking the log to identify repeat QSOs, called *dupes.* At best, dupes are zero point QSOs that clutter your log; at worst, too many unidentified dupes can disqualify your entry. This chore is gone forever — *CT* tells you instantly when you enter a duplicate QSO. Many operators, however, prefer not to enter the dupe in the first place. Easy! Just type the callsign and press **F9**. *CT* lists QSOs with that station, and alerts you on the message line just below the logging line if the QSO would be a dupe. If so, a simple function key (**Alt–W**, **Alt–F8**, or **F11**) clears the logging line.

Checking Multipliers

Less onerous in the old days, but even more important, was keeping track of multipliers. Successful contesters rarely win by simply CQing for the entire contest. Instead, they seek a balance between number of QSOs and number of multipliers by efficiently choosing when to look for multipliers. The key is knowing what multipliers you need and what multipliers are available. *CT* provides this information effortlessly in two ways. Multiplier summary displays can be called up at any time to review what you have worked and what you need. Or, you can see whether you need the station you're currently working on another band by pressing **F10** to get the list produced by the Check Country function.

Viewing Rate and Score Summaries

During the contest, *CT* helps you monitor your performance by computing short term and long term QSO rates, and the value of a multiplier in terms of QSOs and time at the current QSO rate. The companion score summary breaks

down how you are doing by band, which can help you revise your game plan as you go by comparing with others in your class or with past year's results.

Changing Bands

In most contests, *CT* needs to know what band you are operating on. Function keys are available to cycle up and down through the pertinent bands for a particular contest. However, if you have connected a computer-controlled radio, *CT* reads the frequency for every QSO. So, if you change bands with your radio, *CT* will notice automatically. Better yet, you can tell the radio to change to another frequency by typing the frequency in the callsign field.

Sending Phone and CW Messages

Electronic voice and CW message memories are among the most popular accessories in contest stations. The most sophisticated of these provide several user-defined messages, and can keep track of serial numbers. With *CT* and *DVP*, you have all these features and more. To define a CW message, you simply type the text. To define a voice message, you make a digital recording of yourself talking into your station microphone. To play a message, press a function key. That's all there is to it! Here's the bonus — *CT* knows how to convert the callsign that you typed into the log to either CW or voice and insert it into the exchange. You can, literally, operate without speaking or moving your hands from the keyboard, except to tune the radio.

Using PacketCluster

PacketCluster was created by AK1A, who wanted a better 2 meter spotting network. Its capabilities now extend far beyond spotting. If you can access a PacketCluster node (or if you are a sysop yourself), you can take advantage of PacketCluster features from within *CT*. In the Packet Talk mode, you can issue PacketCluster commands by typing as you would in any terminal emulation product. Better yet, in Logging mode, *CT* automatically handles spot information for you. Incoming announcements are filtered so that you are only alerted about spots that are needed multipliers. If you have a computer-controlled radio, pressing **Alt–F4** sends the radio to the spot frequency and puts the callsign in the current logging line. With some radios, *CT* can even set split frequencies. After you have worked the multiplier, which will be easy because you got there faster than most of the competition, you press **Alt–F4** to jump back to your original frequency.

Making announcements is just as easy. Just hit **Alt–F3**. If your radio can talk to *CT*, you're done; the callsign from the current line and the frequency from the radio are put together to send a spot to the PacketCluster network. Without a computer-controlled radio, you will need to type the frequency into a popup window.

Using the *CT* Network

Multi-transmitter contest entrants often set up a computer at each operating position to run *CT*. A special communications mode called the *CT* Network makes it easy to keep the log at each position consistent with the logs at other positions. In addition to automatically passing logging information, the

network also interfaces all of the positions to a single packet TNC, and provides an electronic bulletin board that operators can use to "talk" to each other.

Example Logging Scenarios

These scenarios give step-by-step examples for the CQ World-Wide DX contest. The details are different for different contests. There are, of course, many variations on these standard procedures.

Running

"Running" is contest jargon for working stations rapidly by CQing.

1 **Send your CQ message by pressing F1.**

You can reprogram the CQ message during the contest.

2 **When a station responds, type the call in the callsign field.**

If you miss part of the call, type a question mark.

3 **When the station stands by, press the Ins key.**

Ins sends the station's call followed by your exchange, as a shortcut for pressing **F5** then **F2**. If you haven't finished typing the call yet, press **Ins** anyway, and then complete the callsign. *CT* will notice any characters that you add to the call beyond those it has already sent.

4 **Press F10 to see whether the QSO would be a dupe, and whether you need the station for a multiplier on another band.**

To clear the logging line in case of a dupe, press **Alt–W**. If you discover a dupe before pressing **Ins**, you may prefer to send a "QSO before" message by pressing **Alt–F7**.

5 **When you have copied the station's report, press the + key on the keypad.**

The + key sends the confirmation message and adds the QSO to your log, as a shortcut for **F3** and <**Enter**>. If you have edited the callsign after sending your exchange, you should press **F5** before + to send the corrected call.

Note   The behavior for steps 4 and 5 can be customized using the **WorkDupes/ NoWorkDupes** *and* **Correct/NoCorrect** *text commands pairs.*

Search-and-Pounce

This term is more contest jargon, and applies to the opposite of running, where you are tuning around answering other stations' CQs.

1 **When you hear a callsign, type part of it into the callsign field and press F8 or F12 to run the Check Partial function.**

Check Partial shows a list of calls that match your partial call, with highlighting to show calls that you need. You could, of course type the whole call and

use the Check Call function, **F9**, but using Check Partial usually saves you time.

2   **If you need the station, press F4 to send your call.**

If you don't need the station, press **Alt–W** to clear the callsign field and keep tuning.

3   **After copying your report, press F2 to send your exchange and press \<Enter\> to add the QSO to your log.**

If you have just worked a relatively rare multiplier, announce it by pressing **Alt–F3**.

Grabbing a Spot   Assume that you have both a packet TNC and your radio interfaced with *CT*, and a multiplier that you need is announced. *CT* will beep and show you the announcement on the message line below the logging line.

1   **Press Alt–F4 to send your radio to the multiplier's frequency.**

Be sure to listen for the announced station *before* you transmit, because some radios and/or operators generate incorrect frequencies. *CT* fills in the callsign field for you, but be sure to verify the callsign yourself. If you don't, the QSO is invalid, since you don't really know who you worked.

2   **Press F4 to send your call.**

If you feel the need, you can press the key many times to send your call many times. Press **Esc** to abort the message.

3   **After copying your report, press F2 to send your exchange and press \<Enter\> to add the QSO to your log.**

Or, use **Ins** to send *hiscall* and your exchange, and to log the QSO with one key press.

4   **Press Alt–F4 to return to your original frequency.**

If you want to stay on the new frequency, perhaps because you just changed bands, press **Alt–F5** instead to clear the announce function. If you forget to do this, the next time you try to grab a spot you will return to the original frequency instead of the new announcement frequency.

Passing a Multiplier   Here's how to alert an another operator on the *CT* network at a multi-transmitter setup that you have sent a station to his frequency.

1   **Tell the multiplier the QSY frequency.**

Press **Alt–J** to see the frequencies of all radios on the network.

2   **Press Alt–G, type the alert, press <Enter>.**

For example, you might type `7Q7XX coming to 3501`.

3   **Press Alt–I to hide the Multi Talk window.**

The source for talk messages is automatically identified by the station number that you assign to each computer in the *CT* Information Sheet.

Preparing Contest Reports

Contest sponsors usually require that you submit your entry on paper in a particular format. *CT* helps you create these reports.

*Note   Before you do anything else after the contest, make a copy of the log file, contest.*BIN*, on a floppy disk. If you make a mistake while preparing the reports, you can always copy the file back from the floppy and start over.*

Files Created by *CT*

CT creates several files in your contest directory during the contest. For example, if you name the log file for a CQ World-Wide DX Contest `CQWW91`, the files `CQWW91.BIN`, `CQWW91.ZON` and `CQWW91.BAD` will be created. The first file contains the contest log in a special binary format. The other two files are text files that identify suspicious zones and callsigns in the log file. You need to resolve the errors noted in these files before *CT* can compute a reliable score for your entry.

Note   Use any text editor to review and modify CT text files. You can also use most word processors, if you learn how to save files in text format.

Combining Multi-transmitter Logs

Each computer in a multi-transmitter network has its own copy of the log. The log files might contain different QSO information if, for example, the computer network fails during the contest. The `MERGE` utility program combines two binary log files into one new log file, automatically resolving any discrepancies. If you have more than two logs, use `MERGE` on two at a time, using the output of each step as one of the inputs for the next step.

Fixing Unknown Multipliers

If *CT* cannot determine the multiplier for a QSO during the contest, it saves a copy of the QSO in the *contest.*BAD file. You need to resolve each of these QSOs before your final score is computed, either by augmenting the appropriate multiplier file, or by modifying the QSO in the log file.

Editing Logs

To modify your log after the contest, restart *CT* using the log file.

Note   Never try to edit the binary file with a text editor. If you must, convert the log to a text file using the B82R *utility program.*

Normal logging mode supports navigation through the log to find and modify QSO information. If you need to modify times or dates, use the Post-contest mode, described in *Post-contest Mode* on page 75. If you want, you can also

remove all dupes from the log using the **RmDupes** text command. Once you have a clean log, you can generate a wide variety of reports.

Making Reports   *CT* has many text commands for preparing different reports. Most of these commands begin with the word Write, because the result is a file, rather than a printout. For example, **WriteLog** generates a sequence of text files containing your log, summary sheet, and various other breakdowns of your contest entry. See *Preparing the Paperwork* on page 72 for a discussion of all of the possibilities.

Note   Use DOS facilities to print the text files. CT does not support output directly to a printer, except for the **PrintMult** *command.*

QSL Labels   To prepare labels for specific QSOs, start *CT* with the log file and use the QSL mode as described in *QSL Mode* on page 76. To prepare labels for the entire log, use the QSL utility program as discussed in *Preparing QSL Labels* on page 93. This program compares the log entries against a master QSL database and prepares labels for stations that haven't already been sent cards.

Hardware Installation

The only equipment that is required to use *CT* is a personal computer, although more traditional amateur radio gear is helpful for actually making QSOs. The program supports a wide variety of optional configurations that can integrate CW keying, Digital Voice Processor (*DVP*) control, radio frequency control, packet TNCs, and multiple computer networks. This chapter describes how to set up the hardware, including suggestions for circuits to key radios and voice keyers.

Computers   *CT* runs on color or monochrome IBM PCs or clones. Version 9 requires a hard drive and at least 2MB of random access memory (RAM), and runs on 80386 machines or above.

To enjoy *CT*, you *must* a have quiet computer, one which does not interfere with radio reception and which is not susceptible to interference from your radios. Be sure that these hardware problems are solved *before* the contest!

Memory   *CT* uses extra memory in your computer to increase the log size — you gain approximately 16,000 QSOs per megabyte. *CT* uses extended memory, not expanded memory. Most of the 386-based expanded memory managers, including EMM386 (which comes with DOS5), QEMM386 and MAX386, provide either expanded memory or extended memory on demand. *CT* should find what it needs if one these memory managers is running.

Another user of extended memory is a ram disk. The DOS5 ram disk (RAMDRIVE.SYS) has a size parameter, just like SMARTDRV. A typical RAMDRIVE line is:

```
device=c:\dos\ramdrive.sys 1024 /e
```

This means "setup a ram disk using 1024K of extended memory." Be sure to leave enough memory for *CT*.

Date and Time   *CT* uses the computer's clock to date and timestamp your log entries, and assumes that the clock is set to UTC. If you want to set the clock for another time zone, you can use the TZ environment variable to tell *CT* the size of the offset between that time zone and UTC. For example, putting the line

```
set tz=est5
```

in your AUTOEXEC.BAT file declares that the computer clock is set to Eastern Standard Time, 5 hours behind UTC. The numbers after the first three letters

determine the offset from UTC in hours or hours and minutes. Use a minus sign for time zones that are ahead of UTC (east of the Greenwich meridian), and a colon to separate hours and minutes. For example

```
set tz=xyz-6:27
```

tells *CT* that the computer clock is 6 hours, 27 minutes ahead of UTC. The letters for the time zone are ignored, and *CT* does not adjust for daylight savings time.

Color Monitors   Plain-vanilla monochrome screens and color screens should work just fine with no operator intervention. The strange and murky world of LCD displays, black and white emulating color, ATT, and other combinations can cause unexpected results. There are two DOS commands which set up the display hardware: MODE BW80, and MODE CO80. Try one of these commands before running the program if the screen doesn't look reasonable with the default. You can ask the program to use a limited color set by using the -L option when starting the program. See *Command Line Switches* on page 33 for an explanation. For example,

```
CT CQWW91 -L
```

starts *CT* with the CQWW91.BIN log file in limited color mode.

The normal screen height holds 25 lines of text. *CT* version 9 can use the higher resolution of VGA displays to double this to 50 lines. To enable 50-line mode, start *CT* with the -VGA command line switch:

```
CT CQWW94 -VGA
```

Mouse Support   *CT* supports a Microsoft-compatible mouse, automatically detecting the presence of a mouse driver. *CT* windows can be moved and dismissed with the mouse. To move a window, place the cursor over the window, hold down the left button, and drag the window to the desired position. The window position is saved in the header of the contest BIN file after each move. To dismiss a window, place the cursor over the window and click the right button. Some windows, such as the date and time, can not be moved or dismissed.

Serial Ports   CT communicates with most external devices using up to eight serial communications ports. Most PCs have zero, one or two serial ports, so you may need to add serial ports to your system. The standard assignments are given in Table 1. If your hardware configuration has different assignments, it is a simple matter to modify the default mappings in the appropriate COMTSR program, as discussed in *Terminate-and-Stay-Resident Software* on page 25.

Table 1   Serial Communications Addresses and IRQs

Port Name	I/O Address	Interrupt Request
COM1	3F8	IRQ4
COM2	2F8	IRQ3
COM3	3E8	IRQ2
COM4	2E8	IRQ5

Table 1   Serial Communications Addresses and IRQs

Port Name	I/O Address	Interrupt Request
COM5	280	IRQ10
COM6	288	IRQ11
COM7	290	IRQ12
COM8	298	IRQ15

Parallel Ports   *CT* uses up to two parallel ports to control external equipment. The signals are summarized in Table 2.

Table 2   Parallel Port Control Signals

Pin	Signal
2	Band bit 0
7	Band bit 1
8	Band bit 2
9	Band bit 3
3	Digital voice keyer bit 0
4	Digital voice keyer bit 1
5	Digital voice keyer bit 2
6	Digital voice keyer bit 3
1	Strobe
14	Radio select
16	Push to talk
17	CW key

Use of the Band bits is discussed in *Antenna Relay Control* on page 22. The Digital voice keyer interface is described in *Voice Keyer Control* on page 20. The radio select bit is toggled by the **Alt–.** function, discussed in *Radios* on page 20. The Push-to-talk and CW key bits are described in *CW Keying* on page 18.

Digital Voice Processor   The $\mathcal{DVP}$ board installs easily in any 8 bit slot in your computer. Here's the step-by-step procedure:

1   **Turn off the computer and disconnect the power cord.**

2   **Remove the cover.**

On most PCs, the cover is attached to the rear panel with 5 screws. Take out the screws and slide the cover towards the front of the computer, being careful to avoid snagging internal wiring.

3   **Choose an empty slot and remove the cover plate on the back panel.**

The cover plate is held with a single screw near the top edge of the back panel. Keep the screw!

4   **Insert the $\mathcal{DVP}$ board.**

Touch the PC power supply and set the electrostatic bag containing the $\mathcal{DVP}$ board on the power supply, so everything is at the same potential. Take the board out of the bag and insert the edge connector into the socket on the PC mother board. Use the screw that held the cover plate to fasten the $\mathcal{DVP}$ board to the back panel.

5   **Replace the cover and power cord.**

The $\mathcal{DVP}$ connects between your microphone and your transmitter microphone input, and between you receiver headphone output and your headphones. Cables are available with the correct plugs and jacks for ICOM, Kenwood, and Yaesu radios, or you can buy a cable with just the $\mathcal{DVP}$ plug wired up and add your own audio connectors. When the computer is powered off, or if *CT* is not running, relays on the $\mathcal{DVP}$ board bypass the internal circuitry so you don't have to change the microphone and headphone connections.

CW Keying   Morse code is sent by keying the DTR line of any of the four serial communications port, or the STATUS line of a parallel printer port, LPT1 or LPT2. The circuit needed to key positive-keyed radios from COM1 or COM2 is a 1K resistor from DTR (pin 20 on a DB25, pin 4 on a DB9) to the base of an NPN small signal transistor (for example, a 2N4401, a 2N3904, etc.). The emitter of the transistor and the ground lead of the transmitter keying cable are connected to signal ground (pin 7 on a DB25, pin 5 on a DB9). The collector of the transistor is connected to the transmitter keying cable (hot, not ground side).

Figure 1   Interface Circuits for Positive CW Key Lines
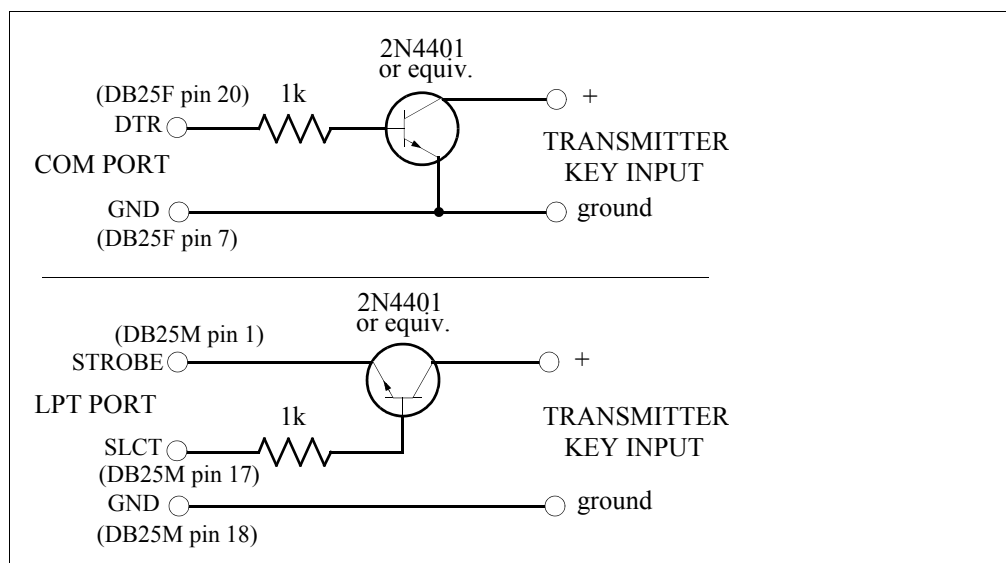
The circuit needed to key positive-keyed radios from LPT1 or LPT2 is a 1K resistor from SLCT (pin 17 on a DB25) to the base of an NPN small signal transistor (for example, a 2N4401, a 2N3904, etc.). The emitter of the transistor is connected to Strobe (pin 1 on a DB25). The ground lead of the transmitter keying cable is connected to signal ground (pin 18 on a DB25). The collector of the transistor is connected to the transmitter keying cable (hot, not ground side).

CT also provides a PTT (push-to-talk) control signal on the parallel ports, which is asserted one baud (dot period) before CW sending begins. This provides time for amplifier relays to close before RF arrives from the transceiver, in cases where the amplifier switching is slow or the transceiver sequencing is poorly designed.

See *Parallel Port Control Signals* on page 17 for the port pinout.

K3KU Interface Art Boyars, K3KU has created a CW keying interface circuit which first appeared in the February 1990 PVRC newsletter. His article is printed below, with permission of the author.

Here's a circuit which will key either positive or negative voltage lines (i.e., either your +12 VDC transistorized rig or your –60 VDC grid block transmitter).

Figure 2   Universal CW Keying Interface by K3KU
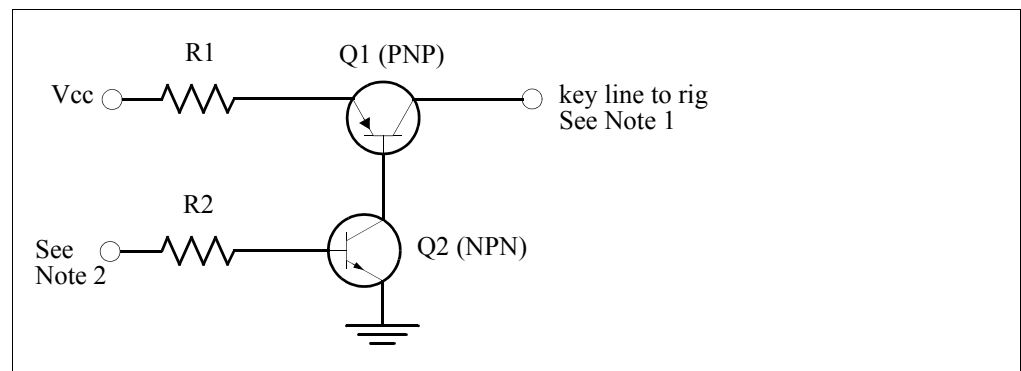
For –VDC (grid block) keying, when Q2 is driven (ON), it sinks base current from Q1, which switches on. With both transistors saturated, the key line is within a few tenths of a volt of ground. R1 is chosen so that enough emitter current is supplied from the Vcc source to drive the key line, typically about 2mA for grid block keying. For example, for Vcc = +5V and i = 2mA, R1 should be about 2.2k or so.

For +VDC keying, Q1 does not act as a transistor! It's collector-base junction just acts as a diode, conducting key line current down to the Q2 collector. The small penalty is that Q2 also has to pull the Vcc/R1 current. This wasted current won't matter unless you are trying to run flea power. R2 is chosen to get enough base drive to saturate Q2. It doesn't take much, and even a CMOS output can probably do the trick. Q1 has to have a high enough breakdown voltage rating to handle the VDC. Q2 only has to be rated at the +VDC.

If you have a negative input signal and negative Vcc, just make Q1 NPN and Q2 PNP. In that case, both transistors need to handle the higher voltage.

Note 1

Will key either transistor or grid-block keyed transceivers. +Vcc is 5-12 volts. R1 is approximately Vcc/2 in kohms. Art used Vcc = 9 vdc, R1 = 4.7k and R2 = 2k. You could use Vcc = 12 vdc, with R1 = 6k for convenience, since many shacks have 12 volt supplies readily available.

Note 2

For a serial communications port, R2 goes to the DTR line, (DB25F pin 20). For a parallel printer port, R2 goes to SLCT line (DB25M pin17), and the emitter of Q2 goes to the Strobe line (DB25M pin 1), rather than ground.

Using an External Keyer

Use a Y connector to retain the use of your electronic keyer, bug, or straight key. Many operators set their keyers a few WPM slower than the *CT* CW speed for instant QRS. Others find it handy when they have screwed up the entry of the callsign into the computer, and it'll take too long to retype the callsign — with the consequence that the contact might get away.

Note   CT does not *interface with computer-controller Morse code boxes. None of the available units has the necessary functionality to support all of the CT features.*

Voice Keyer Control

CT supports the standard created by the NA program for starting voice keyer memories from the computer keyboard through a printer parallel port. The documentation for the NA circuit reads:

"NA has the capability to trigger four memories of an outboard voice keyer through the LPT1 port. The exact implementation of an interface will depend on your particular keyer, but the example circuit should be typical. Q1 thru Q4 are four garden-variety NPN transistors (2N4401, 2N3904, etc.)."

Mike Griffin WE6G also published a nice circuit, powered by a 1.5 volt battery, in the March/April 1990 issue of NCJ, page 25.

Radios

CT communicates with some Yaesu, ICOM, TenTec, and Kenwood radios through the manufacturers' computer interface and a computer serial communications port. A complete list of computer-aware radios that *CT* supports is shown in the Radio popup menu, see *Radio Popup Menus* on page 42 *CT* version 8 uses TSRs provided by K1EA to configure communications ports. See the discussion in *Terminate-and-Stay-Resident Software* on page 25 for complete information. Refer to your transceiver interface documentation for instructions on setting up the computer to radio connections. There are no standards for computer controlled radios, so some of the *CT* functions may not

Figure 3   Voice Keyer Interface Circuit for NA
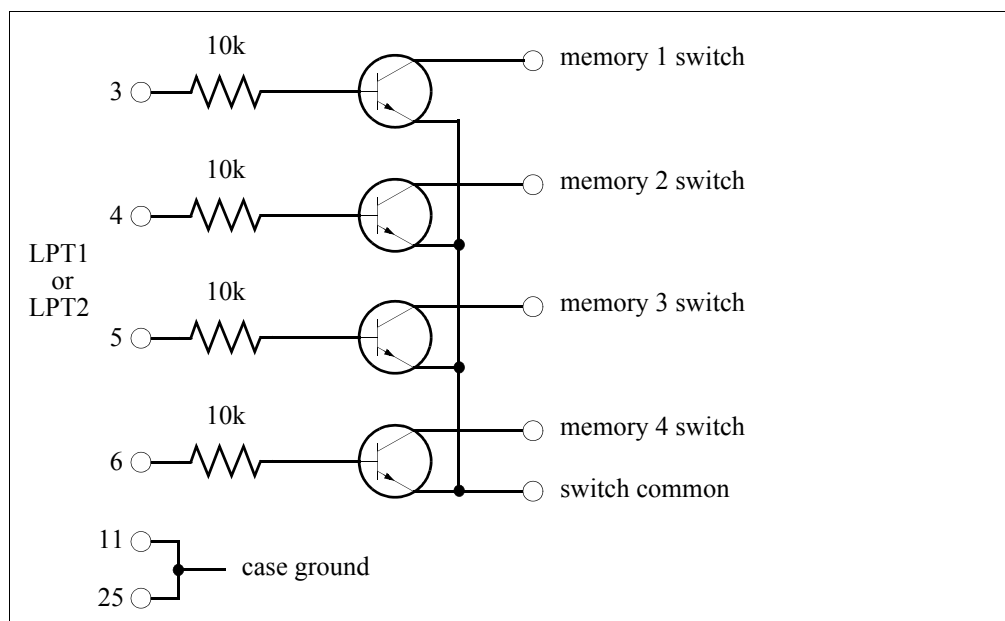
work with some radios. Harass the manufacturers, not K1EA — your input *does* have an effect!

When *CT* is controlling two radios, you need a way to determine which radio is being used to make the current QSO. Either "Radio 1"or "Radio 2" is displayed above the logging area, to the left of the current time display. Press **Alt–.** (Alt and the period key) to toggle between the two radios. This also toggles the Radio select pin on the LPT1 port (and the LPT2 port if you have one), so you can switch other equipment betweeen the radios such as a keyer or headset. See *Parallel Port Control Signals* on page 17 for the port pinout.

Rotators   Some rotators support computer control via serial communications. Those supported by *CT* are listed in the Rotor pop up menus on the Information Sheet, described in *Rotor Popup Menus* on page 42. Use the Setup window, discussed in *Communications Setup* on page 44, to define which serial ports are attached to rotator. Refer to the rotator documentation for details on the wiring between the rotator and computer.

Packet TNC   *CT* can talk to a TNC via any one of your computer's serial communication ports. Configure your TNC to: no parity, 8 data bits (AWLEN 8), 1 stop bit, ECHO OFF. *CT* version 8 uses TSRs provided by K1EA to configure communications ports. See the discussion in *Terminate-and-Stay-Resident Software* on page 25 for complete information. The DRSI PC•Packet Adapter, an internal TNC for IBM PCs, is also supported. Be sure to run TNCTSR-S, provided by DRSI, before starting *CT*. This resident TNC driver is required by the

PC•Packet Adapter. Also, you must tell *CT* about the TNC using the **DRSI** text command.

Antenna Relay Control

Starting *CT* with the `-AC` command line switch provides the current band information on the `LPT1` output in BCD format. This does not conflict with other uses of `LPT1` such as transmitter CW keying or external voice keyer control. Call Top Ten Devices at 610–935–2684 or write them at 143 Camp Council Road, Phoenixville, PA 19460.

CT Network

CT supports multi-transmitter setups by interconnecting several computers in a linear daisy chain using your computer's serial ports. Each computer receives and sends information to one or two neighbors, which then take care of passing information further along the chain. The network connections must not be circular: the computers at the ends of the network communicate with only one neighboring computer. Up to 16 computers can be linked.

Each computer keeps a complete copy of the log which is updated via serial communications lines when other computers log or update QSOs. The advantages of multiple, independent copies of the log are safety, speed and software simplicity. The potential disadvantage is loss of consistency: if a computer is off line when a QSO is made, or is disconnected from the network by an off-line neighbor, its log will not contain that QSO. The distribution disk includes a program, `MERGE`, which makes the logs consistent after the contest.

Bus Topology

To illustrate how to set up a *CT* network, we'll start with the easiest case — two computers.

1 Identify the serial communication ports on each computer.

You have to know the software identity, such as `COM1` or `COM2`, for each of the serial port connectors. Trying to establish network communications by trial-and-error is very difficult because there are too many things that can break the connection.

2 Choose serial ports on each computer to be the network ports, and connect them with a null modem cable.

A null modem cable has pins 2 and 3 crossed over. Some null modem cables also have pins 4 (RTS) and 5 (CTS) and Pins 6 (DSR) and 20 (DTR) crossed over. These are the preferred cables because *CT* supports the full implementation of hardware handshaking. Null modem cables are available at computer stores (including Radio Shack), or can be built using a standard RS-232 cable and a null modem adapter (also available at Radio Shack).

3   Configure a TSR for the serial communications port on each machine.

CT Version 9 uses TSRs provided by K1EA to configure communications ports. See the discussion in *Terminate-and-Stay-Resident Software* on page 25 for complete information.

4   Start *CT* on each computer and set the Station Numbers in the Information Sheet.

Both computers must choose the same mode in the Mode popup menu in the Information Sheet. It doesn't matter what number you choose for the Station Number, as long one of the computers is Station Number 1 and every computer in the network has a different number.

5   In the Communication Setup screen for each computer, set the Device to NETWORK for the Com Port that you have connected to the other computer.

See *Communications Setup* on page 44 for details.

6   Test the network using the Network Gab function.

Press **Alt–G** on either computer to open the Gab window. Type a message and press <**Enter**>. The Gab window should open on the other machine, showing the message prefixed by the station number. As an additional test, log a test QSO on each computer and observe that the QSO is forwarded to the other machine.

To configure networks with more than two computers, the best approach is to repeat the steps above, adding one computer at a time. Computers not at either end of the chain have two serial communications ports connected to other computers, and thus require two TSRs and two NETWORK devices in the Communications Setup screen.

Both logging information and packet data are distributed to all computers, so only one packet TNC is needed in the network. The TNC can be connected to any computer in the chain, and all other computers must select Remote in the TNC popup menu in the Information Sheet (See *TNC Popup Menu* on page 40).

Star Topology   An external device is needed, [and some expertise to describe how to set this up.]

RFI Considerations   If you have difficulty with RF from your transmitter getting into your PC, or if your PC appears to be creating RF noise which is being picked up by your antenna or receiver, you may need to implement one or more of the following interference reduction techniques.

1   Use shielded cables.

Confirm that you are using shielded cables to and from all PC peripherals and that all keying and control wiring to and from your station equipment is properly shielded and filtered.

2   Use a shielded PC cabinet.

Make sure that the cover is metal or metal-coated plastic, and that all the screws are in place to tightly join the cover to the rest of the case.

3   Examine the PC power supply filtering.

The vast majority of IBM-compatible PCs use a switching regulator power supply design which generates RF energy as a by-product of steep transient waveforms. Many (perhaps most) of these power supplies no longer include adequate filtering on the primary AC line cord terminals, with the result that your computer's line cord and your house wiring become an antenna for hash generated inside the PC. If your computer monitor is powered by your PC, its line cord is also part of the antenna system. A simple way to determine if the power supply is a source of interference is to disconnect all peripherals from the PC, then power it on and off while listening on each band.

If your PC is out of warranty and you are comfortable with discrete component breadboarding and soldering techniques, you can fix this interference source yourself by removing the power supply and its cover, and adding a filter inside the supply. A simple, effective filter is a bifilar-wound toroid inserted in the two hot AC input leads reasonably close to the AC socket terminals, with high voltage bypass capacitors from each terminal to the chassis ground. Use as many turns of light-duty zip cord as you can thread through a Txxxx toroid or larger (PCs draw only and amp or so of primary line current). In many PC power supplies, you can even see empty solder holes, and sometimes even silk screening) for the line filter that was supposed to be there!

Software Installation

This chapter describes installing the software from the distribution diskette, configuring terminate-and-stay-resident (TSR) programs for use with the $\mathcal{DVP}$ and serial communications ports, and customizing database files.

Installing on a Hard Disk

The distribution diskette contains an automatic installer. Insert the diskette into drive `A:` and type `A:install`. If your 3.5 inch floppy device is drive B, type `B:install`. The installation program will ask you to specify the drive and directory where you would like *CT* installed. Once the selection is made, it will copy and unpack all the files that are needed to run and support *CT*.

Terminate-and-Stay-Resident Software

Five terminate-and-stay-resident (TSR) programs are provided with *CT*: `DVPTSR`, `COMTSR1`, `COMTSR2`, `COMTSR3`, and `COMTSR4`. You must load TSRs before you start *CT* and unload them in reverse order after you're done using *CT*, but you can stop and restart *CT* without unloading and reloading the TSRs. Use only the TSRs that correspond to physical devices. For example, if you don't have a $\mathcal{DVP}$ yet, you don't need to load `DVPTSR`. The best way to handle TSRs is to use a batch file as discussed in *Loading and Unloading TSRs* on page 28.

$\mathcal{DVP}$ TSR

The TSR driver for the Digital Voice Processor board has no parameters. Load the TSR by typing its name:

```
DVPTSR <ENTER>
```

A small window appears confirming that the TSR has loaded successfully:

```
Digital Voice Processor
        by K1EA
   DVPTSR 1.01 Installed

   IRQ            - 7
   Software int - 60h
   Port address - 308h
Use -H switch for Help
```
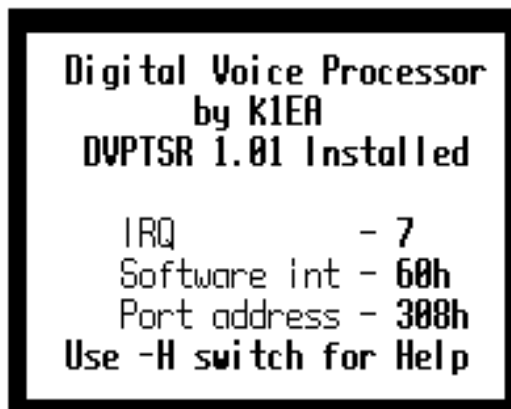
Unload the TSR using the `-U` switch:

```
DVPTSR -U <ENTER>
```

Switches are also called options in this manual. If there is a problem in loading or unloading the TSR, an error message will appear as discussed in *Serial Communications Port TSRs* on page 27. The -H Help switch shows all of the available options for the TSR and the usual values for the communications parameters:

```
  Digital Voice Processor
        by K1EA

-H     This help window
-I     IRQ number (7,5,2)
-A     Base address (308h)
-C     Software int (60h)
-U     Unload TSR
```
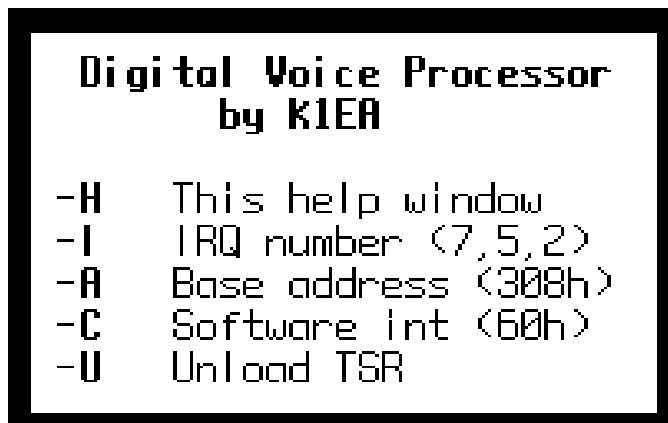
Explaining the IRQ, address, and interrupt parameters is beyond the scope of this manual. Fortunately, very few of you will need to alter the defaults. See the discussion about the serial port TSRs for instructions on how the change the parameter values.

The *DVP* TSR provides access to *DVP* functions from any program, including the DOS command prompt, using hot keys.

Record Immediate — Ctrl–Alt–R
Records to file TMP.DVP in the current directory.

Play Immediate — Ctrl–Alt–P
Plays *name*.DVP to the headphones.

Send Immediate — Ctrl–Shift–P
Plays *name*.DVP to the transmitter.

Record *n* — Alt–*n*
Record from microphone to file Tn.DVP in the current directory, for n equal to 1, 2, …, 0.

Send *n* — Ctrl–*n*
Send to transmitter from file Tn.DVP in the current directory, for n equal to 1, 2, …, 0.

CT supports all of theses functions and many others as well.

Serial Communications Port TSRs

The driver programs for the serial ports have several parameters. The parameter settings are displayed when you load a driver, like this:

```
COMTSR1 <ENTER>
```

```
Communications TSR
COMTSR 1.02 Installed

Port         - COM1
Baud rate    - 9600
IRQ          - 4
Data format  - N81
Flow control - NONE
Software int - 61h
Port address - 3f8h

Use the -H switch for Help

Copyright 1992 by
Harvard Radio, Inc.
```
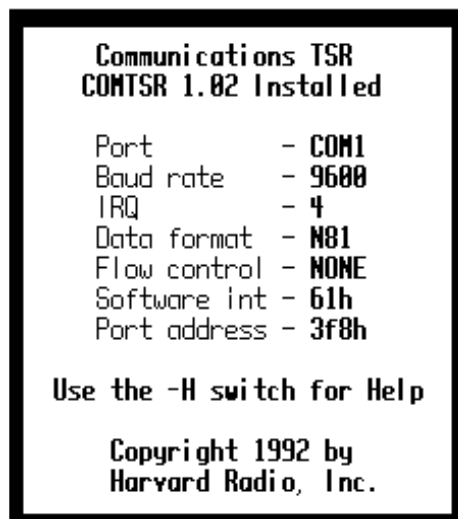
You can change the parameters by adding options on the command line. If you forget what the options are, you can use the -H option to show this display:

```
COMTSR1 -H <ENTER>
```

```
Communications TSR
Harvard Radio, Inc.

-H      This help window
-P      Comm port number (1 - 4)
-B      Baud rate (1200 - 38400)
-I      IRQ number (4, 3, 2, 5)
-A      Base address (3F8, 2F8, 3E8, 2E8)
-C      Software interrupt (61 - 64)
-U      Unload TSR from memory
-N81    No Parity, 8 Data, 1 Stop
-N82    No Parity, 8 Data, 2 Stop
-E71    Even Parity, 7 Data, 1 Stop
-RTS    Flow control RTS/CTS (Pins 4, 5)
-DTR    Flow control DTR/DSR (Pins 6, 20)
-XON    Flow control XON/XOFF (software)
        Example: -P2 -B38400 -N81 -I3
```

The default settings are usually appropriate, except for the baud rate. When you make a change, the new setting becomes the default, so you don't have to customize the parameters every time you load a serial port driver.

Note   The Yaesu FT1000D and many Kenwood transceivers require N82 *for the parity, data, stop settings.*

Loading and Unloading TSRs

When you unload TSRs, using the -U option, you must remove them in the opposite order that you installed them. If you use the wrong order, you will get this error message:

```
COMTSR could not be removed from memory.
```

If you try to load a TSR that is already running, you will get this message:

```
Error - TSR already present.
Use the -U switch to unload.
```

To avoid these mistakes, you should create a batch file (also called a command file), that loads your TSRs, starts *CT*, and unloads the TSRs after you exit *CT*. This example loads three serial communications port TSRs, setting the baud rate for the third port, and the *DVP* TSR:

```
COMTSR1
COMTSR2
COMTSR3 -B9600
DVPTSR
CT -now ww98cw
DVPTSR -U
COMTSR3 -U
COMTSR2 -U
COMTSR1 -U
```

Put these commands in a file named ww98cw.BAT in your *CT* logging directory. Then, if you have set your search path following the instructions in *Installing on a Hard Disk* on page 25, you can start or restart your CQWW 1998 CW log by typing

```
WW98CW <ENTER>
```

When you use the -U option, the other TSR options are irrelevant. It is a good idea to unload the TSRs if you won't be needing them soon, because they can generate output to your screen even when *CT* is not loaded.

Modifying Database Files

CT uses database files to look up prefix, country, and section information, depending on the contest. These database files are text files, so you can use a text editor, like the PC DOS E Editor, to update them. Do not use a word processor, like Word, to edit these files unless you know how to save files in ASCII format.

The CQWW.CTY, ARRL.CTY and IARU.CTY files have been merged into one database, CTY.DAT, which contains CQ zones, IARU zones, standard latitude/longitude, and continent. Specific prefixes or stations may be manually added to any of the country lists. Manually-added data will supersede the default data.

Note   AD1C maintains an up-to-date version of CTY.DAT *that is easily accessible on the CT web site.*

Special characters are used to override different information:

*   At the start of a primary prefix — ignore this country in ARRL DX and IARU contests.

(*n*) After the prefix — use *n* as the zone in CQWW contests.

[*n*] After the prefix — use *n* as the zone in IARU contests.

{*XX*}
After the prefix — use *XX* as the continent, where *XX* is AF, AS, EU, NA, OC, or SA.

<*lat/lon*>
After the prefix — Use *lat* and *lon* as the latitude and longitude in decimal degrees. The range of latitude is –90° to 90°, positive in the Northern hemisphere. The range of longitude is –180° to 180°, Positive to the west of the Greenwich meridian.

*Note   There is a new text command, **SetLat**, which opens a window to set your own latitude and longitude. The data that you enter is stored in the header of the contest* BIN *file. You can also set your location in your* CT.CFG *file, see Configuration File on page 35*

Examples:

```
BY3G(23)zone 23 for CQWW
BY3G[33]zone 33 for IARU
BY3G(23)[33]both of the above
BY3G{OC}continent is Oceania
BY3G<45.0/-60.0>location is 45° North, 60° East
```

If you work a country that your multiplier list does not recognize, you can repair the log after the contest with no ill effects except in the European DX Contest. In this case, *CT* won't permit you to include the QSO in a QTC.

Version 7 and later support updating multiplier files on the fly while in a contest. The following example demonstrates this feature.

You work 2WABC and *CT* fails to recognize the prefix, alerting you by filling the multiplier field with / characters. You question the station, who tells you that the country is Wales. Position the cursor in the call field of the next logging line and type 2W=GW <ENTER>. The country file is immediately updated, and the QSO with 2WABC is scored appropriately.

It is not possible to change an equivalence after it is entered from within *CT*, so be careful. Also, you can not create an equivalence for a country that isn't already in the database file, so it is important to keep the database reasonably current.

Modifying the Sweepstakes Section File   Section abbreviations for the ARRL Sweepstakes are defined in the SEC.DAT file. The file format is similar to the multiplier files used for DX contests:

```
CT:CT, CN, CON;1
EMA:EM;1
ME:ME, MAI;1
```

The first field contains the standard abbreviation for a section. The second field contains other abbreviations for the section. The third column contains the section's call area, used for organizing the multiplier display. Sections outside the "lower 48" are assigned the call area DX, and CRRL sections are denoted by VE. (This check-off list format was invented by K2KIR and subsequently adopted by the ARRL.)

Startup and Initialization

The Information Sheet and the Communications Setup window are used to supply information needed by *CT* to construct your log and to communicate with external devices. The Information Sheet is displayed when *CT* first starts up. The Communications Setup window appears after the initialization messages, which follow the Information Sheet.

Running CT under MS-DOS

The program is run by typing

    CT *contest*

where *contest* is a base file name of your choosing. If the file *contest*.BIN is found in the current directory, *CT* opens it; otherwise it is created as a new empty logging file. The string that you choose for *contest* should contain only letters and numbers, and should have no more than eight characters.

Note   The TSRs needed for your DVP board and serial communications ports, if any, must be loaded before you start CT. See Terminate-and-Stay-Resident Software on page 25.

Search Path

If *CT* doesn't find the necessary multiplier files in the current directory it looks in the directory specified by the environment variable CTPATH, if it exists. You can set CTPATH in your AUTOEXEC.BAT by adding a line like

    SET CTPATH=C:\CT

Of course, *CT* can be run from any directory, as long as the directory containing CT.EXE is listed in the system PATH search list.

DVP Considerations

The *DVP* uses your hard disk intensively. You can reduce the wear-and-tear on the drive by putting the most-used voice files in a RAMdisk, assuming you can spare the memory. *We strongly urge you to do this,* even if you need to buy more RAM.

Note   Because the DVP with CT can quickly fill your entire hard drive, we urge you to make a backup of all valuable files on your hard drive.

To make it as easy as possible to use RAMdisk, *CT* looks for a special environment variable, DVPPATH, and automatically copies voice files into the directory pointed to by the variable. Whenever you change one of the files in the RAMdisk, *CT* automatically makes a copy on the hard disk. Here's how to set up to use a RAMdisk.

1   **Create a RAMdisk, for example, by adding this line to** CONFIG.SYS:

```
device=c:\dos\ramdrive.sys 1024 512 64 /e
```

If ramdrive.sys is not in C:\dos, change the path appropriately. The three numbers are total size (1024 kilobytes), sector size (512 bytes), and maximum number of files (64). The /e option means use expanded memory. To use extended memory, replace /e with /a in the example.

2   **Tell *CT* where to find the RAMdisk by adding a line like this to** AUTOEXEC.BAT:

```
set DVPPATH=d:
```

The letter for the RAMdisk device (d in the example) must be the one following your highest existing device. For example, if you have devices e: and f: already in you system, the RAMdisk would be device g:.

When *CT* loads, if it finds DVPPATH in the environment it copies all of the voice message files and the alphanumeric phonetic voice files into the RAMdisk. If you start the record loop using the **BackCopy** text command, the buffer is also put in RAMdisk. These two actions immensely reduce activity on your hard drive.

Note   Although you could make DVPPATH point to a directory on your hard disk without breaking anything, there is little point in doing so because the disk activity will not be reduced.

Disk cache programs can be used in place of the RAMdisk to achieve some of the reduction in disk accesses. However, these programs are "write-through," meaning that any information written to the cache is also written to hard disk — so the backcopy buffer will still beat on the drive.

CT looks in special directories for various voice files. If you don't have a $\mathcal{DVP}$ board, don't bother reading these bullets — the scheme is pretty complex.

•   The root directory for voice files is DVP. If the environment variable CTPATH is defined, the DVP directory is made relative to the path defined by CTPATH. Otherwise, the directory is made in the current working directory.

•   The root voice directory contains message files associated with the send message function keys; alphanumeric phonetics for the letters A through Z, numbers Ø through 9, and "portable" (/); the buffer for continuous-loop recording and the off-air recording file tmp.DVP. QSO snippets are placed in the current working directory.

•   Prefix and suffix voice files created using the $\mathcal{DVP}$ voice editor in *CT* are stored in 28 subdirectories of the DVP directory. The names of these directories are coded to uniformly distribute the voice files among the 28 directories. This technique is needed to work around the woeful

performance of the Microsoft file system when a single directory has many files.

- If the text command **OpOn** is invoked, *CT* begins looking for the message and alphanumeric voice files in a new place. The new place is a subdirectory of DVP with the same name as the operator's callsign. If the directory doesn't exist, *CT* will create it, but doesn't create any voice files. Each operator must record is own messages and alphanumerics — you probably want to do this before the contest.

- If the environment variable DVPPATH exists when *CT* starts up, the message and alphanumeric voice files are copied to the directory pointed to by DVPPATH (which should be a RAMdisk). If continuous-loop recording is enabled, the buffer is put into the DVPPATH directory — this can substantially reduce hard disk activity. Also, the TMP.DVP file used with the **Ctrl–R** record function is also put in the DVPPATH directory. The **OpOn** command copies the operator's personalized messages and alphanumerics into DVPPATH.

Command Line Switches

CT has several options that control various functions at startup. Add the options after the base file name when you start the program, separated by spaces. All options begin with a minus sign to distinguish them from the file name. For example

```
CT CQWW91 -NOW -NOM
```

starts the software using the log file CQWW91 with the nowait and nomap options. The available options are:

-AC
    Antenna Control — Maintain current band information on the LPT1 output in BCD format. This data can be used to control an automatic antenna switch, such as that manufactured by Top Ten Devices (215–935–2684).

-D Load the MASTER.DTA file, a large database of callsigns used by the Super Check Partial function. This option is obsolete; *CT* now always loads the database.

-DEBUG
    << >>

-DIGI
    << >>

-FO
    For AB6FO — When using the **Rpt** CQ mode, do not stop sending when text is typed into the callsign field. *CT* will stop CQing only when **Esc**, **F4** or + is pressed. This feature is designed for single-ops using two transmitters.

`-HP`

When writing log files for printing, *CT* inserts PCL4 codes for compressed and uncompressed text, for use with HP printers.

`-KY1H`

Displays distance in the Check Country window in addition to heading, sun rise time and sun set time.

`-L` Use limited colors. Useful for laptops.

`-LOOP`

<< >>

`-LTA`

<< >>

`-LZ`

Leading Zeros — Add leading zeros to serial numbers below 100. For example, 7 becomes 007, and 34 becomes 034. The **CWAbbrev** command will turn all zeros into Ts. There is no way to have *CT* send QSO number 10 as T10.

`–MO`

Set this computer to send all QSOs to the network and accept only QSOs that are multipliers. Useful for DXpeditions, where the QSO rate might swamp the network. After the contest, use `MERGE.EXE` to combine the logs.

`-NC`

No Com — Use no serial ports. This is useful for looking at logs after the contest on a different computer without having a radio or TNC connected.

`-NF`

No Frequencies. Disables sending radio frequency information to the *CT* network in a multi-transmitter setup.

`-NI`

<< >>

`-NOW`

Skip over the pauses in the Information Sheet, Startup messages screen, and Communications Setup to minimize restart time.

`-ON`

For DL7ON — << >>

`-RESET`

Resets window colors and positions to defaults.

```
-SHARED
    << >>
```

```
-TT
```
For AA6TT — Erase the RST and Info fields when the callsign is completely erased with **Backspace** or **Alt–W**.

```
-VGA
```
Enable 50–line mode, see *Color Monitors* on page 16.

As you enter *CT*, the following screens appear: the Information Sheet, the Startup screen with initialization messages, the Communications Setup window, and then the Logging window.

Exiting CT   Normal exit is accomplished by **Alt–Q**, **Alt–X**, or the **Quit** command. The first two methods ask for confirmation before proceeding, with the option to cancel and resume logging. All log information is saved to disk before the program stops.

Configuration File   When starting a new contest, *CT* will preload configuration information if it finds a file named CT.CFG in the same directory as the program, or in the directory described by the CTPATH environment variable. Each line specifies a tag name followed by a colon and the value for the tag. Here is the list of tag names: Name, Call, Address, Town, State, ZIP, Zone, Club, CQ, Exchange, QRZ, F6 F7, QSOB4, Autosave, Lat, Lon, Pool, Network, Radio, Radio2, Rotor, Rotor2, TNC, Station, Category, DVK, Voice, Phone, Mode, CWPort, Contest.

An example configuration file, EXAMPLE.CFG, is provided with *CT*. Copy the example file to CT.CFG, and edit the copy with a text editor, substituting your own data as appropriate. Here is an example customized CT.CFG:

```
Name:Dick Newell
Call:AK1A
Address:8 Golden Run Rd.
Town:Bolton
State:MA
ZIP:01753
Zone:05
Lat:41.2
Lon:73.3
Club:Yankee Clipper Contest Club
Contest:CQWW
Category:SO
Mode:SSB
Radio:IC765, COM1, 1200
TNC:COM2, 4800
CWPort:LPT1
Network:COM3, 9600
Network:NONE
Station Number:1
CQ:CQ TEST DE KC1EO
EXCHANGE:5NN5
QRZ:TU KC1EO
```

The colons are required, and spaces are allowed but tabs are not permitted. You can comment any line by putting rem or "!" at the start of the line followed by a space. Two Network entries are required, although one or both can be set to NONE. To specify an internal DRSI TNC, set the value of the TNC tag to DRSI. The accepted values the CWPort tag are LPT, LPT2, COM1, COM2, COM3, and COM4. Use the symbol # to insert the QSO serial number in the value for the EXCHANGE field.

A second configuration file, MULTI.CFG, is used to associate station numbers with labels used in various *CT* windows. A example is provided on the installation diskette.

Information Sheet

The Information Sheet contains a number of text fields that you type into at the top of the window, and other fields at the bottom of the window that contain popup lists of choices:

Don't be alarmed if your screen looks different — documentors can never keep up with the programmers. The <**Enter**> key moves from one field to the next in the Information Sheet, and the up and down arrow keys change the choice in a list. In any text field, **Ctrl**–<**Enter**> removes the Information Sheet and starts loading the data files, while **Esc** returns to DOS. The fields are described in the order that they are chosen by the <**Enter**> key.

When you have completed the Information Sheet, proceed by pressing **Ctrl**–<**Enter**>. For some contest types, additional windows will appear at this time to collect contest-specific information. See *Contest-specific Features* on page 77 and following for information.

File Field	The read-only File field is filled in with the name that is given on the command line when *CT* is started. The prefix of the file is generically referred to in this manual as *contest*. The *contest*.BIN file is often called the *log file*.
Call Field	When using *CT* for the CQ World-Wide DX Contest, the Call field is used to determine your country and continent. All QSO points are computed based on this information. For example, NP4A is counted as 2 points if your call is K1EA, but is 3 points for G3FXB. Similarly, ON4UN counts 1 point for G3FXB, but 3 points for K1EA. The Call field can hold as many as 13 characters.
Zone Field	Your zone for the CQ World-Wide DX Contest is taken from the Zone field, rather than deducing it from your callsign. The field has 4 characters.
Name Field	The 29-character Name field supplies information for the Summary printout.
Street Address Field	The 39-character Street Address field supplies information for the Summary printout.
Town Field	The 26-character Town field supplies information for the Summary printout.
State Field	The 2-character State field supplies information for the Summary printout.
Zip Code Field	The 7-character Zip Code field supplies information for the Summary printout.
Club Affiliation Field	The 39-character Club Affiliation field supplies information for the Summary printout.

Contest Type Popup Menu

The choice ARDX means the ARRL International DX Competition from the DX side. The choice WAE is the European DX Contest (it used to be named the Work All Europe). DXPN is the DXpedition mode.

Mode Popup Menu

The choices are CW and SSB. *CT* fills in your report as 599 or 59, and disables the CW features if the mode is SSB. To state the obvious, if **F1**–**F4** won't key the voice keyer, be sure Mode is SSB on the Information Sheet.

Category Popup Menu

The applicable categories depend on the Contest Type:. Table 3 provides a summary cross-reference, but the precise definitions vary from one contest to another. Consult the contest sponsor's rules.

Table 3: Entry Categories for Supported Contests

	SO	SB	SU	QRP	LP	HP	RV	MS	M2	LM	MM
CQWW	✔	✔	✔					✔			✔
C160	✔							✔			
WPX	✔	✔		✔				✔			✔
ARRL	✔	✔	✔	✔				✔	✔		✔
ARDX	✔	✔	✔	✔				✔	✔		✔
AR10				✔	✔	✔		✔			
A160				✔	✔	✔		✔			
SS				✔	✔	✔		✔			
VHF	✔	✔		✔			✔			✔	✔
FD	✔							✔			✔
WAE	✔							✔			✔
DXPN											✔

You cannot see information from a packet TNC in the Single Operator class, although you can make announcements. Single Operator Unlimited is for packet-assisted operations in the CQ World-Wide DX Contest and the ARRL International DX Contest. Single band entrants who use packet spots must submit a log as Single Operator Unlimited. Use the **BandSpot** text command to see spots for only one band during the contest.

TNC Popup Menu
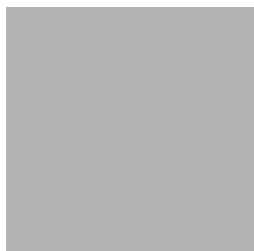
The choices are None, COM, DRSI, and Remote. Select COM if a TNC is connected directly to a serial communications port. Be sure to load the TSR for the serial port (see *Terminate-and-Stay-Resident Software* on page 25), and to identify the port in the Communications Setup window (see *Communications Setup* on page 44). If the TNC is an internal PC•Packet Adapter, select DRSI, use the TNCTSR driver (see *Packet TNC* on page 21), and identify the TNC to *CT* using the **DRSI** text command. If a TNC is available on one of the other computers in a multi-transmitter setup, select Remote. Single operator entries can configure a TNC to put out spots, but *CT* does not notify the single operator of new multipliers, nor allow the single operator to see the spots.

CW Port Popup Menu
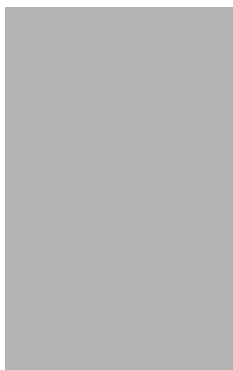
The choices are: NONE, COM1, COM2, COM3, COM4, LPT1, or LPT2. No other configuration is necessary, although you must have loaded the corresponding COMTSR driver if you select one of the serial communications ports. See *Terminate-and-Stay-Resident Software* on page 25.

Voice Keyer Pop Up Menu

This menu selects NONE, LPT1, LPT2, or DVP, for a digital voice keyer. Don't forget to load the $\mathcal{DVP}$ TSR if you select DVP in this menu.

Station Number Popup Menu

The choices are the numbers between 1 and 16. If you choose a multi-transmitter class, you must assign each computer a different station number using the Station Number popup menu, so that the program can record which computer made each QSO. Station Numbers are also used to identify speakers in the Multi Talk window. The computer assigned as Station Number 1 (which must be assigned) distributes date and time to all of the other computers to synchronize the logs.

Radio Popup Menus
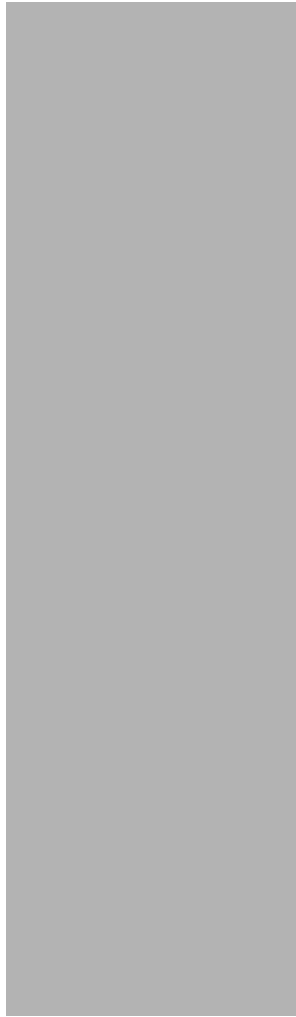
Choose your radios in the two popup menus labeled Radio 1 and Radio 2, and establish their serial communications ports in the Communications Setup window. The corresponding COMTSR programs must have be loaded before running *CT*, as discussed in *Terminate-and-Stay-Resident Software* on page 25. *CT* will complain if the radio does not respond to the program's requests for information.

Rotor Popup Menus

Choose your antenna rotators in the popup menus labeled Rotor 1 and Rotor 2, and establish their communications ports in the Communications Setup

window. The corresponding COMTSR programs must have be loaded before running *CT*, as discussed in *Terminate-and-Stay-Resident Software* on page 25

Startup Display with Initialization Messages

When you exit the Information Sheet with **Ctrl–<Enter>**, a sequence of informational startup messages appears. After the initializations are complete, *CT* pauses so you can read the messages. Review the messages to confirm that you have loaded the correct contest log file, and that there were no errors in loading the database files. Strike any key to continue on to the Communications Setup window.

Communications Setup

The Communications Setup window appears if you have changed your choices for devices that need serial ports in the TNC, Radio, or Class pop up menus in the Information Sheet. The window can be recalled at any time by the Setup text command. The three lists in the Communications Setup window are used to configure the software for the serial ports: Use the left and right arrow keys to move between the Com Ports, Devices, and Baud Rate lists. Use the up and down arrow keys to change the choice in a list. Hit the Esc key to leave Communications Setup without changing the configuration, and Ctrl–<Enter> to save the changes and leave the screen.

The Com Port list shows the current configuration for each serial port. The parameters other than baud rate are set when you configure your TSRs. See *Terminate-and-Stay-Resident Software* on page 25. Devices identified as available in the Information Sheet, including TNC, Radio, and Network, must be assigned to a port in Communications Setup. If you fail to associate a port with a device, *CT* will complain later on the bottom line of the logging screen, with a message similar to "COM port to radio not initialized."

No more than one device can be assigned to the same port, except that the same serial port can be used to control a radio and for CW keying. Unused or uninstalled ports should be set to the NONE device.

No more than one port can be assigned to the same device, except the network device, NETWORK, which identifies ports connected to other computers running *CT*. Each computer in the network must have a different station number.

The Kenwood radios typically use 4800 baud, and ICOM radios use 1200 baud. The Yaesu FT-1000D uses 4800 baud.

Note   If you have an early model of the FT1000 with ROM version less than 6.0, you must contact Yaesu to obtain a upgrade in order to use the radio with CT.

Using *CT*

CT is, first and foremost, a real-time logging program. This means high-performance duping, automatic scoring, and near-perfect protection of log data. It also means a host of handy functions, like quickly showing if the current station is needed on another band. This chapter explains the real-time logging features, and how to use CW and Voice Keyer functions, and the Radio and Packet capabilities.

Before reading this chapter, you may find it helpful to review the nomenclature and typographical conventions in *Using This Manual* on page 2

Basics   You have started and initialized *CT*, right? The steps are given in the previous chapter if you need details.

Note   *One more time: you must load the appropriate TSRs before you start CT. See Terminate-and-Stay-Resident Software on page 25.*

It is prudent to verify the date and time displayed above the log area before logging any QSOs. To correct a date or time error, you can use the **SetTime** text command or exit *CT* and change the computer clock using DOS commands. To restart quickly when you don't need to modify the initialization information, use the nowait option. For example,

```
CT CQWW91 -NOW
```

starts the program using the CQWW91.BIN log file, skipping over the start up screens.

Program Modes   *CT* has five major operating modes:

- The Logging mode is used to add QSOs to your contest log during the contest, and to make limited changes to the log.

- The Post-contest mode enables additional log editing features for use only after the contest.

- The CW Keyboard mode turns whatever you type into Morse code.

- The Packet Talk mode directs whatever you type to the Packet TNC.

- The QSL mode prepares QSL labels for QSOs in your log.

Only one mode is active at a time. If you don't get expected behavior when you type something, you're probably in the wrong mode. Post-contest mode and QSL mode are identified by indicators on the screen following the time information, like this:

In Packet Talk mode, the keyboard entry goes to the Packet Send window instead of the current logging line. Normally, the borders of the Packet Receive window and the Packet Send window are yellow. When Packet Talk mode is active, these border colors change to white.

The CW Keyboard mode is identified by highlighting the second line in the CW Status window:

This window may be hidden by other windows such as the Packet windows, but you will know you're in CW Keyboard right away when you try to type something because you will transmit Morse code instead of inserting characters on the logging line. To force the CW Status window (along with the Rate window) in front of others, press **Alt–R**.

There are actually many other modes in *CT*. Most are "mini-modes" that ask for specific information or actions. For example, the **Alt–N** displays a window asking for a note to attach to the current QSO. Usually, you must complete the request and dismiss the mini-mode before you can resume using normal *CT* functions. If you get into a mini-mode by mistake, or change your mind, press **Esc** to dismiss the mode without any effect.

Saving the Log File   Completed QSOs are written to disk immediately, so at most one incomplete QSO is lost if the computer crashes. To automatically save another copy of the log to a floppy disk during the contest, insert a formatted floppy disk in drive A and type **AutoSave** in the callsign field. *CT* will save to the file *contest*.SAV on the floppy every hour on the hour for the rest of the contest. To save the log immediately, type **SaveLog**.

Note   *These functions work with drive A, and will fail if there is no diskette in the drive, if the diskette is full, if the diskette is not formatted, or if the drive door is open. If you need to use drive B, look up the* SUBST *command in your*

DOS manual.

Help   Pressing **Alt–H** brings up the *CT* Help window, showing the contents of the CT.HLP file. If the help file contains more information than can fit into one window, use the **PgUp** and **PgDn** keys to scroll to a different part of the file. Hit **Alt–H** again (it is a toggle) to get back to the Logging window. You can customize the CT.HLP **file** using any text editor.

Changing Bands and Modes   Unless you have a computer-controlled radio configured with *CT*, you must tell the program what band you are operating on. **Alt–F1** changes to the next higher frequency band, and **Alt–F2** changes to the next lower frequency band. Some contests, such as Field Day and the ARRL 10 Meter contest, use more than one emission mode. **Ctrl–F1** and **Ctrl–F2** rotate through the possible modes for the current Contest Type.

Redefining Keys   Use the text command **DefineKey** to open a window for remapping keys. The first key press identifies the key to be remapped. The second key press identifies the new key assignment. If you wish to undefine a key, press the same key twice. If you wish to clear all definitions, press **Ctrl–C** as the second key.

Upper and lower case characters are considered to be different, and may be re-mapped separately. Therefore, upper case N can be defined to be different from lower case n. This can be very confusing when your shift lock key is on. Nonetheless, this feature is important for users of laptop or notebook computers who may be short of keys.

Up to 128 keys may be redefined. The keys definitions are not stored by contest, they are stored globally in a file named KEYDEF.INI.

Redefining Colors   The text command **Colors** brings up a series of menus to reconfigure color assignments. Use the cursor up and cursor down keys to select a window, then press Enter or the right arrow key to bring up a menu of attributes for that window. You can change colors for normal text, highlight text, needed QSOs, needed multipliers, window border, and window title. Use the up and down arrow keys to select which attribute to modify. Use the left arrow and right arrow keys to cycle through the color choices. To change the background color, use **Ctrl–→** and **Ctrl–←**. When you are done changing the color of a item, press **Esc** to return to the item selection menu. When you are done with all color changes, press **Esc** one additional time to return to logging mode.

The color settings are stored in the contest BIN file, so each contest can be tailored separately. If you wish to save these settings for future logs, use the text command **ColorSave**. This creates a file name COLORS.INI in either the current directory, or in the directory specified by the CTPATH environment variable. Both the color setup and window positions are recorded. New logs use this file to set up the initial color scheme.

Exiting the Program   To exit *CT*, type **Quit** in the callsign field of the Logging Window, or press **Alt–Q** or **Alt–X**. The last two methods ask for confirmation before proceeding, with the option to cancel. All log information is always saved to disk before the program stops. If automatic save to floppy is on, the log is also saved to the floppy disk in drive A:

Logging   The Logging window contains a variety of display boxes that depend on what functions have been invoked. The QSO logging area is at the lower left, below the date and time status line, and above the messages line. The logging area shows a few previous QSOs, with data for the current QSO entered on the bottom line. Each log entry has a number of fields that depend on the Contest Type. For example, the CQ World-Wide DX Contest logging entry has 7 fields:

From left to right, the fields are QSO number, band, UTC, callsign, report received, number received, and multiplier flags. If the Contest Type selects the ARRL November Sweepstakes, the log entry has 9 fields:

The fields for SS are QSO number sent, band, UTC, exchange received (number, precedence, callsign, check, section), and multiplier number.

The log QSO number is defined by the program and cannot be changed. The time field is filled by reading the computer clock, and should not be changed in real-time. See "Entering Times" on page 76. for instructions on editing the time field in the Post-contest mode.

Tab Key   Most of the logging action occurs in the callsign and number received fields. The text cursor, indicating where keystrokes will be stored, starts out in the callsign field. Text that you type in the callsign field is automatically converted to uppercase. The **Tab** key moves the cursor to the next field on the right, wrapping around to the callsign field from the report received field: callsign, report received, and number received. In SS, the sequence is: callsign, number, precedence, callsign again, check, and section. The report received field is filled with a default value of 599 for CW contests and 59 for SSB contests. Tabbing into the report received field places the cursor under the signal strength digit; striking a number key replaces the default digit (9).

Space Bar   The **Space** bar toggles the cursor between the callsign and number received fields, except in SS where it acts like the **Tab** key. In the CQ WW Contest, the number received field is the zone, and is automatically filled in based on the callsign. In the ARRL DX Test, the number received is the power, and is automatically filled in if the station has been worked before.

Multiplier Marks When the cursor leaves the callsign field and a complete call has been entered, *CT* quickly determines if the QSO is a dupe or a multiplier and updates the multiplier field. The six subfields in the multiplier field correspond to the six HF contest bands, 160 through 10 meters from left to right. In SS, there is one subfield, and in the VHF QSO Party, the bands are 50, 144, 220 432, 903, 1.2G, 2.3G, 3.4G, 5.7G, 10G, and 24G. The marks in the subfields have the following meanings:

/ Can't determine the multiplier

– Not a multiplier

* New country but not a new zone

New country and new zone

^ New zone but not a new country

Enter Key A QSO is made permanent by pressing <**Enter**>. If a necessary field has invalid data, *CT* complains on the message line below the logging area and will not accept the QSO. In a network configuration, the log data is sent to the other computers. A completed log entry can be edited, but not deleted. The FIX_MINE program, described in *Removing Bad QSOs* on page 94, supports pruning QSOs from the log after the contest. To mark a QSO for removal by FIX_MINE, you change the callsign to your own station call. Also, you can use the **RmDupes** command after the contest to strip all duplicates from your log. See "Removing Dupes" on page 74.

Note FIX_MINE *and* **RmDupes** *can damage your log in certain contests, so do not attempt to use them before reading the pertinent sections of this manual.*

Marking Invalid QSOs Completed QSOs can not be deleted from the log during the contest. You can, however, mark a QSO as invalid by using the navigation keys to make that QSO the current logging line and pressing **Ctrl–L**. The marked QSO is highlighted, and does not contribute to the Summary window totals. You can unmark a marked QSO by applying **Ctrl–L** again.

Navigation Keys These are the keystrokes for moving the *text cursor*. On most PCs, the text cursor is a blinking underscore character. The *current logging line* is the line containing the text cursor. The symbols ←, →, ↑, and ↓ refer to the cursor arrow keys.

→, **Ctrl–F**
  Move the text cursor forward one character in a field.

←, **Ctrl–B**
  Move the text cursor backward one character in a field.

Ctrl–E

Move the text cursor to the end of a field.

Ctrl–A
Move the text cursor to the beginning of a field.

Tab
Move the text cursor to the next field.

Space
Toggle the text cursor between the call field and the number received field (zone, power, etc.).

↓   Move the text cursor to the call field in the next log entry.

↑   Move the text cursor to the call field in the previous log entry.

PgDn
Scroll forward one page, leaving the text cursor on the same line.

PgUp
Scroll backward one page, leaving the text cursor on the same line.

Ctrl–PgUp
Scroll backward 24 hours.

Ctrl-PgDn
Scroll forward 24 hours.

Ctrl–G
Move the text cursor to a log entry by serial number, scrolling the log if necessary. If a number is in the call field, go to that QSO number, otherwise go to the end of the log.

Editing Keys   These special key combinations change the data in you log.

Ctrl–D, Delete
Delete the character on the text cursor.

Backspace
Delete the character to the left of the text cursor.

Ctrl–K
Delete (Kill) all characters from the position of the text cursor to the end of the field containing the cursor.

Ctrl–W, Ctrl–Backspace
Delete (Wipe) all characters in the field containing the text cursor.

Alt–W, Alt–F8, F11

Delete all characters (Wipe QSO) in all fields in the logging line.

<Enter>
Complete the current log entry and start a new log line.

Band and Mode Set Keys

Alt–F1
Change the log band (and a computer-controlled radio) to the next higher contest band.

Alt–F2
Change the log band (and a computer-controlled radio) to the next lower contest band.

Ctrl–F1
Change the log and a computer controlled radio to the next emission mode. For example, in DXpedition Mode, CW→SSB→RTTY→CW, and so forth.

Ctrl–F2
Change to the previous emission mode: CW→RTTY→SSB→CW

Check Partial

The Partial window is opened by **F8**, **Shift-F8**, **Alt–U**, or **F12.** When the window is open, *CT* is in automatic check partial mode. This means that *CT* checks for partial calls after every keystroke. If **F8** (Check Partial) is used to open the Partial window, *CT* checks only calls already in the log. If any of the other three key sequences is used to open the Partial window, *CT* checks against both the log and calls in the MASTER.DTA file. Both operations are very fast in version 9.

The Partial window lists all matches, with needed calls highlighted. The example list is the check result with "BV" in the callsign field of the K1AR 1992 CQWW CW log. Once you have invoked the function, it looks for matches every time you type a character in the callsign field, so you don't have to keep hitting a function key. The matching algorithm finds all calls that contain the partial call string anywhere within the call. A question mark matches any single character. For example, the partial "BV2" narrows the example list to just the 4 BV2s, while "BV2?M" shows BV2DM as the lone possibility. Calls needed on the current

band appear in bold. For color monitors, bold equals white. The message line notes when the search for partials is complete.

Jim Reisert, AD1C, maintains three versions of the callsign database file, for download from the BBS or *CT* web site. The first version contains only callsigns of domestic US and Canadian stations, for use in contests such as SS, VHF SS, FD, and for DX stations in the ARRL DX contests. The second version contains only non-US and non-VE callsigns, for use by US and Canadian stations in the ARRL DX contests. The third version is the combination of the first two, and is intended for most other DX contests and contests with fully international participation.

Check Call

The Check Call function, **F9**, displays the log entry for each band that has a QSO with the station in the callsign field. Duplicate checking is automatically performed whenever <**Enter**> is pressed. The check is also made when the **F4** key is pressed. Normally, **F4** sends your call on CW (See "Send Message Keys" on page 65.), but if the callsign is a dupe, nothing is sent. This is handy for efficient search and pounce operating.

Portable designators are ignored when checking calls. For example, K5ZD and K5ZD/3 are considered to be the same call.

Check Country

The Check Country function, **F10**, searches the log for the callsign in the current logging line, and displays the log entry for any band that has a match. If the call

is not found, the call for the first QSO with that country is listed, if any. Thus, a single keystroke checks both the call and country, obviating the need to use Check Call (**F9**). In addition to country and zone information, the window shows the direct path beam heading and the times of sunrise and sunset at the country's coordinates. These computations depend on the latitude and longitude information in the CTY.DAT file, and on your own latitude and longitude as set by the **SetLat** or **SetLon** commands, or in your CT.CFG file.

Zone Map

The Zone Map function, **Alt–Z**, shows a chart of the CQ WW zones at the upper left corner of the screen. An asterisk indicates zones that have been worked in the contest on each band. In the ARRL DX Contest from the DX side, **Alt–Z** displays a map of states and provinces. States and provinces not yet worked are displayed in bold (white on a color monitor). In the ARRL VHF QSO Party, **Alt–Z** displays a grid square map. The center of the map is set with the **Grid** text command, See "ARRL VHF QSO Party" on page 85..

Multiplier Summary

Hit **Alt–M** to show the Multiplier Check Sheet display, listing the countries worked by band for a single continent. The first **Alt–M** shows the continent that was selected when the Multiplier Check Sheet was last displayed. Each subsequent **Alt–M** displays the next continent in the list North America, South America, Europe, Asia, Africa, and Oceania. Pressing any other key returns to the logging window.

If **Alt–M** is not working, the program may have been started with the –NOM switch to permit more QSOs; See "Command Line Switches" on page 33..

Rate Meter and Rate Graph

The Rates window in the upper right area of the logging window tracks QSOs per hour over the last 10 and 100 QSOs:

```
┌RATES─────────────────┐
│Last 10  QSO Rate =  0.0│
│Last 100 QSO Rate =  0.0│
│                        │
│   Rates for all bands  │
│  Time  ON:  0.0 hours  │
│  Time OFF:  0.0 hours  │
└────────────────────────┘
```

The rate calculation does not count dupes in computing the rate, but does count zero point contacts. For example, if a W works a W in the CQ World-Wide DX Contest, that is a zero point contact, but it will count in the rate. The **PointRate** command switches the Rate window to show the number of points added in the last 10 minutes and in the last hour, and the **QSORate** command restores the default format.

For multi-transmitter classes, the rate display can be toggled between current band only and all bands, using the text commands **BandRate** and **AllRate**, respectively. The Rates window is toggled by the **Alt–R** function.

The program also includes graphical display of rates by hour. To show the graph, press **Ctrl–F9**. To hide the graph, press **Ctrl–F9** again.

QSY Meters　　The QSY Meter helps multi-single and multi-two entrants comply with band-changing rules. When a band change is permitted, *CT* displays "QSY OK" in the QSY Meter. For CQWW multi-single and ARRL DX multi-two, two QSY meters are displayed, one for your station and one for the other station. In multi-single mode, the stations are labeled Run and Mult, while in multi-two they are Run1 and Run2. The meter for you own station is always on the left.

Toggling between Run1 and Run2 changes the color of the band label and the QSY meter. Normally, changing to Run2 changes the color to white or highlight. The 10-minute timers also correspond to the Run1 and Run2 colors.

CT recalculates the 10-minute timer from the start of the log under the following conditions:

1　　A band change was applied to a prior QSO

2　　A time change was applied to a prior QSO

3　　A change of station (Run1 or Run2 for the M2 category, Run or Mult for the MS category) was applied to a prior QSO.

Summary Display　　The Summary display is shown in the lower right area of the screen:

The columns for the CQ World-Wide DX Contest are QSOs, zones, countries, and dupes. The data displayed and the scoring system is based on the contest type found in the Contest Type field of the Information Sheet. The Summary display is toggled by the **Alt–S** function.

Band Map

The Band Map window accumulates and displays information about what stations are on what frequency on each band. This helps identify stations as you are tuning across a band, minimizing time wasted waiting for a station to sign his call. Use **Alt–,** to toggle the window. Stations are listed in order of frequency, with the bottom of the band at the top of the list.

Information is added to the window from three sources: stations worked by you, stations manually entered by you, and spots received from your PacketCluster connection. Every ten minutes, the window purges information older than 60 minutes. To manually enter a station in both the Callouts and Band Map windows, type the callsign and press either **Ctrl–Enter** or **Ctrl–J**. If you have a computer-controlled radio, the current radio frequency is used; otherwise, a small window pops up for you to type in the frequency. The Band Map window displays the current band and updates when you change bands.

Stations on the Band Map are displayed in different colors. If a station is not needed (PX2A), it is displayed in black. If it is needed but is not a multiplier (RA3XU), it is displayed in light blue. New multipliers (5A1A) are displayed in white. For those using monochrome displays, new multipliers are also marked with the # symbol.

If a station on the Band Map is spotted, worked, or entered again, the new information replaces the old data. If a new station is spotted or worked within 400 Hz of an existing entry, the new entry replaces the existing. This way, running on a frequency does not fill up the Band Map.

If you are using a computer-controlled radio, the highlighted (at 14000.5 in the sample) line indicates your actual frequency. When the radio is tuned within 400 Hz of an entry in the Band Map, that entry appears on the black line. The black line turns white on blue and the * symbol is displayed if it is a needed station but not a multiplier. The line turns white on red and the # symbol is displayed for needed multipliers.

The Band Map window supports point-and-shot with a computer-controlled radio. Use **Alt–→** to begin; the window border color changes from yellow to white. Use ↑ and ↓ to move the highlighted line to an interesting station in the list. Press the **Delete** key to remove the entry, or press <**Enter**> to copy the callsign to the logging line and set the radio to the selected station's frequency. Press **Alt–F4** to return to your run frequency., and press **Alt–F4** again to go back to the most-recently selected entry in the Band Map or Callouts window. With this scheme, you can quickly alternate between run and pileup frequencies. If you do not want to go back to you run frequency at all, but just want to work stations in the band map, press **Alt–F5** after working each station.

You can delete band map entries, such as stations that have moved. After entering the window using **Alt–→** and selecting a line using ↑ and ↓, press the **Delete** key.

The Band Map windows displays frequency, callsign, status character, time, and exchange (such as zone, state, or power). This is helpful in the ARRL DX test, for example, to identify a station by the power sent.

Defining New Prefixes

To add a new prefix to the country multiplier file during the contest, simply tell *CT* what the new prefix equals. For example, type GP=GU in the callsign field to add the new prefix GP as an equivalent to the old prefix GU. Both the current log, and the multiplier file will be changed. The old prefix must already exist, so you're out of luck if a new country appears during the contest.

Passing Multipliers

Moving new multipliers from band to band is a quick way to build up your score. In a multi-transmitter, you can use *CT* to show the other operators the call and frequency for a station that you have asked to QSY, by pressing **Alt–D**. A mini-window is displayed which prompts you for the QSY frequency:

When you press <**Enter**>, all computers are notified, displaying the pass frequency and current callsign. **Alt–=** shows the Pass display, which contains a list of stations recently passed from another band. Also, you can see the frequencies of everybody on the network with a computer-controlled radio by pressing **Alt–J**. The Pass functions are not available in the single-operator entry class. Also, See "Network Gab" on page 72. for a discussion of another *CT* Network communication function.

Making Schedules

Pressing **Alt–E** displays a mini-window that asks for a call. After you type a callsign and press <**Enter**>, the mini-window asks for a time, and then for a frequency. A completed schedule looks like this:

When you press <Enter> the third time, the mini-window goes away and the information is entered into a list of schedules. One minute before a schedule, your computer will beep three times and blink the message line to remind you. To see the list of schedules at any time, press **Alt–B**. The schedules window covers the rates window; to expose the rates window press **Alt–R**.

Writing Notes   Alt–N prompts you for a brief note which is sent to a file named *contest*.NOT, along with the time and callsign on the current logging line. **Alt–N** can hold and print a maximum of 56 characters per entry. The file is a text file, and may be read by any word processor, or text editor. In desperation, you may even read it with the DOS command TYPE/P, for one page at a time. Edit *contest*.NOT after the contest to correct typing errors, amplify remarks, and memorialize your thoughts during the contest. Notes are forwarded to all computers on a *CT* network so they will all have the complete set.

If you are operating in a multi-operator category, use the **OpOn** and **OpOff** text commands, not **Alt–N**, to note operator changes; See "Voice Messages" on page 61.. These commands coordinate with the *DVP* to choose different voice message directories.

Digital Voice Processor   The advanced features of the *DVP* enable four capabilities in *CT*:

- Recording and sending voice messages.

- Sending callsigns by mapping letters and numbers to voice files containing your pre-recorded phonetics, including the portable designator and two-character prefixes and suffixes.

- Continuous-loop recording of receiver output in a 30-second buffer, with function keys to save all or some of the buffer to *QSO snippet* disk files.

- Direct recording of receiver output to disk, and playback from disk, limited only by disk capacity.

CT has a number of new commands to support these features. Also, two animated indicators at the lower left corner of the screen show record and play activity — leftmost is for playback and rightmost is for recording.

The text commands **OnAir** and **OffAir** control whether or not audio generated by the *DVP* is sent to your transmitter's microphone input. Similarly, the text commands **PTT** and **NoPTT** control whether or not *CT* will close your transmitter's push-to-talk line when sending. If the **OffAir** command is invoked, then the state of the PTT command is ignored and *CT* will not key your radio. The **Mon** and **NoMon** text commands control whether or not you hear the *DVP* output or your radio's audio output when transmitting. Monitoring the *DVP* output is often easier on your ears, but can't tell you if you have the speech processor cranked up too much.

Voice Messages   Transmitting voice messages is accomplished exactly the same as transmitting CW messages, by pressing function keys. The available keys are **F1** through **F7** and **Alt–F7**, excluding **F5**. You can record anything you like for these messages. The conventional assignments are described in *CW Keying and Messages* on page 65. Voice messages can be interrupted instantly by pressing **Esc**. This removes all

pending output. If you try to send a message that doesn't exist, *CT* transmits nothing and types the missing file name at the bottom of your screen.

You can enable and disable sending voice serial numbers with **Ctrl–F4**, and enable/disable sending voice callsigns with **Ctrl–F5**. For serial number contests, you can insert an optional message such as "your number is" between the callsign and the number. The text command **Pause** brings up a window for setting the gap in milliseconds between the callsign and the serial number as played by the *DVP*. Ctrl–F3 records a "your number is" message which is played before a serial number in SS, WPX and CQP. For example, the *DVP* can play: "kilo one echo alpha your number is one sixty three bravo …"

*Note   The *DVP* does not yet support "type-ahead," so you need to get the whole call into the callsign field before hitting a function key that plays the call.*

The **Rpt** text command asks for a repeat delay, which applies to all subsequent messages, voice or CW. Repeat mode is identified on the screen like this:

The **Esc** key stops message transmission, but does not affect the repeat mode. Use **NoRpt** to turn repeat mode off.

*Note   The *DVP* use of the *Esc* key prevents the key press from getting to a DRSI internal TNC. To send commands to the DRSI, use * wherever the normal usage needs Esc. For example, use *ck1gq to initiate a connection to K1GQ.*

You can edit any of the voice messages at any time. Changes replace the previous messages and persist until you make more changes, perhaps in another contest. Use the **OpOn** text command to associate an operator with a particular message set. The **OpOn** command asks for the operator's callsign:

Messages recorded after an **OpOn** command are saved in a special place, so that messages recorded by other operators are preserved. Use the **OpOff** command to return to the default messages, not associated with any particular operator.

To start recording a message, first type **OffAir** to prevent transmitting while you record, and type **Mon** if you want to hear yourself. Then press **Shift** and the appropriate function key. Begin speaking into your microphone immediately, and press **Esc** quickly when you're done. During the recording, the record indicator spins at the lower left on the screen. The indicator stops when you press **Esc**. Press the function key for the message to hear how it sounds.

Voice Callsigns　　When you press **F5** or **Ins** in voice mode, *CT* tries to convert the current callsign to a sequence of voice messages as follows. First, *CT* searches for files that contain voice recordings for two characters matching the prefix and/or suffix of the callsign. Then, *CT* fills in the remaining letters and numbers, and the portable designator /, from single-character voice recordings. All this happens so quickly that you won't perceive any delay. If a necessary single-character file isn't found, none of the call is transmitted.

Use the text command **DVP** to get to the DVP Editing window:

```
┌DVP Editing Window - ALTX or ALTQ to exit
│
│ ┌──────────────────────────────┐
│ │ Auto space: 8 ms (use +/-)   │
│ │ Cur Up/Dn clip pt: 200       │
│ │ F1 to record prefixes and pairs │
│ │ F2 playback letter           │
│ │ F3 edit test call            │
│ │ F4 playback a call           │
│ └──────────────────────────────┘
│ ┌Test Call────────────┐
│ │                     │
│ └─────────────────────┘
│
│
│
│         Type any letter and speak...type letter again to end.
│                  Open C:\CT\DVP\QUESTION.DVP
```
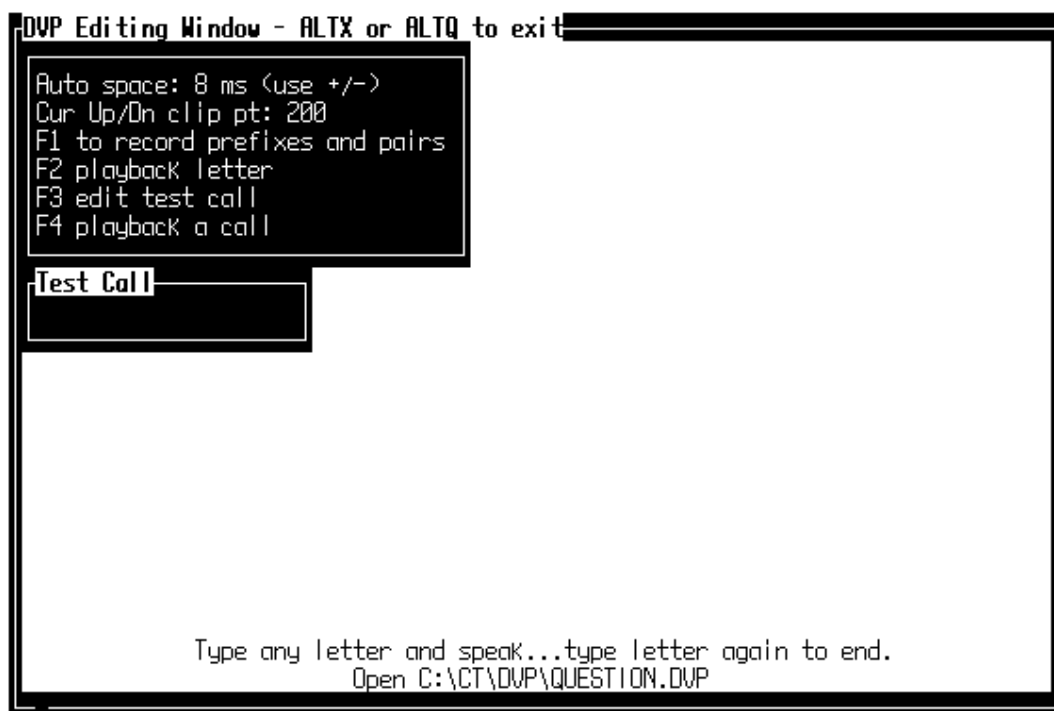
You use this window to make both single-character recordings and prefix/suffix recordings. Before you begin making recordings, use **OffAir** and **Mon** to disable transmissions and monitor the *DVP* output directly. If you have identified an operator using **OpOn**, the single-character recordings will be associated with that callsign, but there is only one set of prefix/suffix recordings for all operators.

First, set the autospace and clip values for your recording. Autospace determines how many milliseconds of zero audio are added before and after your recording. The clip level determines where your recording begins and ends. The editor searches inward from the start and end of the recording to find the first sample where the level exceeds the clip level, and defines those samples as the start and end of the record.

To start making a single-character recording, press a letter key, number key, or the "?" or "/" keys. Speak the character, then press the same key again to end the recording. You can be reasonably sloppy about timing your key strokes because

the clip level feature will trim your recording automatically. The DVP Editing window will immediately show you a graph of your recording. One use for this graph is to judge the effectiveness of your choice of phonetics by observing whether the audio level is high throughout the recording. You can listen to your new recording by pressing **Ins** and typing the character(s) you want to hear in the mini-window. This is an excellent way to assess whether your recording is effective in conjunction with other recorded characters.

To make two-character recordings, press **F1** after the DVP Editing window appears. These recordings are independent of the **OpOn** setting. Follow the instructions — basically, you type the two characters, press <**Enter**> to start recording and <**Enter**> again to stop recording. When you have finished making two-character recordings press **Esc** or **Alt–X** to return to the main DVP Editing window.

The ability to synthesize voice callsigns is unprecedented in amateur radio contesting, and is likely to generate much debate. We have already learned that it is important to record all of the alphanumerics, prefixes, and suffixes at the same time in order to achieve acceptable consistency in the pitch, level, and overall "sense of urgency." Finding good settings for the parameters and making recordings that blend into good-sounding callsigns is sure to be both an art and a highly-individualistic enterprise.

Voice QSO Snippets

A QSO snippet is a short recording of your receiver's output. The recording is saved in a file in the same directory as your log file, and is named *number*.DVP, where *number* is the current QSO number. Since most of us won't know we want to make a snippet until after something interesting happens, *CT* provides a way to continuously capture the most-recent 30 seconds of receiver output. Then you need only press a function key to save some or all of what you just heard.

Start the 30-second continuous loop using the **BackCopy** text command. The animated record indicator will begin spinning at the lower left on your screen, and your hard disk access light will be on all the time unless you are using a RAMdisk as discussed in *DVP Considerations* on page 31. Now you can make a snippet whenever you like using the **Alt–6** through **Alt–0** keys to capture 30, 20, 15, 10 or 5 seconds respectively. And, of course, you can transmit the snippet just as easily. Put the text cursor in the QSO that you want to send and press **Alt––** (the minus key is right next to the 0 key). *CT* and *DVP* can record and playback at the same time, so you never have to stop BackCopy (using **NoBackCopy**) in order to send voice messages, callsigns, or snippets.

Voice Recordings

If you're not using **BackCopy**, or if you want to record more than 30 seconds, press **Ctrl–R** to begin recording immediately to a file named TMP.DVP. The length of the recording is limited only by the space available on the disk device. Be cautious — you may find yourself with no space left for more important information, such as your next QSO. Press **Esc** to stop recording.

Use **Ctrl–P** to play the recording into your headphones but not over the air. If you want to transmit the recording, press **Alt–P**. Pressing **Ctrl–R** again will replace the previous recording with a new one.

CW Keying and Messages

CT has all the capabilities of a full-function Morse keyboard with programmable memories. To enter CW Keyboard mode, leaving Logging mode, use **Alt–K**. In CW Keyboard Mode, anything you type will be immediately transmitted as Morse code. All other CW functions operate the same in either of the two modes. To return to Logging Mode, use **Alt–K** again. The CW Status display at the middle right area of the Logging Window shows the current speed and keyboard mode. If the display is obscured, **Alt–K** or **Alt–R** will uncover it. The **Alt–K** toggle function is disabled in SSB contests.

For technical reasons, the minimum keying speed is 11 WPM. The maximum keying speed is 50 WPM. The default speed at startup is 32 WPM, regardless of mode. The computer's speaker is enabled by typing the text command **Sound** in the call field and hitting <**Enter**>. The speaker is disabled by the **NoSound** text command.

Question marks are permitted in the callsign field and are transmitted as part of *hiscall*. The log entry is not accepted until the question marks are removed. *CT* puts the cursor position at the first question mark and changes to overstrike mode, so you need only type a character to replace the question mark.

Send Message Keys

These keys start sending stored messages. Playback can be stopped instantly by pressing **Esc**. This removes all pending output; *CT* does not have hold and resume functions.

F1 Send the CQ message.

F2 Send the exchange message followed by a space.

F3 Send the confirm message.

F4 Send your call.

If the callsign on the current logging line is a dupe, F4 won't send anything. You can disable this behavior using the **WorkDupe** text command, and reenable it using **NoWorkDupe**.

F5 Send *hiscall*.

F6 Send the F6 message.

F7 Send the F7 message.

Alt–F7
Send the frequency is in use message.

Multi-function Send Message Keys	**Ins** (Insert key) Equivalent to **F5** and **F2**, sending both his call and the exchange. In Sweepstakes, if the station is a dupe, **Ins** sends QSO B4. In other contests, the default is to send the exchange, but you can change to the Sweepstakes behavior using the text command **NoWorkDupe**. The companion text command **WorkDupe** text command tells **Ins** to send the contest exchange whether or not the QSO is a dupe, regardless of the contest type.

CT has a nifty "send-ahead" feature. If you hit **Ins** and continue editing the callsign, the program will notice any changes that it hasn't already sent. With a little practice, you will find that this feature makes it very easy to avoid that feeling of panic when it's time to transmit and you haven't finished typing the call.

+ Equivalent to **F3** and <**Enter**>, confirming a QSO and completing the log entry.

If a station is worked using the **Ins** key, *CT* remembers the callsign sent. If that callsign is modified and **F3** or + are used to finish the QSO, then *CT* inserts the modified callsign automatically before the confirm message. For example, G3FXB answers a CQ, but you type G3FXD and hit **Ins**. If you then correct the call and hit +, *CT* will send G3FXB TU *mycall*. This behavior can be disabled by the text command **NoCorrect**, and then reenabled by **Correct**.

Set Message Keys
All of the messages except *hiscall* can be edited at any time during a contest. Changes are remembered when you exit and restart, except for *mycall* in the **F4** message, which is filled in from the Information Sheet each time you start *CT*. While updating a memory, hitting <**Enter**> before any text has been entered, or **Esc** at any point, terminates the update and leaves the memory unchanged. Also See "ARRL November Sweepstakes" on page 83. for special instructions on setting the exchange message components.

Shift–F1
Set the **F1** message.

Shift–F2
Set the **F2** message.

Shift–F3
Set the **F3** message.

Shift–F4
Set *mycall* (does not change the Information Sheet callsign, or the *mycall* string in other messages).

Shift–F6
Set the **F6** message.

Shift–F7

Set the **F7** message.

Shift–F9

Set the QSO B4 message, used with the **NoWorkDupe** feature discussed under the **Ins** function key on page 66.

CW Keyboard Control Keys

Alt–K

Toggle into and out of CW Keyboard mode.

Alt–F9

Decrease CW sending speed 2 WPM.

Alt–F10

Increase CW sending speed 2 WPM.

Alt–V

Change the CW speed by taking the number typed in the Set CW Speed mini-window.

Ctrl–C or **Esc**

Stop sending currently in progress and reset.

Number Abbreviations

By default, except in SS, *CT* uses A, N, and T for 1, 9 and 0 in the **F2**, send exchange, transmission. The **NoCWAbbrev** text command changes to normal Morse characters for 1, 9, and 0, and **CWAbbrev** returns to abbreviated characters. For example, with **CWAbbrev** on, 007 becomes TT7, and 109 becomes ATN. There is no way to mix N and 1 in serial numbers for WAE or WPX. In CQWW, and ARRL from the DX end, you can create your own version of the report sent with **Shift–F2**. Of course, the number abbreviations do not apply to callsigns.

Sending Speed Variation

A + character embedded in a CW message increases the CW speed by 5 WPM. Similarly, a – character decreases the speed by 5 WPM. Use multiple + and – characters to achieve other increments. The speed is set back to the original value when the message ends or is aborted, so the increments and decrements do not have to be balanced.

Half-baud Space

The ^ character (Shift–6) sends a half-baud space (half the length of a dot). This is most useful in stored messages. For example, to set the CQ message with extra space between suffix letters, press Shift–F1 to open the set message window and type:

```
CQ TEST K1^E^A
```

Digital Voice Keyers

Note   *This section does not apply to the DVP. See Digital Voice Processor on page 61.*

CT assigns **F1** through **F4** to start the respective memories when the mode is SSB. **Esc** is a panic stop, like its function on CW. Use the voice keyer controls to stop the playback. *CT* does not have a way to send a voice "Thank you" message and log the contact with one keystroke like the + key function on CW. See *Voice Keyer Control* on page 20 for information about connecting your voice keyer to your computer.

Frequency Control

CT can read frequency information directly from some radios, guaranteeing correct band information for each QSO. See *Radios* on page 20 for information about connecting a radio. *CT* can also set the frequency of these radios. If the callsign field contains only digits when <**Enter**> is pressed, the program tries to convert the data into a frequency within one of the contest bands. If the conversion succeeds, the current VFO is set; otherwise, *CT* complains on the message line. Numbers are zero-padded on the right to form a good frequency.

The "–" key on the keypad or keyboard displays a subwindow for entering a split transmit frequency. Kenwood radios are set to the split mode and the transmit frequency is set appropriately. This function does not work with ICOM radios other than the IC- 765 and IC-781, because there is no way to set split mode. Hit the **Esc** key to leave the subwindow without setting a split. Hit <**Enter**> to return the radio to transceive mode.

Rotator Control

If a computer-controlled antenna rotator is configured in the Information Sheet, you can set the heading using the **Ctrl–F10** function. If *CT* finds a number between 0 and 360 in the callsign field, it sets the current rotator to that heading. If *CT* finds a prefix in the callsign field, it computes the heading using your latitude and longitude (set via **SetLat** or in your `CT.CFG` file) and the country coordinates from the `CTY.DAT` file. When two rotators are configured, you toggle between them using the **Alt–/** function. The name of the current rotator, Rotor 1 or Rotor 2, is displayed above the logging area.

When the rotator is misaligned, you can define an offset to be added to the heading sent to the rotator, using the **Offset** text command. Supply a positive value, in degrees, to increase the heading in the clockwise direction.

Packet TNCs and PacketCluster®

CT uses a split window interface to packet TNCs. The Packet Receive window monitors information sent to the computer by the TNC, while the Packet Talk window accepts your input to be sent to the TNC when you press <**Enter**>. Press **Alt–O** to show the Packet Receive window, and **Alt–T** to show the Packet Receive and enter Packet Talk mode. **Alt–T** toggles between Packet Talk mode and Logging mode, while **Alt–O** allows you to watch activity without changing modes.

CT acts like a dumb terminal to the TNC, which must be in converse mode. Characters entered in the Packet Send window go to the TNC after <**Enter**> is hit. Characters received from the TNC are displayed in the Packet Receive window. DX

spots in the PacketCluster™ format that are new multipliers are always noted on the message line at the bottom of the Logging Window, whether or not the Packet display is open.

If the TNC seems to work, but won't display the packet window, check the Information Sheet to see if Class is set at Single Op. Single operator stations may send spots, but not receive them. A warning is issued if a Single Op presses **Alt–O**, and the Packet Display is not opened. However, Single Ops *can* make announcements using **Alt–F3**.

Note   Pressing **Ctrl–W** *while in Packet Talk Mode wipes out the current line in the Packet Send Window.*

Callouts   Pressing **Alt–A** displays the Callouts (Announce) window:

```
┌PacketCluster (tm)─────────
│2056  N4FD/C6A    21346.9
│2051  C9RJJ       21323.0
│2051  VP2VF       28389.8
│2052  J73WA       21329.0
│2053  GW4BLE      14217.7
│2054  EA8DM       14209.7
│2056  VP5H        21341.0
│2056  VP9DX       21275.1
│2057  EA7BA       21262.9
│2057  5Z4RS       21375.0
│2057  CT5P        21309.2
└───────────────────────────
```

The window lists spots received by *CT* from your PacketCluster connection. The window has four display modes, with the current mode shown at the bottom. The modes are:

1   List new multipliers on this band only

2   List new multipliers on any band

3   List new QSOs on this band only

4   List new QSOs on any band.

After entering the Callouts window (using **Ctrl–→**), press **PgUp** or **PgDn** to cycle through the modes.

Every ten minutes *CT* purges the Callouts window of spots older than 60 minutes. This aging process is based on the time that a spot was received by *CT*, not on the timestamp that PacketCluster places on it.

The point-and-shot technique for the Band Map window works in the same way for the Callouts window. Use **Ctrl–→** to begin; the Callouts window border color

changes from yellow to white. Use ↑ and ↓ to move the highlighted line to an interesting station in the list. Press <**Enter**> to copy the callsign to the logging line and set the radio to the selected station's frequency. Press **Alt–F4** to return to your run frequency., and press **Alt–F4** again to go back to the most-recently selected entry in the Band Map or Callouts window. With this scheme, you can quickly alternate between run and pileup frequencies. If you do not want to go back to you run frequency at all, but just want to jump from callout to callout, press **Alt–F5** after working each station.

You can delete bad spots, such as wrong mode or busted calls, from the Callouts window. After entering the window using **Ctrl–→** and selecting a spot using ↑ and ↓, press the **Delete** key. Deleted spots are gone forever, and are also removed from the Band Map window.

Whenever the Callouts window is selected (the border is white instead of yellow), incoming spots are held in a queue. This prevents the window from scrolling at the moment that you press <**Enter**>, which would send your radio to the wrong spot.

Spots in the Callouts window are marked with symbols and color coded

no symbol
    Blue — Needed QSO on another band

^   Cyan — Needed QSO on this band

*   Yellow — Needed multiplier on another band

White — Needed multiplier on this band.

The Callouts window shows all spots received by *CT* in the last 60 minutes that are needed multipliers. When the multiplier is worked, the call is removed from the list. The text command **BandSpot** restricts the list to the current band and **AllSpot** restore the list to all bands. Needed spots are always posted on the message line when they arrive, but the next message event will obliterate the information. Normally, out-of-band spots are ignored, but the text commands **SeeWARC** and **NoSeeWARC** toggle this filtering action. The spotting functions are not available in the single-operator class.

Point and Shoot   **Ctrl–→** selects the Callout window, and **Alt–→** selects the Band Map window for Point and Shoot mode. Use ↑ and ↓ to select an entry, then <**Enter**> to grab the entry and return to Logging Mode. Grabbing the entry puts the call into the call field and sets your radio to the entry's frequency, as discussed in the next paragraph.

Grabbing Spots   **Alt–F4** pulls the call of the most recent needed DX spot into the call field so you don't have to type it in. **Alt–F4** also sends your radio to the spot frequency,

including correctly-formatted splits except for the ICOM radios that can't be set to split mode by computer. When using an ICOM radio other than the IC-765 or IC-781, VFO A is set to the transmit frequency, and VFO B is set to the receive frequency, but you must push the radio's SPLIT button.

Hitting **Alt–F4** again puts the radio back where it started, and hitting **Alt–F5** resets the spotting frequencies but leaves the radio on the new band (for a new running frequency).

DX Announcements

Alt–F3 causes a DX spot to be sent to the TNC using the PacketCluster format. The announced call is the call under the cursor or the last call worked. If a computer controlled radio is connected, the spot frequency is taken from the radio. Otherwise, you must fill in the frequency yourself in the Spot Frequency window:

When announcing a split receive frequency, separate the TX and RX frequencies with a slant bar; for example, G3FXB transmitting 7091.3 and listening 7213.

Multioperator Techniques

To make QSOs, just log stations as you always do. New or changed data is forwarded to all other computers automagically.

Operator Identify

Use the **OpOn** text command to set the callsign of the current operator. While this isn't required by contest sponsors, it can be helpful when analyzing logs in a post-contest brag session. The call set by **OpOn** is displayed in the bottom border of the Summary window.

Station Identity

For the multi-single category, set one computer to be your run station by typing **Run** into the callsign field. Set the other computer to be your multiplier station by typing **Mult** into the callsign field. For the ARRL International DX Contest multioperator two transmitter category, assign the first and second run stations with **Run1** and **Run2**.

The Summary window displays whether you are the run or multiplier station. Each QSO is marked internally, so the required two logs can be printed. When you prepare your logs as discussed in *Preparing the Paperwork* on page 72, you get a logs called *contest_*R and *contest_*M.

Multiplier Spot Filtering

During the contest, *CT* filters PacketCluster™ spots so that the run station is notified of multipliers on the run band, while the multiplier station is notified of new multipliers on all bands. If one of your stations is unmanned, set the active station to be the multiplier station so that you can see spots on all bands and QSY accordingly.

Passing Stations   You can use *CT* features to quickly identify stations needed on other bands as they are worked, so you can ask the station to QSY. Watch the Check Country window to determine if the station is needed. Use the RUN PASS window, toggled by **Alt-J**, to see the frequencies of all the radios on the *CT* network, so you know the QSY frequency. If the destination band isn't running, he can set a frequency in the PASS column via the **Alt–D** function.

Network Gab   Networked computers running *CT* have a private chat window, allowing operators to communicate without shouting. **Alt–G** (Gab) shows a mini-window that you type into to send a message to the other computers. The <**Enter**> key automatically displays the Network Talk window throughout the network. **Alt–I** toggles the window on and off. Messages in the Network Talk window are prefixed by the Station Number of the originator. Talk messages are logged in the file *contest*.TLK.

Preparing the Paperwork

Getting you results on paper is the final event in a contest, although some contest sponsors now accept at least some of your data on floppy disks. In general, you have two tasks. First, clean the log, then write the report files and print them.

Cleaning the Log File   Here are the steps that you follow:

1   **Make a copy of the log file and put it in a safe place.**

If you make a mistake in the following steps, it may be easier to start over with a fresh copy of *contest*.BIN.

2   **Optional — Run the FIX_MINE utility program.**

If, during the contest, you have entered your own call to cover QSOs that you want to remove from the log, this is the time to do it. See *Removing Bad QSOs* on page 94.

3   **Review the bad zones file.**

A text file named *contest*.ZON was created by *CT* that lists potential zone mistakes. Use the DOS TYPE command, an editor, or other means you prefer to review this file. Note the QSO numbers for later editing.

4   **Review the bad calls file.**

A text file named *contest*.BAD contains the list of calls that *CT* could not resolve to a multiplier. Determine the correct country for each call and edit the appropriate multiplier file, adding the missing prefix. When you start *CT*, one of the lines in the startup messages screen tells you how many calls are in the *contest*.BAD file. Your objective is to reduce the number to zero, so that *CT* can correctly determine your score.

5 Restart *CT* and make needed edits.

Use the **Ctrl–G** function to navigate to QSOs that need to be changed, See "Navigation Keys" on page 51..

6 Optional — Remove duplicate QSOs.

Use the **RmDupes** text command to do this. Most contest sponsors prefer that you leave duplicate QSOs in the log to assist cross-checking. In any case, *CT* computes the correct score and indicates your QSO totals with duplicates removed. See *Removing Dupes* on page 74.

7 Exit the program and verify that the bad calls file is empty.

If *contest*.BAD is not empty, repeat steps 4, 5, and 7 until you succeed.

8 Restart *CT* and write your contest reports.

Check that the startup messages confirm that there are no bad calls. Now your score is correct, and you can use the **WriteLog** text command to create the final set of files.

Creating Report Files   *Note   With a few exceptions, all of the reports prepared by CT must be printed using DOS commands. Typing PRINT as a text command does* not *send reports to a printer in CT.*

To make a complete set of reports, restart *CT* and enter **WriteLog** in the callsign field. For the ARRL International DX Contest, this writes out a text file named *contest*.ALL. The log you submit to ARRL is a printout of *contest*.ALL. For contests such as the CQ World-Wide DX Contest which require logs by band, **WriteLog** writes out six text files, one per band: *contest*.10, *contest*.15, *contest*.20, *contest*.40, *contest*.80, and *contest*.160. In addition to the log file(s), **WriteLog** also automatically creates some of the following documents, depending on the Contest Type — see *Contest-specific Features* on page 77. You can generate specific report files, when appropriate, using the text commands shown in parentheses.

contest.BRK (**BreakDown**)
    Rate sheets with QSOs and multipliers by hour, and QSOs and minutes by hour.

contest.CNT
    QSO counts by band and country. Tells you how many JAs you worked during that great 40 Meter long path opening.

contest.CON
    Continent statistics — how many and percentage of total QSOs in each continent.

contest.CTY (**WriteCList**)

Countries worked, with the call of the first station worked in each country, by band.

contest.DUP (**WriteDupe, DupeSheet**)

QSOs by band, using a compressed print format. This is really a listing of all stations worked, the name is a misnomer, held over from the days of paper logging. This file has control characters (special instructions) embedded in it to cause dot matrix printers to go into compressed mode. If your printer doesn't support this, you will get lines that wrap around and are hard to read. You suppress this formatting with the **NoCompress** text command, and reenable it with the **Compress** text command.

mycall.LOG (**WriteARRL**)

For ARRL contests only, the log in the required format for submission on diskette, for all supported ARRL contests. In addition to the diskette, ARRL requires that you submit the summary sheet on paper.

contest.MUL (**WriteMult**)

Multiplier breakdown by continent and band. This file has control characters (special instructions) embedded in it to cause dot matrix printers to go into compressed mode. If your printer doesn't support this, you will get lines that wrap around and are hard to read. You suppress this formatting with the **NoCompress** text command, and reenable it with the **Compress** text command. The PrintMult text command sends the breakdown report directly to your printer — *the program will hang if the printer is not ready.*

contest.SUM (**WriteSum**)

The summary sheet. You can edit this page before printing it to include information on your rig, antennas, excuses, and so forth.

These files silently overwrite any existing files with the same names.

Removing Dupes   The text command **RmDupes** creates a file named NEW.BIN which is identical to the current log except that all duplicate QSO are removed. You must exit *CT* and restart with the new file before you prepare the paperwork.

Note   **RmDupes** *and* FIX_MINE *renumber QSOs, which will change the numbers in the printed logs for serial number contests, and can mangle the bookkeeping for QTCs in the European DX Contest.*

Don't remove dupes without powerful motivation — the score and summary statistics presented by *CT* correctly account for any dupes in the log, and contest log checkers use your log to cross-check entries in other logs. Here are two common motives, which aren't really as important as they were in the days of paper logs.

- You can't stand to see any dupes in the log. Note, however, that some purists want *every* QSO in the log, and that the contest committees sometimes find them useful for cross checking. You might be surprised how often a dupe in your log is not reflected in the other log.

- You have marked a bad QSO by entering a known dupe or your own call. Yes, these clutter up the printed log, if you make one, but they have no effect on what really matters — your score.

Note   *A better way to mark bad QSOs is the* **Ctrl–L** *function, described in Marking Invalid QSOs on page 51.*

The Notes File   The text file *contest*.NOT contains any entries that you have made during the contest by using the **Alt–N** command. You can, of course, edit *contest*.NOT to include further war stories, excuses, and so forth. Compulsive personalities may also wish to correct bad typing which originated during the heat of the battle.

Post-contest Mode   Normally, *CT* will not allow you to change the date or time for a QSO. The Post-contest mode enables these functions to support creating a computer log from a paper log. To enter the Post-contest mode, type **PostContest** in the callsign field. The date and time changes to that of the last log entry, and the mode indicator following the date is turned on:

To leave Post-contest mode, type **NoPostContest**. The date and time will change back to the current time read from your computer's clock.

Note   *The date and time editing functions can seriously damage your log. Make a copy of the log file before you begin.*

Setting the Date   **SetDate** is a text command, used only in the Post-contest mode, that prompts you for a date in the day/month/year or day-month-year format. Be sure to set the contest date prior to entering log data in Post-contest mode. Be sure to set the contest date again for QSOs on the second day of the contest.

Note   *Because you can change dates and times, it is possible to get the log out of time order. This means that the rate meters and off time may be wrong or even negative. CT can't do anything about this.*

After entering the **SetDate**, every QSO, new or old, on which you use **Alt–F** (to change the time) will get this new date. It is easy to forget that you've used the **SetDate** command, and wind up with *CT* thinking that a contact from the first day was made on the second day. If you suspect a problem, type **AK1AFormat** into the callsign field to write an ASCII format log, and then view the log, looking for a bad date. You'll probably find a QSO or two with the wrong date. Go back into *CT* and **SetDate** correctly. Your problem should go away.

Entering Times   In Post-contest mode, *CT* logs QSOs normally, but does not enter a time for each QSO. As you enter QSOs, use the **Alt–F** key occasionally, to show a small window for entering the exact time of the QSO:

If you use *CT* to edit times or dates for a European DX Contest log, the time sent for QTCs will be incorrect. The only way to repair this error is to edit the final text log file, *contest*.LOG.

Interpolating Times   **FillTimes** is a text command, used only in Post-contest mode, that fills in estimated times for each QSO that does not yet have a time filled in. Estimated times are evenly-spaced between the times that you entered with **Alt–F**, and are marked with a period just before the callsign.

QSL Mode   The QSL mode supports preparing labels for some of the QSOs in your contest log, Restart *CT* with your contest log file and type **QSLMode** in the callsign field. An indicator appears next to the date showing the mode and the state of the Please/Thanks flag:

When you type a call while in QSL mode and press <**Enter**>, *CT* searches for that call in the log. If *CT* finds the call it will create a label for that contact and show the result in a window at the lower right in the screen:

If CT finds lots of contacts, on lots of bands, it will make out more than one label, as necessary. QSL mode prints labels to accommodate all possible band countries. Each label includes the name of the contest and either "Please QSL" or "Thanks for QSL" depending on flags that are set by the **Pse** and **Tnx** text commands. QSOs for more than one band are put on a label if possible. The label format assumes standard single column ⅞ × 3 inch labels.

If *CT* fails to find the call entered, it applies a wrong call algorithm to list near-matches. The algorithm permits you to examine QSOs for calls which are close to the one you entered:

- For logged calls of the same length as the entered call, *CT* will show all calls with exactly one character of difference.

- For logged calls differing in length by exactly one character, *CT* will display all calls where all characters but one are an exact match.

For example, In a log containing QSOs with K1GR, K1GX, and K1GQK, typing K1GQ into the callsign field in QSL mode produces the following list:

```
┌QSL Partials──────────────────────
│   1 25-Mar-92 2115  20 CW  K1GX
│   2 26-Mar-92 2227  20 CW  K1GR
│   3 26-Mar-92 2227  20 CW  K1GQK
│
```

You can use the arrow keys to move up and down in the list to choose a QSO; when you press <**Enter**> the call in the QSO is changed to match the one you typed and prepares the label. If you don't want to change your log, clear the callsign field using the usual editing key (See "Editing Keys" on page 52.) and type another call.

Normally, *CT* writes QSL label information to the file *contest*.QSL. You can send QSL labels directly to a printer, as well as the file, using the **Print** text command. **NoPrint** stops sending to the printer.

To disable QSL mode, type the text command **NoQSLMode**.

Contest-specific Features

The following sections supply information that is specific to each contest. Some information of this type is also discussed elsewhere. In particular, See "Number Abbreviations" on page 67. for a description of how Morse code numbers are handled. Brief overviews of the contest formats are provided, but you should examine the contest columns in the amateur radio journals to get the definitive statements of the current rules. The *Contest Corral* column in **QST** is an excellent place to start.

CQ World-Wide DX Contest

The phone mode contest is the fourth full weekend of October, and the CW mode contest is the fourth full weekend in November. The general format is work anyone outside your own country for QSO credit, and work anyone including your own country for multiplier credit. Multipliers are the countries and CQ zones. *CT* determines multipliers automatically using the prefix of the station's callsign and the data in the CQWW.CTY file.

The CQ World-Wide DX Contest logging line looks like this:

The 7 fields are QSO number, band, UTC, callsign, report received, number received, and multiplier flags. The number received field is the zone, and is automatically filled in based on the callsign. See *Multiplier Marks* on page 51 for definition of the multiplier flags. The six subfields in the multiplier field correspond to the six contest bands, 160 through 10 meters from left to right.

The binary log file is named *contest*.BIN. *CT* automatically creates the auxiliary files *contest*.BAD and *contest*.ZON. See *Cleaning the Log File* on page 72 for a discussion of what to do with these files. The **WriteLog** text command writes out 14 text files: *contest*.10, *contest*.15, *contest*.20, *contest*.40, *contest*.80, *contest*.160, *contest*.ALL, *contest*.BRK, *contest*.CNT, *contest*.CON, *contest*.CTY, *contest*.DUP, *contest*.MUL, and *contest*.SUM. See *Creating Report Files* on page 73 for a description of these files.

The Zone Map function, **Alt–Z**, shows and hides this chart of the CQ WW zones at the upper left corner of the Logging window:

Asterisks indicates zones that have been worked in the contest on each band.

The Check Zone Countries function, **Shift–F10**, conjures up the prefixes of every country in a named zone:

```
┌Check Zone Window──────────────────────────────┐
│  FO/c      TI                                  │
│  HK0/a     TI9                                 │
│  HK0/m     U3                                  │
│  HP        YN                                  │
│  HR        YS                                  │
│  TG                                            │
│                                                │
│                    ZONE: 7                     │
│                                                │
└────────────────────────────────────────────────┘
```

Name the zone by typing the zone number in the callsign field. This answers the question "What countries are in zone7?" So, for example, if you need zone 7 on 10 Meters, you can use **Shift–F10** to see who to look for.

The Multiplier Check Sheet function, **Alt–M**, displays countries worked by continent, as described in *Multiplier Summary* on page 55.

CQ World-Wide 160-Meter DX Contest

The CW mode contest occurs in January, and the phone mode weekend is in February. You work everybody for QSO points, with extra points for other countries and continents. The multipliers are U.S.A. states, Canadian provinces, and DXCC countries. Your multipliers are partly determined by prefixes, in concert with two multiplier data files, CQ160.DAT and CQWW.CTY.

The logging line looks like this:

The fields are QSO number, band (always 160), UTC, callsign, report received, multiplier received, and multiplier. If it can, *CT* fills in the multiplier received field based on the prefix. The multiplier is filled with the multiplier name when the QSO is a new multiplier. If you work a maritime mobile station in the CQ 160 contest, enter the multiplier received as "MM."

The binary log file is named *contest*.BIN. *CT* automatically creates the auxiliary file *contest*.BAD. See *Cleaning the Log File* on page 72 for a discussion of what to do with this file. The **WriteLog** text command writes out 8 text files: *contest*.ALL, *contest*.BRK, *contest*.CNT, *contest*.CON, *contest*.CTY, *contest*.DUP, *contest*.MUL, and *contest*.SUM. See *Creating Report Files* on page 73 for a description of these files.

The Zone Map function, **Alt–Z**, generates this display:

Multipliers that you need are shown in bold.

The Multiplier Check Sheet function, **Alt–M**, displays countries worked by continent, as described in *Multiplier Summary* on page 55.

CQ World-Wide WPX Contest

The phone mode contest is late in March, and the CW mode contest is late in May. You work anyone outside your country for QSO points, with more points for other continents. Work anyone, including your own country for multiplier credit. The multipliers are prefixes. The CQWW.CTY file is needed in this contest.

The logging line looks like this:

The fields are your QSO serial number, band, UTC, callsign, report received, serial number received, and multiplier. You must type the received number before the QSO will be accepted. *CT* determines the multiplier for you and fills in the multiplier field for QSOs that are new multipliers.

The binary log file is named *contest*.BIN. *CT* automatically creates the auxiliary file *contest*.BAD. See *Cleaning the Log File* on page 72 for a discussion of what to do with this file. The **WriteLog** text command writes out 11 text files: *contest*.10, *contest*.15, *contest*.20, *contest*.40, *contest*.80, *contest*.160, *contest*.ALL, *contest*.BRK, *contest*.DUP, *contest*.MUL, and *contest*.SUM. The **WriteARRL** text command prepares the *callsign*.log. See *Creating Report Files* on page 73 for a description of these files.

The **Alt–Z** function does not apply to this contest.

The Multiplier Check Sheet function, **Alt–M**, displays countries worked by continent, as described in *Multiplier Summary* on page 55.

ARRL International DX Contest

The CW mode contest is the third full weekend in February, and the phone mode contest is the first full weekend in March. There are two classes of participants, "domestic" and DX. Domestic stations are in U.S.A. or Canada. Only QSOs between domestic and DX have QSO and multiplier value. For domestic stations the multiplier is DXCC countries. For DX stations, the multiplier is states and provinces. To handle scoring correctly, *CT* has separate contest types — ARRL for domestic entrants and ARDX for DX entrants. Multipliers for domestic entrants are determined using the ARRL.CTY file, while multipliers for DX entrants use the ARDXDX.DAT file.

The logging line for domestic entrants looks like this:

The fields are QSO number, band, UTC, callsign, report received, power received, and multiplier flags. You must type the received number before the QSO will be accepted, If you have worked the station before, *CT* will fill in the power received field. *CT* determines the multiplier for you and fills in the multiplier field for QSOs that are new multipliers. See *Multiplier Marks* on page 51 for definitions of the flags. The logging line for DX entrants is similar with modifications to the last two fields.

The binary log file is named *contest*.BIN. *CT* automatically creates the auxiliary file *contest*.BAD. See *Cleaning the Log File* on page 72 for a discussion of what to do with this file. For DX entrants, the **WriteLog** text command writes out 6 text

files: *contest*.ALL, *contest*.BRK, *contest*.DUP, *mycall*.LOG, *contest*.MUL, and *contest*.SUM. For domestic entrants, 3 additional files are written: *contest*.CON, *contest*.CNT, and *contest*.CTY. See *Creating Report Files* on page 73 for a description of these files.

The **Alt–Z** function does not apply to domestic entrants. For DX entrants, **Alt–Z** displays a map of states and provinces:

```
┌STATES/PROVINCES WINDOW─────────────────────┐
  CT  NY  DE  AL  AR  CA  AZ  MI  IL  CO  NB  PQ
  MA  NJ  PA  GA  LA      ID  OH  IN  IA  NS  ON
  ME      MD  KY  MS      MT  WV  WI  KS  PEI MB
  NH      DC  NC  NM      NV          MN  NF  SK
  RI          FL  TX      OR          MO  LAB AB
  VT          SC  OK      UT          NE      BC
              TN          WA          ND      NWT
              VA          WY          SD      YU

└────────────────────────────────────────────┘
```

States and provinces not yet worked are displayed in bold on a monochrome monitor or white on a color monitor.

For domestic entrants, the Multiplier Check Sheet function, **Alt–M**, displays countries worked by continent, as described in *Multiplier Summary* on page 55. The function does not apply to DX entrants.

DX entrants send transmitter power as part of the exchange. *CT* asks you to supply a transmit power when you choose the ARDX Contest Type in the Information Sheet. Acceptable values are 1 through 100 in 1 Watt steps, 100 through 1500 in 10 Watt steps, and the letters KW. You can use the text command **TxPwr** to change the transmitter power. All subsequent contacts will be recorded at the new power, until **TxPwr** is used again. On CW, transmitter power sent in the **F2** message is not updated by the **TxPwr** command; Use **Shift–F2** to change the message text.

In the multioperator two transmitter (Multi-2) category, assign the first and second run stations with **Run1** and **Run2**.

ARRL 10-Meter Contest

This mixed-mode contest is the second full weekend in December. You work anybody for QSO points, once per mode, with extra points for CW QSOs and for QSOs with Novice or Technician stations. The multipliers are states, provinces, DXCC countries, and ITU regions for maritime and aeronautical mobiles. *CT* uses the AR10.DAT and ARRL.CTY multiplier files in this contest. AR10.DAT includes definitions for R1, R2, and R3. These are ITU Regions, and are the multipliers for marine mobile and aeronautical mobile stations.

The logging line looks like this:

W/VE stations send signal report and state/province. Other stations send signal report and serial number. The logging fields are your QSO serial number, band, UTC, callsign, report received, serial number received for DX stations or state/province received for W/VE stations, mode indicator, and multiplier. You must type the received number before the QSO will be accepted. *CT* determines the multiplier for you, if possible, and fills in the multiplier field for QSOs that are new multipliers.

The binary log file is named *contest*.BIN. *CT* automatically creates the auxiliary file *contest*.BAD. See *Cleaning the Log File* on page 72 for a discussion of what to do with this file. The **WriteLog** text command writes out 9 text files: *contest*.10, *contest*.BRK, *contest*.CNT, *contest*.CON, *contest*.CTY, *contest*.DUP, *mycall*.LOG, *contest*.MUL, and *contest*.SUM. See *Creating Report Files* on page 73 for a description of these files.

The Zone Map function, **Alt–Z**, function shows a list of the W/VE multipliers:

```
┌─STATES/PROVINCES MAP – CW ─────────────────────────┐
│ CT  NY  DE  AL  AR  CA  AZ  MI  IL  CO  NB  PQ      │
│ MA  NJ  PA  GA  LA      ID  OH  IN  IA  NS  ON      │
│ ME      MD  KY  MS      MT  WU  WI  KS  PEI MB      │
│ NH      DC  NC  NM      NU          MN  NF  SK      │
│ RI          FL  TX      OR          MO  LAB AB      │
│ UT          SC  OK      UT          NE  R1  BC      │
│             TN          WA          ND  R2  NWT     │
│             VA          WY          SD  R3  YU      │
│                         AK                          │
└────────────────────────────────────────────────────┘
```

Multipliers that you need are shown in bold (white on color monitors).

The Multiplier Check Sheet function, **Alt–M**, displays countries worked by continent, as described in *Multiplier Summary* on page 55.

ARRL 160-Meter Contest

This CW-only contest takes place the first full weekend in December. You work everybody for QSO points. W/VE entrants get extra QSO point credit for DX QSOs. The multipliers are ARRL sections. W/VE entrants also count DXCC countries as multipliers. *CT* uses the AR160.DAT and ARRL.CTY multiplier files for this contest.

The logging line looks like this:

W/VE stations send signal report and section. Other stations send signal report. The logging fields are your QSO serial number, band, UTC, callsign, report received, section received for W/VE stations, mode indicator, and multiplier.

You must type the section before the QSO will be accepted. *CT* fills in the multiplier field for QSOs that are new multipliers.

The binary log file is named *contest*.BIN. *CT* automatically creates the auxiliary file *contest*.BAD. See *Cleaning the Log File* on page 72 for a discussion of what to do with this file. The **WriteLog** text command writes out 9 text files: *contest*.160, *contest*.BRK, *contest*.CNT, *contest*.CON, *contest*.CTY, *contest*.DUP, *mycall*.LOG, *contest*.MUL, and *contest*.SUM. See *Creating Report Files* on page 73 for a description of these files.

The Zone Map function, **Alt–Z**, function shows a list of the W/VE multipliers:

```
┌SECTION MAP─────────────────────────────────────┐
│ CT  ENY DE  AL  AR  EB  AZ  MI  IL  CO  MAR PR  │
│ EMA NLI EPA GA  LA  LAX ID  OH  IN  IA  PQ  VI  │
│ ME  NNJ MDC KY  MS  ORG MT  WV  WI  KS  ON  PAC │
│ NH  SNJ WPA NC  NM  SB  NV          MN  MB  AK  │
│ RI  WNY     NFL NTX SCV ORE         MO  SK      │
│ VT          SC  OK  SDG UT          NE  AB      │
│ WMA         SFL STX SF  EWA         ND  BC      │
│             TN  WTX SJV WWA         SD  YU      │
│             VA      SV  WY                      │
└────────────────────────────────────────────────┘
```

Multipliers that you need are shown in bold (white on color monitors). Section abbreviations can be confusing. In particular: AL is Alabama, AK is Alaska, AR is Arkansas, LA is Louisiana, LAX is Los Angeles, OR is Oregon, and ORG is Orange. *CT* does not attempt to identify section multipliers arriving from PacketCluster™.

The Multiplier Check Sheet function, **Alt–M**, displays countries worked by continent, as described in *Multiplier Summary* on page 55.

Use the text command **MySec** to change your current section. All QSOs listed in *mycall*.LOG show the section set by the last **MySec** command.

ARRL November Sweepstakes

The CW mode contest is the first full weekend of November, and the phone mode contest is the third full weekend of November. W and VE work each other for QSO points; DX stations do not participate. The multipliers are ARRL/CRRL sections. *CT* uses the SEC.DAT file to check section multipliers. When you choose SS as the Contest Type in the Information Sheet, *CT* asks you to define your Sweepstakes exchange information — precedence, check, and section — using mini-windows that appear when you leave the Information Sheet.

The logging line looks like this:

The nine fields are QSO serial number, band, UTC, received QSO serial number, received precedence, callsign, received check, received section, and multiplier

number. You must fill in the callsign and received exchange for each QSO. *CT* fills in the other fields for you. Move the cursor between fields by pressing the **Space** or **Tab** keys. The cursor starts in the callsign field for a new QSO, and progresses through the other fields in the following order: number, precedence, back to callsign, check, section. **Shift–Tab** rotates through the sequence in the opposite direction. Information typed into the fields is tested against several rules:

- The number field must contain a number between 1 and 10,000

- The precedence field must contain A, B, or Q

- The callsign field must contain at least one letter and one number

- The check field must contain a two-digit number

- The section field must contain a valid abbreviation for a section. The choices are defined in SEC.DAT.

The binary log file is named *contest*.BIN. *CT* automatically creates the auxiliary file *contest*.BAD. See *Cleaning the Log File* on page 72 for a discussion of what to do with this file. The **WriteLog** text command writes out 5 text files: *contest*.BRK, *contest*.DUP, *mycall*.LOG, *contest*.MUL, and *contest*.SUM. See *Creating Report Files* on page 73 for a description of these files.

The Zone Map function, **Alt–Z**, shows a list of sections:

```
┌SECTION WINDOW───────────────────────────────────────┐
│ CT  ENY DE  AL  AR  EB  AZ  MI  IL  CO  MAR PR       │
│ EMA NLI EPA GA  LA  LAX ID  OH  IN  IA  PQ  VI       │
│ ME  NNJ MDC KY  MS  ORG MT  WV  WI  KS  ON  PAC      │
│ NH  SNJ WPA NC  NM  SB  NV          MN  MB  AK       │
│ RI  WNY     NFL NTX SCV ORE         MO  SK           │
│ UT          SC  OK  SDG UT          NE  AB           │
│ WMA         SFL STX SF  EWA         ND  BC           │
│             TN  WTX SJV WWA         SD  YU           │
│             VA      SV  WY                           │
└─────────────────────────────────────────────────────┘
```

Multipliers that you need are shown in bold (white on color monitors). Section abbreviations can be confusing. In particular: AL is Alabama, AK is Alaska, AR is Arkansas, LA is Louisiana, LAX is Los Angeles, OR is Oregon, and ORG is Orange. *CT* does not attempt to identify section multipliers arriving from PacketCluster™.

The Multiplier Check Sheet function, **Alt–M**, does not apply in this contest.

You can use **Alt** in combination with the number keys to send specific parts of the Sweepstakes exchange:

Alt–1

Send your serial number.

Alt–2
Send your precedence.

Alt–3
Send your call.

Alt–4
Send your check.

Alt–5
Send your section.

You can change your Sweepstakes exchange using **Shift–F2**. Type the new exchange information in the mini-window, using # in place of your serial number.

ARRL VHF QSO Party

This contest takes place in June and again in September. Generally, you work anyone you can on any amateur radio band 50 MHz and above. The multipliers are grid squares; *CT* doesn't need a multiplier file for this contest, and supports 12 bands: 50 MHz, 144 MHz, 222 MHz, 432 MHz, 903 MHz, 1.2 GHz, 2.3 GHz, 3.4 GHz, 5.7 GHz, 10 GHz, 24 GHz, and Light. The default band in a new log is 144 MHz. When you choose VHF as the Contest Type in the Information Sheet, *CT* asks you to specify your grid square.

The logging line looks like this:

The fields are QSO number, frequency band, UTC, callsign, received report, received grid square, and multiplier. You must fill in the callsign and grid square, unless the station has been worked before and is still in the same location. *CT* fills in the other fields, an places an asterisk in the multiplier field for new multipliers.

The binary log file is named *contest*.BIN. *CT* automatically creates the auxiliary file *contest*.BAD. See *Cleaning the Log File* on page 72 for a discussion of what to do with this file. The **WriteLog** text command writes out 5 text files: *contest*.BRK, *contest*.DUP, *mycall*.LOG, *contest*.MUL, and *contest*.SUM. See *Creating Report Files* on page 73 for a description of these files.

CT does not track modes, or allow entry of signal reports, because they are not part of the contest. Remember that *CT* cannot send CW slower than 22 WPM, so hook up an external keyer.

The Zone Map function, **Alt–Z**, displays a grid square map, which is centered on your grid square. Use the text command **Grid** to center the grid square map on another coordinate. Use the text command **MyGrid** to change your grid square.

The Multiplier Check Sheet function does not apply to this contest (**Alt–M** is redefined to have the same function as **Alt–Z**).

CT's rover category is incomplete. The rules allow a rover to restart their log and work everyone again when the grid square is changed. *CT* does not support this rule. Use separate log files to do this. The CT.CFG file can reduce the aggravation of restarting the program, See "Configuration File" on page 35.

ARRL Field Day   This activity takes place in late June. W/VE stations work anyone for QSO points, but DX stations can not participate competitively. The rules are intricate; complete details are published in May QST. Although there are no multipliers in the usual sense there are many bonuses. *CT* uses the FD.DAT file to check the received section information.

When you choose FD as the Contest Type in the Information Sheet, the following window appears to collect the ancillary data needed to compute your score:

```
┌FD Options -  Press Ctrl <Enter> to continue┐
│                                             │
│      Section ......................         │
│      Category ...................    1A     │
│      Power .....................     A      │
│      Emergency Power Bonus ......    N      │
│      Public Relations Bonus .....    N      │
│      Location Bonus .............    N      │
│      Information Booth Bonus ....    N      │
│      Message Origination Bonus ..    N      │
│      Messages Relayed ..........     0      │
│      Satellite QSO Bonus ........    N      │
│      Natural Power Bonus ........    N      │
│      W1AW Message Bonus .........    N      │
│      Packet QSO Bonus ..........     N      │
│                                             │
└─────────────────────────────────────────────┘
```

CT also supports the D category, correctly scoring QSOs with other D category entrants as zero points. *CT* credits 100 points per transmitter running on emergency power.

The logging line looks like this:

The seven fields are QSO number, band, UTC, callsign, received entry category, received section, and mode. You must fill in the callsign, category and section fields.

The Summary window shows all the band-mode combinations where you can make QSOs in the Field Day activity. The DIG columns refer to digital modes, such as RTTY and AMTOR.

The Band Up and Band Down functions, **Alt–F1** and **Alt–F2**, cycle through rows in the Summary window. The Mode Up and Mode Down functions, **Ctrl–F1** and **Ctrl–F2,** cycle through the columns.

The binary log file is named *contest*.BIN. *CT* automatically creates the auxiliary file *contest*.BAD. See *Cleaning the Log File* on page 72 for a discussion of what to do with this file. The **WriteLog** text command writes out 5 text files: *contest*.BRK, *contest*.DUP, *mycall*.LOG, *contest*.MUL, and *contest*.SUM. See *Creating Report Files* on page 73 for a description of these files.

The Zone Map function, **Alt–Z**, shows a list of sections:

```
┌SECTIONS MAP - 20 CW ─────────────
 CT  ENY DE  AL  AR  EB  AZ  MI  IL  CO  MAR PR
 EMA NNJ EPA GA  LA  LAX ID  OH  IN  IA  PQ  VI
 ME  SNJ MDC KY  MS  ORG MT  WV  WI  KS  ON  PAC
 NH  NLI WPA NC  NM  SB  NV          MN  MB  AK
 RI  WNY     NFL NTX SCV ORE         MO  SK  DX
 UT          SC  OK  SDG UT          NE  AB
 WMA         SFL STX SF  EWA         ND  BC
             TN  WTX SJV WWA         SD  YU
             VA      SV  WY
└──────────────────────────────────
```

Since sections aren't multipliers, this is merely for the curious.

The Multiplier Check Sheet function, **Alt–M**, does not apply to this contest.

You can change your Field Day exchange using **Shift–F2**. Type the new exchange information in the mini-window.

European DX Contest　　This contest used to be known as WAE (Work All Europe). The CW mode event occurs in August, phone in September, and RTTY in November. Stations inside Europe work stations outside Europe for QSO credit. For stations outside Europe, the multipliers are European countries, as determined by the `CQWW.CTY` country and prefix file. Bookkeeping for this contest is unusually intricate due to the QTC feature of the rules. *CT* supports entrants both inside and outside Europe.

The logging line looks like this:

The seven fields are QSO number, band, UTC, callsign, received report, received serial number, and multiplier flags. You must fill in the callsign and serial number fields. *CT* completes the other fields, and marks new multipliers with a asterisk.

WAE QTC Form　　Pressing **Alt–L** starts the WAE QTC form. The QTC Receiving Station is filled in from the current logging line, but you can change it before sending the QTC. Some function keys are temporarily redefined with appropriate messages as shown at the right in the window. Typically you press <**Enter**> to accept the receiving station call, **F2** to send the entire QTC, and **Alt–L** to get back to the logging window. *CT* is smart enough to automatically exclude a QSO with the receiving station in the 10 QTCs, and to add it to the next QTC list. In networked configurations, *CT* passes the QTC information to all computers.

The binary log file is named *contest.*BIN. Another binary file, *contest.*QTC, hold records of your QTC messages. *CT* automatically creates the auxiliary file *contest.*BAD. See *Cleaning the Log File* on page 72 for a discussion of what to do with this file. The **WriteLog** text command writes out 11 text files: *contest.*10, *contest.*15, *contest.*20, *contest.*40, *contest.*80, *contest.*ALL, *contest.*BRK, *contest.*CNT, *contest.*CTY, *contest.*DUP, *contest.*MUL, *contest.*SUM, and *contest.*WAE. See *Creating Report Files* on page 73 for a description of these files. The last file, *contest.*WAE, contains the printout of your QTC messages for the contest sponsor.

The Zone Map function, **Alt–Z**, does not apply to this contest.

The Multiplier Check Sheet function, **Alt–M**, shows the standard set of multiplier lists by continent, although only the list for Europe is relevant.

Note   The logs for this contest are especially susceptible to damage by editing functions that remove QSOs or change date/time.

DXpedition Mode   This "Contest Type" isn't really a contest — it provides the power of *CT* to DX expeditions who need to manage thousands of QSOs and QSLs. The functions available are essentially the same as those for the CQ World-Wide DX Contest, with the addition of the 30-meter, 17-meter and 12-meter bands, and a band for satellite QSOs.

California QSO Party   This mixed-mode event takes place in early October. Everybody works everybody for QSO points, with extra points for CW QSOs. The multipliers are California counties, or, for Californians, states and provinces. *CT* supports entrants inside California, with multipliers determined using the CQP.DAT database file. The logging line lists your QSO serial number, band, time, the other station's callsign, serial number and section or province, mode, and multiplier

If you are outside California, KI3V has created a substitute for `CQP.DAT` that changes the multipliers to California counties. Rename the original file to something else and then rename the `CQP1.DAT` file to `CQP.DAT`.

IARU HF World Championship

This contest is a mixed-mode event on the second full weekend of July. You can enter as CW-only, phone-only, or mixed-mode. Everybody works everybody for QSO credit, once per band-mode. Different QSO points are counted depending on continent and ITU zone. The multipliers are ITU zones (once per contest) and IARU HQ member-society stations per band. *CT* uses the `IARU.DAT` file to determine multipliers. The exchange is RST and ITU zone, except that society stations send "HQ" instead of their zone. *CT* recognizes HQ in the zone field and scores your log appropriately. The logging line looks like this:

All-Asian DX Contest

The CW mode event is in mid-June, and the phone event is in early September. Stations inside Asia work stations outside Asia for QSO points. The multipliers for stations outside Asia are Asian prefixes. For stations inside Asia, the multiplier is ARRL DXCC countries. Multipliers are determined using the `ARRL.CTY` database. The exchange is RST and your age

WRTC

RAC

NAQP

Advanced Techniques

CT is a powerful program, with many unobvious capabilities. This section rewards those intrepid few who actually read manuals by discussing some advanced techniques.

Faster Startup

Use `CT.CFG` to save time in starting *CT* for a new contest. See *Configuration File* on page 35 for details on editing your configuration file.

Search-and-Pounce

Using the Check Partial function, **F8**, is the best way to search and pounce efficiently. Hit **F8** and type two or more characters in a callsign. Unless you typed a common prefix like G3 or DJ, the Check Partial window will show only a few calls that are potential matches. Calls which have not been worked on the current band are highlighted. To check another call, quickly erase the current partial using the **Wipe** or **Wipe QSO** editing keys (See "Editing Keys" on page 52.), then type the new characters. You don't need to hit **F8** again unless

you use another function that covers the Check Partial window. You will soon find that you are automatically hitting two characters as you tune the band, just as you automatically used to glance at the checksheet. When you only hear the suffix, Check Partial has a big advantage over paper dupe sheets. You won't have to mentally associate a prefix with the suffix, then find it on the paper.

If you are answering CQs, here is the typical order of keystrokes:

1   **Type** *hiscall* **and press F10.**

    Checks whether the station has been worked before, and whether or not it is a new multiplier on any band. You may want to call a dupe to move him if needed on another band, so checking dupes is less effective than Check Country.

2   **Press F4.**

    Sends *mycall.* If you have enabled the automatic prevention of duplicates using the **NoWorkDupe** text command, pressing **F4** won't send anything, so you don't have to press **F10** in the previous step if you don't care about multipliers.

3   **Press Ins and <Enter>**

    Sends *hiscall* and your report, and logs the QSO. equivalent to **F5** and **F2**.

Running   If you are CQing, here is the typical order of keystrokes:

1   **Press F1.**

    Sends your CQ message.

2   **Type** *hiscall* **and press Ins.**

    Sends *hiscall* and your report, equivalent to **F5** and **F2**.

3   Press + **on the keypad.**

    Sends your confirm message and logs the QSO, equivalent to **F3** and <**Enter**>.

Increasing Your Multiplier   Try to get the habit of watching the Check Country window (**F10**). The window stays on the screen after you call it up, and automatically updates when you type a callsign and press the Tab key or the space bar. This teaches you what you need on what band. For example, after working a dozen GWs on 20 and 15, you just know you need a GW on 40, because it has been displayed at you so often.

Last Two Letters   Some misguided souls who have been overexposed to list operations answer your CQ with only the last two letters of their calls. Enter the two letters and

Ctrl–A to place the cursor at the beginning of the call field, ready to insert the rest of the call.

Clear a QSO There are times when you want to wipe the slate clean. *CT* offers several ways to do this to a QSO, See "Editing Keys" on page 52. for descriptions of the Wipe and Wipe QSO function keys.

Correcting Logging Errors Should you forget to change bands in the logging program after changing bands with your radio, there is no harm done. Simply back up in the log to the appropriate QSO with your arrow keys and change bands, for each incorrect QSO, with either **Alt–F1** or **Alt–F2**. QSOs entered on the wrong band must be changed one at a time. Similarly, in contests where mode may change (Field Day or the ARRL 10 Meter Contest), mode errors can be changed by backing up and typing **Ctrl–F1** or **Ctrl–F2**.

If you find that you've entered a callsign in error after committing the QSO by pressing <**Enter**>, navigate the text cursor back up to the erring callsign and replace it with your own callsign. Later, after the contest, run FIX_MINE, to remove all contacts with your own callsign. See *Removing Bad QSOs* on page 94.

Note   Using this technique in contests with serial numbers will munge your log.

To find a previous QSO when you know the call, first type the callsign and type **F9** or **F10** to see the QSO serial number. Next type **Ctrl–W** to remove the callsign from the current log entry line. Type the QSO number and **Ctrl–G** to navigate to the QSO. Edit the QSO, and type **Ctrl–G** again to return to the current log entry.

Low Memory Condition If your computer warns you that you are running out of memory, you can gain some back by removing the country maps used by the **Alt–M** function to show your multipliers by continent. This can be done very quickly, and will permit 300–600 more QSOs. Exit *CT* using **Quit**, **Alt–Q**, or **Alt–X**, then restart immediately with the no maps and no wait switches (See "Command Line Switches" on page 33.). For example:

```
CT CQWW91 -NOM -NOW
```

Utility Programs

Several utility programs are provided with *CT* that work with the binary log file and the multiplier database files. Some of the programs are on the distribution diskette and others are only available on the *CT* BBS or the *CT* web site.

Preparing QSL Labels

A separate stand alone program, QSL, is provided with *CT*. This program processes a log in batch mode to generate a label for every station on every band worked. All data is kept and sorted on disk, so there are no limits due to memory size on how many QSOs can be processed. The program is aware of three modes, CW, SSB, and RTTY, and knows about the WARC bands for DXpedition mode and Field Day.

Run QSL by typing the program name and the log file name at the DOS prompt. For example,

```
QSL CQWW91.BIN <ENTER>
```

processes the CQWW91 log, producing the label file CQWW91.LAB and the binary master QSL file MASTER.QSL. You must send the label file to a printer using DOS commands. The label file has six lines per label, single label width, for the standard ⅞ × 3 inch labels.

Note   Previous versions of MASTER.QSL *are incompatible with the current version of* QSL.

When QSL is run against subsequent log files, MASTER.QSL is loaded first. The program generates QSL label information only for calls and bands that do not appear in MASTER.QSL. The MASTER.QSL file is then updated to include the log just processed. Using QSL, G3FXB receives a QSL for each band the first time you work him, then never receives another for that band. The QSL program needs CQWW.CTY to determine countries. Either copy the CQWW.CTY file to the directory that contains QSL, or set the CTPATH environment variable as discussed in *Search Path* on page 31.

You can use a text editor to review and modify the label file before printing. Finding the proper alignment for label forms is often a matter of trial and error, so you may want to start with a label file containing just one or two labels. Be sure to write down the final alignment procedure for subsequent sessions.

Log File Conversion

The binary log file cannot be edited with a text editor. The B2R9 utility program converts a *contest*.BIN file to a text file *contest*.RES. The R2B9 utility program

converts a *contest*.RES file back to the binary format. These programs only work with Version 9 binary files. The utilities B2R8 and R2B8 are available for Version 8 binary files. Although the Post-contest mode makes these utilities obsolete for log preparation, the conversion can be useful for importing contest logs into some of the day-to-day loggers on the market.

The "8" in the utility programs is a reminder that they apply to *CT* version 8 binary log files. The format of these files is different from that for previous versions. The differences make it impossible for *CT* version 8 to read older log files without conversion. You can convert between version 7 and version 8 binary log files using the two utility programs 7TO8 and 8TO7.

Note   Some programs other than CT can also read your CT binary log files. This is possible because K1EA freely disseminates the binary file format for other programmers to use.

Removing Bad QSOs

Once a QSO has been committed to the log file by pressing <**Enter**>, it can not be deleted within *CT*. To cover mistakes during the contest, edit the QSO to substitute your own callsign. Then run the FIX_MINE utility program after the contest, *using a copy of your log file*, to delete all QSOs with yourself and thus cleaning out all the mistakes.

Note   This program is dangerous for serial number contests (for example, the European DX Contest, ARRL November Sweepstakes, or The CQ World-Wide WPX Contest). FIX_MINE will renumber the QSOs, causing discrepancies between the numbers you actually sent and the numbers recorded in your log.

Combining Logs

The MERGE utility programs (specific versions are provided for best performance on each machine type) combine two binary log files into one file. Why would you have two logs (or more) logs?

- You ran a multi-transmitter entry using the *CT* Network, and the logs got out of sync because the network failed or one of the computers crashed.

- You ran the contest on a computer with 640K of RAM. After 4500 QSOs or so, *CT* warned you that you were about to run out of memory, so you started another contest log.

To merge two logs, supply the two base names on the command line. For example,

```
MERGE CQWW91 CQWW91_B
```

replaces CQWW91.BIN with the merged contents of CQWW91.BIN and CQWW91_B.BIN. To merge more than two logs, just repeat the above step with a new second file each time.

Function Keys and Command Reference

CT has many *functions* and *commands*. You ask *CT* to perform a function by pressing a pre-defined *key sequence*, and you ask for a command by typing the name of the command into the callsign field and pressing <**Enter**>. This chapter lists all of the key sequences and commands, with brief discussions of their properties. You can learn more about specific items by looking for other references to them in the Index.

Key Sequences   There are many functions in *CT* that are invoked by pressing predefined key combinations. The combinations are grouped into four categories:

- Function key functions involve one of the function keys, **F1** through **F12**.

- Alternate key functions require holding down the **Alt** key and pressing another key, excluding function keys.

- Control key functions require holding down the **Ctrl** key and pressing another key, excluding functions keys.

- Special key functions involve one of the non-alphanumeric keys other than the function keys, such as **Tab** or **PgDn**.

Note   You can use the DefineKey command to change the key sequence that is associated with a function.

Table 4   Unmodified Function Key Functions

Key Sequence	Function Name	Function
F1	send_cq	transmit CQ message
F2	send_ex	transmit exchange message
F3	send_qrz	transmit confirm message
F4	send_call	transmit *my call*
F5	send_his_call	transmit *his call*
F6	send_f6	transmit F6 message (default is "cl?")
F7	send_f7	transmit F7 message (default is "?")
F8	chk_partial	list all calls in the log that match the callsign field
F9	chk_call	show bands where station has been worked
F10	chk_cty	show bands where station's country has been worked
F11	wipe_qso	clear the current log entry
F12	check_unique	list all calls in the logs and master database that match the callsign field

Table 5   Shift–Function Key Functions

Key Sequence	Function Name	Function
Shift–F1	set_cq	set F1message
Shift–F2	set_ex	set F2 message
Shift-F3	set_qrz	set F3 message
Shift–F4	set_call	set F4 message
Shift–F5		
Shift–F6	set_F6	set F6 message
Shift–F7	set_F7	set F7 message
Shift–F8	check_unique	list all calls in the logs and master database that match the callsign field
Shift–F9	set_dupe_msg	set QSO before message
Shift–F10	check_zone	List the prefixes of countries in the zone number in the callsign field
Shift–F11		
Shift–F12		

Table 6   Alt–Function Key Functions

Key Sequence	Function Name	Function
Alt–F1	band_down	change the log and radio to the next lower band
Alt–F2	band_up	change the log and radio to the next higher band
Alt–F3	announce_dx	spot the current QSO to packet
Alt–F4	toggle_freq	set the log and radio to the selected spot or bandmap entry
Alt–F5	new_running_freq	set the run frequency to the current frequency
Alt–F6		
Alt–F7	send_qso_before	transmit the QSO before message
Alt–F8	wipe_qso	clear the current log entry
Alt–F9	speed_down	decrease the CW speed by 2 WPM
Alt–F10	speed_up	increase the CW speed by 2 WPM
Alt–F11		
Alt–F12		

Table 7   Ctrl–Function Key Functions

Key Sequence	Function Name	Function
Ctrl–F1	mode_down	change the log and radio emission mode
Ctrl–F2	mode_up	change the log and radio emission mode
Ctrl–F3	tog_mult_stn	toggle the log between Run and Mult
Ctrl–F4	tog_send_ser	toggle $\mathcal{DVP}$ send number
Ctrl–F5	tog_send_call	toggle $\mathcal{DVP}$ send callsign
Ctrl–F6	set_number_msg	Record the $\mathcal{DVP}$ "your number is" message
Ctrl–F7		
Ctrl–F8		
Ctrl–F9	rate_sheet	show/hide the rate graph window
Ctrl–F10	aim_beam	

Table 8   Alt Key Functions

Key Sequence	Function Name	Function
Alt–A	tog_announce	show/hide the Callouts window
Alt–B	enable_sked_win	show the Schedules window
Alt–C	tog_check	show/hide the Check Country window
Alt–D	send_pass	show the Pass Freq? window
Alt–E	set_sked	
Alt–F	edit_time	show the Set QSO date/time window
Alt–G	send_talk	Show Talk Line (gab) window
Alt–H	show_help	show the Help window
Alt–I	tog_talk_win	show/hide the network messages window
Alt–J	tog_freq_win	show/hide the network frequencies window

Table 8   Alt Key Functions

Key Sequence	Function Name	Function
Alt–K	tog_kb_mode	toggle CW keyboard mode
Alt–L	execute_qtc	show the WAE QTC window
Alt–M	show_mults	show the multiplier check sheet window
Alt–N	write_note	show the notes window
Alt–O	pkt_win	monitor input from packet
Alt–P	send_tmp	transmit voice recording from temporary file
Alt–Q		save the log and quit
Alt–R	enable_rate_win	show the rate window
Alt–S	enable_sum_win	show the summary window
Alt–T		toggle packet talk mode
Alt–U	check_unique	List the prefixes of countries in the zone number in the callsign field
Alt–V	set_speed	set the CW speed
Alt–W	wipe_qso	clear the current log entry
Alt–X		save the log and quit
Alt–Y	tog_mult_stn	toggle the log between Run and Mult
Alt–Z	enable_zone_win	show the zone map or grid squares
Alt–1	send_serial_num	transmit the serial number (SS)
Alt–2	send_prec	transmit the precedence (SS)
Alt–3	send_call	transmit *my call* (SS)
Alt–4	send_chk	transmit the check (SS)
Alt–5	send_sec	transmit the section (SS)
Alt–6	save_30	record a 30 second audio snippet
Alt–7	save_20	record a 20 second audio snippet
Alt–8	save_15	record a 15 second audio snippet
Alt–9	save_10	record a 10 second audio snippet
Alt–0	save_5	record a 5 second audio snippet
Alt––	play_qso	transmit the audio snippet
Alt–=	enable_pass_win	show the pass window
Alt–,	tog_band_map	show/hide the band map window
Alt–.	switch_radio	toggle between radio 1 and radio 2
Alt–/	switch_rotator	toggle between rotator 1 and rotator 2
Alt–Del	radio_cmd1	
Alt–Insert	radio_cmd2	
Alt–↑	out_gain_up	increase $\mathcal{DVP}$ audio output level
Alt–↓	out_gain_down	decrease $\mathcal{DVP}$ audio input level
Alt–→	sel_band_map	change keyboard focus into band map window

Table 9   Ctrl Key Functions

Key Sequence	Function Name	Function
Ctrl–A	start	move the cursor to the start of the current field
Ctrl–B	backward	move the cursor backward one character
Ctrl–C	stop_cw	Stop CW sending
Ctrl–D	dl	delete the character at the cursor
Ctrl–E	end	move the cursor to the end of the current field
Ctrl–F	forward	move the cursor forward one character
Ctrl–G	show_log	go to log line number
Ctrl–H	backspace	move the cursor backward on character
Ctrl–I	switch_field	move the cursor to the next field (also Tab)
Ctrl–J		add the current log entry to the band map window
Ctrl–K	kill	delete characters from curror position to the end of field
Ctrl_L	tog_non_qso	mark log entry as invalid QSO
Ctrl–M	logit	<Enter>
Ctrl–N	forward_log	
Ctrl–P	play_tmp	play voice recording from voice recording
Ctrl–R	rec_tmp	start voice recording to temporary file
Ctrl–T	tune	key-down for tune (press any key to end)
Ctrl–W	wipe	clear the current log entry
Ctrl–<BS>	wipe	clear the current log entry
Ctrl–Enter	ctl_ret	enter callsign in Band Map
Ctrl–PgUp	backward_day	go back one day in log
Ctrl–PgDn	forward_day	go forward one day in log
Ctrl–↑	in_gain_up	increase $\mathcal{DVP}$ audio input sensitivity
Ctrl–↓	in_gain_down	decrease $\mathcal{DVP}$ audio input sensitivity
Ctrl–←		delete field
Ctrl–→	sel_announce	change keyboard focus into Callouts window

Table 10   Special Key Functions

Key Sequence	Function Name	Function
<Enter>	ctl_ret	log QSO
Ins	ans_cq	equivalent to F5 then F2
Esc	stop_cw	panic stop (sending)
Tab		next field
Shift–Tab	switch_prior_field	previous field
+	log_and_qsl	equivalent to F3 then <**Enter**>
–	send_split	show split frequency window
Space	switch_call_field	toggle between call field and info field
Home	start	start of field
End	end	end of field
Del	dl	delete character on cursor
PgUp	backward_page	move cursor back one log page
PgDn	forward_page	move cursor forward one log page
↑	backward_log	move cursor back one log line
↓	forward_log	move cursor forward one log line
←	backward	move cursor back one character in field
→	forward	move cursor forward one character in field
.	switch_radio	
,	switch_stereo	

Text Commands   The following commands are invoked by typing the command into the callsign field. The commands are listed alphabetically.

AK1AFormat

AllQSOSpot

AllRate
> Sets the rate computations to use QSOs on all stations in the multi-transmitter class. See **BandRate**.

AllSpot
> Show spots for all bands in the Callouts window. See **BandSpot**.

Alternate
> In SO2R, causes CQ's to alternate between radio 1 and radio 2.

AutoSave
> Saves the *contest*.BIN file, in its then current form, to drive A (and *only* to drive A), every hour on the hour, as *contest*.SAV. See **NoAutoSave**.
>
> This command may hang your machine if you do not have a formatted

floppy in drive A with the door closed.

BackCopy

Enables 30-second continuous voice recording loop with $\mathcal{DVP}$. See **NoBackCopy**.

BandQSOSpot

BandRate

Sets the rate computations to use only QSO made by this station in the multi-transmitter class. See **AllRate**.

BandSpot

Show only spots for the current band in the Callouts window. Useful for multi-transmitter entries. See **AllSpot**.

Beep

Turns on the speaker. See **NoBeep**. Beeps are used by *CT* to notify you of dupes, new multipliers, and other important events.

BreakDown

Generates a rate sheet file, *contest*.BRK, showing QSOs and multipliers by hour.

Bug

Sets keyer type to bug.

Colors

Enters a series of menus for setting text and window colors.

ColorSave

Writes COLORS.INI in current directory or CTPATH, containing color settings and window positions. Used to initialize colors and positions for new logs.

Compress

Enables compressed character printing on most dot matrix printers. See **NoCompress**. Compressed characters are used in *contest*.DUP and *contest*.MUL.

Cont

Correct

If a station is worked on CW using the **Ins** key, *CT* remembers the callsign sent. If that callsign is modified and then **F3** (QRZ) or + is used, *CT* inserts

the new, corrected call before the QRZ message. See **NoCorrect**.

CurtisA
Sets keyer type to CurtisA.

CurtisB
Sets keyer type to CurtisB.

CWAbbrev
Enables abbreviation codes A, N, and T for digits 1, 9, and 0. See **NoCWAbbrev**.

CWLeft

CWRight

DefineKey
Opens a window for reassigning keys.

DRSI
Enables packet communications via an internal PC•Packet Adapter. See **NoDRSI**.

DupeSheet
Synonym for WriteDupe.

DVP
Shows the DVP Editing window for building alphanumeric voice libraries.

Exit

FillTimes
Causes *CT* to fill in estimated times for each QSO without a time. Estimated times are marked with a period (.) prior to the callsign. This command applies only in PostContest mode.

Grid
Relocates the center of the grid map in the VHF QSO Party.

Help
Displays the Help Window.

MemLeft
Displays the number of QSOs that will fit in the remaining available mem-

ory.

Mon

Sets the $\mathcal{DVP}$ to monitor its own audio when transmitting instead of the receiver output. See **NoMon**.

Mult

Sets the logging tag to multiplier station for the multi-operator single-transmitter class. See **Run**.

MyGrid

Sets the log's grid square coordinates for the ARRL VHF QSO party.

MySec

Sets the log's section for ARRL contests that use sections as multipliers.

NoAutoSave

Disables **AutoSave**.

NoBackCopy

Disable continuous-loop voice recording. See **BackCopy**.

NoBeep

Turns off speaker noises. See **Beep**.

NoCompress

Disables **Compress** mode. This does *not* reformat the printout to avoid line wraps on 80 character devices. See **Compress**.

NoCorrect

Turns the **Correct** feature off. See **Correct**.

NoCWAbbrev

Restores normal Morse code characters for digits 1, 9, and 0. See **CWAbbrev**.

NoDRSI

Disables an internal packet TNC. See **DRSI**.

NoKeyer

Sets keyer type to none.

NoMon

Sets the $\mathcal{DVP}$ to monitor receiver output instead of the $\mathcal{DVP}$ output. See **Mon**.

NoPostContest

Returns *CT* to normal logging mode. See **PostContest**.

NoPrint

Turns **Print** mode off for QSL printing. See **Print**.

NoPTT
> Disables control of push-to-talk through the $\mathcal{DVP}$. See **PTT**.

NoQSLMode
> Returns $\mathcal{CT}$ to normal logging mode. See **QSLMode**.

NoRadio
> Disables communication with a radio, to unhang $\mathcal{CT}$ if the radio fails. See **Radio**.

NoRpt
> Disables repeat mode. See **Rpt**.

NoSeeWARC
> Filters out WARC-band spots. See **SeeWARC**.

NoSound
> Disables computer's speaker when sending CW. See **Sound**.

NoWorkDupe
> Sets **Ins** to send the QSO B4 message for QSOs that are dupes, based on the callsign sent, rather than the exchange. See **WorkDupe**.

Off

OffAir
> Prevents $\mathcal{DVP}$ output from reaching transmitter and disables PTT.

Offset

OffThresh

On

OnAir
> Enables $\mathcal{DVP}$ output to transmitter, and enables PTT.

OpOff
> Restores default voice messages and alphanumerics.

OpOn
> Gets the operator's callsign and loads his voice messages and alphanumeric library into RAMdisk if configured.

PassFreq

Pause
Shows a window for setting the gap between the callsign and the serial number as played by the *DVP*, in milliseconds.

PointRate
Sets the rate window to show points per minute, averaged over the last 10 minutes and the last hour.

PostContest
Puts *CT* in Post-contest logging mode and turns on a Post-contest mode status indicator. QSOs are logged as usual, but no time is entered by the program. See **NoPostContest**.

Print
Sends QSL labels to the printer as well as to the QSL file. See **NoPrint**.

PrintMult
Sends the multiplier sheet directly to the printer. *CT will hang if the printer does not respond.*

Pse
Adds "Please QSL" to QSL labels in QSL mode. This text is always added when using the standalone QSL program since its purpose is to make labels for every station worked in the appropriate test and send cards to each station. See **Tnx**.

PTT
Enables push-to-talk control through the *DVP*. See **NoPTT**.

PTTDELAY
Sets delay PTT asserted to first CW sent. The acceptable range is zero to 255 milliseconds.

QSLMode
Places *CT* in QSL label generation mode. See **NoQSLMode**.

QSORate
Sets the rate window to show QSOs per hour, averaged over the last 10 QSOs and the last 100 QSOs. This is the default setting.

Quit
Saves to disk and exits to DOS without asking for permission.

Radio
Re-enables communication with a radio. See **NoRadio**.

RmDupes

Creates a file called NEW.BIN which is identical to the current log file except all the duplicate QSOs have been removed.

Rpt

Gets a repeat interval for voice and CW messages and enters repeat mode. See **NoRpt**.

Run

Sets the logging tag to run station for the multi-operator single-transmitter class. See **Mult**.

Run1, **Run2**

Assign the first and second run stations in the ARRL DX Contest multiop-erator two transmitter category.

SaveLog

Copies the log file to the file *contest*.SAV on a floppy disk in drive A, without exiting *CT*. *Do not run this function without a formatted disk in the drive!*

SeeWARC

Stop filtering WARC-band spots. See **NoSeeWARC**.

SetLat

Shows a window for defining the entrant's latitude and longitude.

SetLon

Same as **SetLat**.

SetDate

Prompts for a date in day/month/year or day-month-year format, to establish the date in Post-contest mode.

SetSerial

Prompts for a serial number. Subsequent serial numbers sent start with this number

SetTime

Sets the computer time without leaving *CT*.

Setup

Shows the Communications Setup window.

Size

Shows the memory consumed by one QSO.

Sound

Enables the computer's speaker when sending CW. See **NoSound**.

Stn1, **Stn2**

Assign the first and second run stations in the ARRL DX Contest multioperator two transmitter category. A synonym for Run1, Run2

SuperCMOS

Sets keyer type to SuperCMOS.

Tnx

Adds "Thanks for QSL" to QSL labels in QSL mode. This feature is not available in the standalone QSL program. See **Pse**.

Tune

Key-down until any key is pressed.

Tx1, **Tx2**

Assign the first and second run stations in the ARRL DX Contest multioperator two transmitter category. A synonym for Run1, Run2

TxPwr

Version

WorkDupe

Sets **Ins** to send the exchange rather than the QSO B4 message when the QSO is a dupe. See **NoWorkDupe**.

WriteARRL

Prepares a log file named *mycall*.LOG in the format required by ARRL for submission on diskette. You must also include a paper summary sheet. Also useful for preparing CQ WPX logs.

WriteCList

Generates a list of countries worked in *contest*.CTY.

WriteDupe

Generates a dupe sheet file, *contest*.DUP, listing stations worked by band. This name is a carry-over from the days of paper logging.

WriteDVP

Generates a sorted list of $\mathcal{DVP}$ prefix and suffix recordings in the file DVP.LST.

WriteLog

Generates the logs that contest organizers require, as well as practically every other file you'll need after the contest.

WriteMult

Prepares a single-page multiplier checkoff sheet file, *contest*.MUL, with printer commands for compressed mode printout.

WritePwr

WriteSum

Generates a summary sheet file, *contest*.SUM.

Troubleshooting

Here are some hints based on users' experiences with previous version of *CT*.

TNC Cable Connections   In the past, users have reported problems in getting their TAPR2 packet TNCs (MFJ, PK-80, etc.) to communicate with *CT*. The problem was that these TNCs require that the DTR line be asserted, whereas *CT* versions prior to 6.16 negated DTR. The solution was to disconnect or unsolder the DTR line in the cable between the computer and the TNC. Beginning with *CT* Version 6.16, the DTR line is asserted and no modification of cables is required. Also, the TNC XFLOW parameter must be ON.

> *Note   Attention AEA PK232 users — you must have the DCD parameter turned on in your TNC to receive information in the CT packet monitor window. This can be done using your standard TNC software.*

Clean Boot   On rare occasions, mysterious anomalies occur with *CT*. Among others, anomalies may involve CW sending and "STACK OVERFLOW" when the program is left alone for a few minutes without entering anything. If you have problems, we strongly suggest that *CT* be started with a "clean boot." Disable any non*CT* TSRs, such as disk caching programs, Xtree or other DOS shells, SideKick, or screen blankers. Although *CT* works well with most well-behaved TSRs, a clean boot sometimes solves an otherwise baffling problem and also frees up some RAM (permitting more QSOs).

Frozen Keyboard   If you manage to freeze the keyboard, do not panic. First, be sure that you haven't put yourself into Packet Talk mode (**Alt–T**) or Keyboard mode (**Alt–K**). If you are truly dead, Press **Ctrl**, **Alt**, and **Del** together (or push your RESET button). Reload DOS (setting the time again, if necessary), load your *CT* TSRs, and start again with CT *contest* -NOW <ENTER>. You're back in business.

Cursor Stuck in the Time Field   If you accidently press **Alt–F**, you will jump the text cursor into the time field on the current logging line. *CT* won't let you out until you type a valid time and press <**Enter**>. If you're in the middle of a contest, try to enter something close to the correct time to avoid distorting the rate information.

No Spots   If you have selected Single Operator as your category, you will not see spots from your PacketCluster node. However, you can still send spots to the PacketCluster

with **Alt–F3**. Also, the Run station in a Multi-single class sees spots only for the run band.

Wrong Dates and Times

After entering the date with the **SetDate** text command in Post-contest mode, every QSO, new or old, on which you use **Alt–F** to change the time will get the new date. It is easy to forget that you've used the **SetDate** command, and wind up with *CT* thinking that a contact from the first day was made on the second day. If you suspect a problem, type **AK1AFormat** into the callsign field to write an ASCII format log, and then view the log, looking for a bad date. You'll probably find a QSO or two with the wrong date. Go back into *CT* and **SetDate** correctly. Your problem should go away.

Note   Once you have entered the time field with **Alt–F***, there is no way out except by entering a time and then hitting <***Enter***>. If you get into the time field by mistake, enter a time. If it is during the contest, and you get the time that you enter wrong, the rate meter and time on/off will be incorrect. Go on and fix the time later, after the contest.*

When you use **Ctrl–W** to wipe an incomplete QSO, the time field is not cleared. If there is a material time lapse before the next QSO, the time will be off. To avoid this, use *mycall* in the incomplete QSO instead of wiping it, and run FIX_MINE after the contest to remove the QSO.

Grab Spot Goes to the Wrong Frequency

If you forget to use **Alt–F4** or **Alt–F5** after you have worked a previous spot, the next time you press **Alt–F4** you will jump back to your old frequency instead of the new spot frequency. Manually put your radio back where it was, then press **Alt–F4** to grab the spot. **Alt–F4** always grabs the latest spot that is a new multiplier, so you may get the wrong one if you aren't quick. Use the Point and Shoot function, Ctrl-→, to pick the one you want from the Announcements list.

Multi-transmitter Logs out of Sync

If different computers in a *CT* Network show different numbers in the Summary window, one or more of the computers failed to receive a valid QSO data record over the network. This can happen if the network is very busy, causing the serial communications ports to lose data. Don't worry, the logs can be reconciled after the contest with the MERGE program. If you expect trouble because, for example, you're a multi-multi DXpedition, start *CT* with the multiplier-only option to reduce the load on the network:

```
CT CQWW91 -MO
```

Unknown Multipliers

If *CT* can't figure out the multiplier in a DX contest, you have a problem in the country multiplier file. If you add the prefix on the fly and *CT* still can't find the multiplier, the most likely problem is that the prefix was already defined, but that the definition has an error. Carefully check the file, looking for missing colons and semicolons. For example, in an old version of the CQWW.CTY file, 4K2

could not be matched because the required semicolon at the end of the definition was missing.

CT *by K1EA*

Index