

TriCoder™

Portable Bar Code Reader

A battery
operated
Portable Batch
Reader with
Voice Messages
for PC, Mac,
etc.

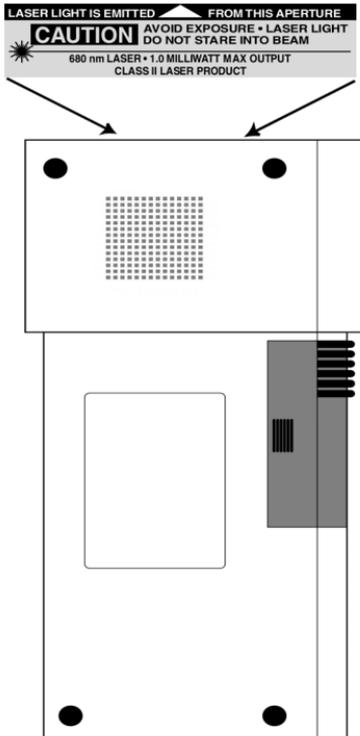


Owner's Guide

Warning: This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

Certain models of this product have a laser scanner integrated with it as one unit. The laser used is a Class II Laser Product and has a 1.0 Milliwatt Maximum Output.

To operate the laser scanner, aim the top of the case at a bar code and press the “Scan Key” on the keyboard of the TriCoder™. The light source will turn off once a successful scan has occurred or 2.5 seconds has elapsed, whichever is first. Do not look directly into the laser light source with the “Scan Key” depressed; avoid direct eye contact with the laser light source. Warning labels to AVOID DIRECT EYE EXPOSURE, DANGER are located according to the diagram below:



The LT54 models of the TriCoder as well as the LZ300 and LZ400 Laser Scanners are covered by one or more of the following U.S. Patents:

Patent #	4,360,798	4,369,361	4,387,297	4,460,120
	4,496,831	4,593,186	4,603,262	4,607,156
	4,652,750	4,673,805	4,736,095	4,758,717
	4,816,660	4,896,026	4,897,532	4,923,281
	4,933,538	5,015,833	5,017,765	5,021,641
	5,029,183	5,103,461	5,113,445	5,140,144
	5,149,950	5,157,687	5,168,148	5,168,149
	5,180,904	5,230,088	5,235,167	5,243,655
	5,247,162	5,250,791	5,250,792	5,262,627
	5,280,498	5,304,786	5,304,788	5,321,246
	5,367,151	5,373,148	5,378,882	5,396,053
	5,399,646	5,408,081	5,410,139	5,410,140
	5,412,198	5,420,411	5,436,440	5,444,231
	5,449,891	5,468,949	5,479,000	5,479,002
	5,479,441	5,528,621	5,532,469	5,543,610
	5,504,322	5,578,810	5,589,680	5,612,531

There are no user adjustments or maintenance operations to be performed on the integrated laser scanner.

Caution - use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure.

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How to Use this Manual

The TriCoder™ is an extremely versatile bar code reader. It functions as both a portable data collection device as well as a fixed on-line bar code reader. Although the TriCoder can perform complex data collection functions, its true value is in its simplicity. With very little instruction, a user can collect data using one of the built-in programs, upload it and process the data.

This manual is provided with the intention of acting as a guide or reference. Sometimes the best way to learn to use the TriCoder is to simply turn it on and start following the prompts. Other times, more guidance is desired, especially if the user wants to get up and running quickly.

Two data collection tutorials are provided as well as detailed instruction on using the TriCoder as a fixed reader using NON PORTABLE mode. The first *Quickstart Tutorial* uses the built-in Program #0, a simple one prompt (ITEM) data collection program that is useful for simple inventory applications. The second *Quickstart Tutorial* demonstrates Program #1, an editable program that by default prompts the operator for an item number, then a quantity. To get started quickly, we suggest using one of the *Quickstart Tutorials*, then move on to the PROGRAMMING section if you find that neither Program #0 nor Program #1 offers exactly what you need.

Although most people use the TriCoder as a portable data collector, it is also frequently used in **NON PORTABLE** mode as a fixed reader for library and POS applications. Everyone should use **NON PORTABLE** mode for testing communication before beginning data collection. Chapter 3, *Using NON-PORTABLE mode*, covers all areas of fixed use.

USB support on the TriCoder is now so fast (40 times faster than serial, 1000 times faster than keyboard) it is the interface of choice. You can have very fast data uploads, program transfers, and still have operate as a USB keyboard in non-portable mode. USB is standard on all models of the TriCoder.

The remainder of the manual is a reference guide. Chapters 5, 6, and 7 of the CONNECTION AND SETUP section provide details on configuring the TriCoder as well as the actual hardware connections. Chapters 8 and 9 of the PROGRAMMING section of the manual details usage of voice messages, Data Identifiers for data editing, and default Qty 1 scanning. Chapters 10-14 of the ADVANCED USAGE section describe Voice Messaging, Transmitting and Receiving programs, Tables and Pick Lists and Memory partitioning.

The TROUBLESHOOTING section provides reference for error messages, solving problems and details on how to reach Worth Data. The REFERENCE section offers bar code specifications and other useful information.

TriCoder Quickstart

As powerful as the TriCoder is, its basic operation is quite simple. Many people can use Program #0 or Program #1 to satisfy their data collection needs. This Chapter helps you get started quickly using Program #0 or Program #1. It also will refer you to the correct place if you want to customize or expand on Program #1. We highly recommend going to **Chapter 3; Non Portable Mode** and establishing communication between the TriCoder and the PC *before* you continue with either of the tutorials. It is easier to establish communication with one data item in the TriCoder rather than trying to do so during a massive batch upload. The chapters in this section are:

- **Program #0 Tutorial**

Uses the fixed program #0 to collect and upload data for a single ITEM prompt to your computer. If you need a program that prompts for an item number and then a quantity, go to the Program #1 Tutorial. If Program #0 works for you, except that you have trouble with the wedge upload, switch to USB or see Program #2. It is identical to program #0 but allows timing delays to be inserted in the Upload Prefix and Suffix. See **Chapter 8; Creating a custom program** for information on the Upload Prefix and Suffix.

- **Program #1 Tutorial**

Uses the editable program #1, which prompts for *Item Number*, then *Quantity*. The tutorial includes collecting, reviewing, and uploading data as well as providing outlines for different file formats and voice messaging. Since Program #1 is editable, the tutorial also discusses use of the following popular features:

- **Data Security**

- Restricting user to Data Collection mode or to data collection in one program only.

- **Xtra Statement**

- Automatically enter a quantity of 1 without the user having to input any data.

- **Non Portable Mode**

Provides details on Non Portable use and establishes communication between TriCoder and host computer through the USB port, keyboard and serial port. Includes installation instructions for the Windows TriCoder Utilities program

- **Uploading Data**

Guides the user through the uploading of data through USB, the keyboard and serial port for both tutorials described above.

Tips on choosing a program for Data Collection

The TriCoder comes with 3 programs pre-installed. Program #0 is a simple un-editable program prompting repeatedly for an ITEM. Program #2 is identical to Program #0 except that it allows for customization (i.e. the Upload Prefix and Upload Suffix). See **Chapter 8; *Creating custom programs*** for details on what the *Upload Prefix* and *Upload Suffix* can do for you.

Program #1 differs from Program #0 and #2 in that it has two prompts - "**ENTER ITEM NO.**" and then "**ENTER QUANTITY**". Program #1 is also fully editable and lends itself well to the use of several features in particular.

The tutorial on Program #1 includes explanation of two safety features. The first safety feature, *Data Security*, confines the user to data collection mode ONLY. The user is not allowed into any mode other than DATA COLLECTION mode. In addition to using *Data Security* to restrict the user to DATA COLLECTION mode, you can use the second security feature, *Program Restriction*, to confine the user to one particular program in the TriCoder. For details on how to use these *Data Security* features, see **Chapter 6; *TriCoder Setup***.

Another useful programming feature explained in the tutorial is the *Xtra Statement*, which works with the "ENTER QUANTITY" prompt by automatically entering a quantity of "1" if the user enters another ITEM number instead of a quantity. See **Chapter 8, *Creating a custom program*** for details on the Xtra program statement.

Program #1 is extremely versatile. Use it if you can, making modifications to fit your application. If you require a customized program, these are just a few of the options and features offered by custom programming:

- Additional user prompts for other types of data
- Program timing delays to facilitate uploading directly into an application
- Branching to different areas in the program, depending on the input from the user
- Downloading tables of data to validate or edit into the TriCoder
- Recording customized Voice Messages

If any of the above features (or anything *not* offered by Program #1) appears to be something you are interested in, move on to the *PROGRAMMING* section of the manual. The **Chapters 8 and 9** in the *PROGRAMMING* section cover all aspects of creating and maintaining custom programs in the TriCoder.

Choosing an Interface

If you are a Windows® user with Windows Vista, XP, 2000, ME or 98SE, we suggest that you use the high speed USB interface, which offers the following advantages: (the first time you plug in your USB cable, you may be asked to choose the type of USB interface you wish to use)

- 1) Forty times faster data uploads than serial data uploads.
- 2) The ability to update your firmware with all the improvements available on the Website over the years or your TriCoder's life at speeds 40 times faster than serial, (its not even possible with the keyboard wedge).
- 3) The ability to download tables, upload/download programs from your PC at much faster speeds than serial, (not possible with keyboard wedge interfaces). All communication is controlled by the new TriCoder Utilities - you can even change your setup!
- 4) The ability to operate in Non-Portable Mode as a USB keyboard without having to add a jumper block to a Y-Cable when the TriCoder is removed from the Y-cable for portable data collection
- 5) The ability to use the *Virtual TriCoder* program for developing custom programs on the TriCoder in a Windows environment.

If you are a Macintosh user, you should specify the PC and Mac USB Keyboard.

Chapter 1

Program #0 Quickstart

The default data collection program, Program #0, is a simple program, repeatedly prompting the operator for data entry of the same type. This TriCoder program works well for a simple inventory where each item is scanned. This chapter is in the form of a tutorial. Even if you don't intend to use Program #0, working through the tutorial will prepare you for creating your own programs and learning the basics of data collection.

Step 1

Getting into Data Collection Mode

The first step involves turning on the TriCoder (make sure you have good batteries), getting into DATA COLLECTION mode and choosing **Program #0**.

Turn on the TriCoder by pressing the ON/OFF key. The TriCoder will power up and display its opening screen:

The TriCoder starts with the following opening screen:

```
DMA TRICODER x20xx X  
HIT ANY KEY_
```

Press any key on the TriCoder keypad. If the TriCoder was in NON PORTABLE MODE when it was shut off earlier, it will automatically go back into NON PORTABLE MODE now. If this is the case, press the F1 key to get to the DATA COLLECTION prompt. If the TriCoder was in any other mode at shutoff, DATA COLLECTION is the first prompt you will see after pressing any key at the opening screen.

```
DATA COLLECTION?  
KEY [YES/NO]?_
```

At the DATA COLLECTION prompt, press the YES key on the TriCoder keypad. Press "0" on the TriCoder keypad to select the default Program #0.

```
1. SAMPLE PROGRAM  
2.  
3.  
PROGRAM NO. [0-3]?_
```

(If you had programs created in program #2 and #3, you would see their program name in the spaces above for 2 and 3.)

Step 2

Collecting Data

The second step involves collecting data in the TriCoder. This is a good time to practice scanning. If you are not familiar with scanning bar codes, see **Appendix C; How to scan a bar code** for details and suggestions. If you don't intend on using bar codes later, you can just enter the same data from the keypad.

Pressing "0" at the PROGRAM NO.? prompt begins the data collection process by displaying this prompt for the operator:

ENTER DATA —

For the purposes of this tutorial, we will use the sample bar codes as our data. Upon scanning, the TriCoder will beep once and display the following:

ENTER DATA (*original prompt*)
00001 (*bar code #1*)
ENTER DATA (*new data entry prompt*)

After scanning, the TriCoder displays the original prompt, then the data just entered, then the new data entry prompt. For the tutorial, our second piece of data will be 00002. Go ahead and scan sample bar code #2 or key in 00002:

00001 (*original data*)
ENTER DATA (*2nd data entry prompt*)
00002 (*2nd piece of data entered*)
ENTER DATA (*new data entry prompt*)

Continue to scan the sample bar codes or enter the data from the keypad. The TriCoder display will scroll with each entry as shown immediately above. As soon as you are finished entering all 10 bar codes, press the **END** key to exit **DATA COLLECTION**.



01



02



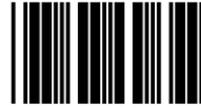
03



04



05



06



07



08



09



10

Program #0 Sample Bar Codes

Uploading Data

Once you have collected your data in Program #0, uploading that data to the computer is the final step. For the tutorial, we assume that you have successfully established communication between the computer and the TriCoder. If you have not, go to **Chapter 3; *Non Portable Mode***, and establish communication first. If you are ready to upload, go to **Chapter 4; *Uploading Data*** and proceed with your upload.

Chapter 2

Program #1 Quickstart

Program #1 prompts the operator for "Item" and then "Quantity". What makes this program different from program #0 (other than the additional "Quantity" prompt) is that Program #1 is editable. It can be customized to allow for additional prompts, voice messaging and file formatting. The tutorial for Program #1 includes collecting data, reviewing and editing data, using popular uploaded file formats and finally, uploading the data

Step 1

Collecting Data

Collecting data in Program #1 requires two pieces of data; item and quantity. By default, Program #1 is set up to accept data from either the scanner or the keypad for the item, but only from the keypad for the quantity.

Program #1 also features voice messaging. By default, Program #1 plays a voice prompt of "Item" for the visual "ENTER ITEM NO." prompt and a voice prompt of "Quantity" for the visual "ENTER QUANTITY" prompt. Program #1 only plays each voice message the first 5 times the prompt is displayed. The TriCoder can be programmed to play the voice message every time the visual prompt is displayed if desired. See **Chapter 8; Creating a custom program** or **Chapter 13; Voice Messaging** for details.

To collect data in Program #1, answer no to all TriCoder prompts until you see:

**DATA COLLECTION?
KEY [YES/NO]?_**

At the DATA COLLECTION prompt, press the YES key on the TriCoder keypad. Press "1" on the TriCoder keypad to select the default Program #1.

**1. SAMPLE PROGRAM
2.
3.
PROGRAM NO. [0-3]?_**

(If you had programs created in program #2 and #3, you would see their program name in the spaces above for 2 and 3.)

Using the bar code samples on the next page, scan an item number bar code, then enter the quantity of "123" on the TriCoder keypad.



Continue to scan bar codes and enter quantities until you have at least 10 records. You can check to see how many times you have scanned an item number by pressing the following keys while at the ENTER ITEM prompt:

- Press **SHIFT**
- Press **F1**
- Press **T**

You can use the same key sequence to check the number of times you have entered data for *any* prompt.

To end data collection in Program #1, simply press the END key. If you forget to exit Data Collection and simply turn the TriCoder off, do not panic – the TriCoder has saved your data. Pressing the F1 key while in Data Collection also exits data collection and returns you to the Mode Menu. Using the END key to end Data Collection is the preferred method.

Step 3

Reviewing and Editing Data

During or after collecting data, it is possible to review and edit the data while it is still in the TriCoder. You can also delete data entirely. *Data Review Mode* is a handy tool – especially if you know you’ve made a mistake and want to correct it before you upload your data.

For the tutorial, lets say that we just wanted to take a break from collecting data, exited DATA COLLECTION (by pressing the END key), turned off the TriCoder and went to lunch. We’re back now and want to resume our data collection. Turn the TriCoder back on and just as in step 1; get into DATA COLLECTION mode. Since there is already data in the TriCoder, instead of simply displaying the prompt, the TriCoder plays the “DATA FILE EXISTS” voice message, and displays the same message on the TriCoder screen:

**DATA FILE EXISTS
HIT ANY KEY_**

then immediately displays the ENTER DATA prompt.



Say we want to review the data already in the TriCoder - maybe we made a mistake or think we missed some data. To review data already in the TriCoder, press the “UP ARROW” key on the TriCoder keypad. The TriCoder will beep – 2 low beeps then 2 high beeps and display:

**Data Review Request
Press <BEGIN> key to
Start or <F1> for
Data Collection_**



If we just wanted to go into DATA COLLECTION, we would simply press F1 and start scanning again, but we want to review the data already collected so press the BEGIN key to get into DATA REVIEW mode. Once in DATA REVIEW mode, the TriCoder displays the last data collected. To get to the beginning

of your data file, press the BEGIN key. The TriCoder displays:

ENTER QUANTITY

XXX (last quantity data entered)

BEGIN OF FILE

HIT ANY KEY_



Press any key on the TriCoder keypad. The TriCoder displays the first record of data. To scroll through the data record by record, press the RIGHT ARROW key.



To immediately go to the end of the data, press the END KEY. At the END OF FILE prompt, hit any key to get to the last record of data in the file.



To scroll backwards through the data record by record, press the LEFT ARROW key. To edit individual characters in a data record, use the right and left arrow keys to find the data you want to edit.



If you know what data you are looking for (or want to look for all data that has certain characters) you can use the SEARCH key. After pressing the SEARCH key, the TriCoder displays the SEARCH PATTERN prompt. Enter the data you want to search for (i.e.22) then press ENTER. The TriCoder begins its search at the beginning of the file and moves forward until a match is found. If using our example of 22, the TriCoder would find all data that contains 22, regardless of its position in the data (i.e.22345, 32245, 34522). To scroll through the data fields, press the SEARCH key again.



Pressing the DELETE key deletes characters to the left. Replace characters simply by pressing a key. To replace an entire data entry, use the right and left arrow keys to find the data, then press the CLEAR key to delete the entry. You can re-enter data at this point by entering data from either the keypad or by scanning. If you enter data from the keypad (when either editing single characters or replacing an entire entry) you must press ENTER on the keypad for the change to take place. If you want to completely delete the data, after pressing CLEAR, the



TriCoder will prompt you with **DELETE THIS FIELD?** If you are sure you want to delete the data, press ENTER.



You can use the STATUS key at any time during data collection to check the amount of memory you have left as well as the battery levels:

mm/dd/yy hh:mm:ss

xxxk BYTES FREE

AAaBAT■■■■■■■■■■■■■■■■■■■■-xx%

LI - BAT■■■■■■■■■■■■■■■■■■■■-xx%

If during data collection, the TriCoder displays the following message:

**WARNING 2K LEFT
HIT STATUS KEY_**

it means that the TriCoder has only 2K of memory left to collect data. This is a good time to go and upload your data. You can continue to collect data but you will eventually get this message:

**OUT OF MEMORY
HIT ANY KEY_**

F1

Pressing a key will take you out of Data Collection mode and back to the Mode Menu. You will have to upload your data before you can collect any more.

When you are ready to go back to collecting data, press the F1 key at any time to begin appending data to the existing data file. The F1 key also backs you out of any mode you are in; for example, if you are in Non Portable mode, pressing F1 takes you back to the Data Collection prompt of the Mode Menu.

**Step
4**

Uploading Data

Once you have collected your data in Program #1, uploading that data to the computer is the final step. For the tutorial, we assume that you have successfully established communication between the computer and the TriCoder. If you have not, go to **Chapter 3; Non Portable Mode**, and establish communication first. If you are ready to upload, go to **Chapter 4; Uploading Data** and proceed with your upload.

Non Portable Mode

NON PORTABLE mode allows the user to transmit data directly from the TriCoder to the host computer immediately without saving the data in the TriCoder's memory. Once data is entered via scanning a bar code or using the keypad, data is transmitted immediately by the TriCoder to the host. This mode is primarily used with the USB interface and the keyboard wedge interface. It is also used to test serial communication. **NON PORTABLE** mode is used to enter data directly into an application. Common applications include library check in/out, document tracking, and Point-Of-Sale. **NON PORTABLE** mode should also be used to establish communication between the TriCoder and host computer before serial or fast USB data uploads are attempted.

Getting in and out of NON PORTABLE mode

When you turn the TriCoder on, the first screen you see is the TriCoder version screen. After the opening screen is the TriCoder **Mode Menu**. The Mode Menu is your navigational tool for getting into an out of the different activities in the TriCoder. The **Mode Menu** consists of the following prompts:

DATA COLLECTION?
KEY [YES/NO]?_

DATA UPLOAD?
KEY [YES/NO]?_

NON PORTABLE MODE
KEY [YES/NO]?_

PROGRAMMING MODE?
KEY [YES/NO]?_

PROGRAM TRANSMIT?
KEY [YES/NO]?_

PROGRAM RECEIVE?
KEY [YES/NO]?_

Answering **NO** to any prompt takes you to the next prompt. If you are already in a particular mode (i.e. Non Portable Mode) and want to get back to the **Mode Menu**, simply press the F1 key.

If you are in **NON PORTABLE** mode and turn the TriCoder off, when you turn the TriCoder back on and press a key at the opening screen you are automatically brought back into **NON PORTABLE** mode.

If you are in any other mode, simply answer NO to all prompts until you see:

**NONPORTABLE MODE
KEY [YES/NO]?_**

Press YES to enter **NON PORTABLE** mode. If you have USB specified as the interface and you do **not** have the TriCoder connected by USB to the computer, you will get the message:

**USB not Connected
Connect, Hit any Key
or F1 – Exit
or F2 – Display Only**

If you simply want to view data on the TriCoder screen and **NOT** transmit data to the computer, press F2. If you want to exit Non Portable Mode, press F1. If you want to communicate to the computer, connect to your USB port and press any key.

The TriCoder now displays:

NONPORTABLE MODE

and is ready and waiting for input.

If you want to leave **NON PORTABLE** mode, simply press the F1 key to return to the beginning of the MODE MENU.

Typically, the TriCoder is used in **NON PORTABLE** mode while it's connected to the host computer either by keyboard splitter Y-cable, USB cable connection, or via serial connection with PortKey. See **Chapter 5; *TriCoder Connection***, for more information and diagrams to help you correctly connect the TriCoder to your computer.

Establishing communication in Non Portable Mode

USB Keyboard Interface and Keyboard Wedge

To test communication as a keyboard (USB or traditional), all you need is a program capable of accepting data from the keyboard – for example, Windows Notepad. The key to testing communications is to keep it simple – you don't want to have to determine whether it's your software or the TriCoder causing a problem.

1. Plug the TriCoder interface cable into the TriCoder and into the proper host computer port.

First Time USB Use

As shipped from the factory the TriCoder's *Computer Interface Jumper* is set for RS-232 Serial (T54/LT54). YOU CAN ALWAYS USE USB. The first time you connect a USB cable to a host computer running Windows® or Mac OS, you will be asked to choose which USB interface you wish to use with the TriCoder by the TriCoder displaying the following message:

Choose USB Interface
1 - PC USB High Speed
2 - PC OR MAC USB KYBD

If you have a Mac, you must choose 2. You are limited to Non-Portable Mode and Data Upload only as 2 - PC OR Mac USB Keyboard.

If you are using Windows® (Vista, 2000, ME, XP, 98SE) and you wish to upload your files directly into your application through the keyboard, you must choose 2, (USB keyboards are still superior to keyboard wedge because there are no timing delays and no jumper block is necessary). After specifying 2, you will be asked to install the USB Keyboard HID driver, which is probably on your hard disk, but if not, is on your original Windows CD ROM; just keep clicking on NEXT until you are forced to supply the original Windows CD ROM (if the driver installation is aborted, see **Appendix G; USB Driver Installation Recovery** for more information).

Data uploads through the keyboard will be slower than high speed USB but you can still use the USB High Speed program uploads/downloads, firmware upgrades, and table downloads by changing computer interface to the high speed USB operation, however you will be required to install another driver for high speed support, TRICODERUSB, which is supplied on your Worth Data Utilities CD ROM, (also on our website, www.barcodehq.com under *Downloads*).

IMPORTANT: If you are installing the TriCoder in Windows® XP, you may see a dialog box appear warning you that the installation may cause your system to be unstable. The TriCoder installation WILL NOT harm Windows® XP or make your system unstable – go ahead and complete the installation.

If you are using Windows and you wish to use the *TriCoder Utilities* to upload data to a file in high speed, choose 1. You will also be able to do program uploads/downloads, firmware upgrades, and table downloads. Once you have chosen this setting, you will be required to install the high speed TRICODERUSB driver that is supplied on your TriCoder Utilities CD ROM, (also on our website, www.barcodehq.com under *Downloads*). The first time you attempt to use Non-Portable Mode, you will be asked to install the USB Keyboard HID driver, which is probably on your hard disk, but if not, is also on your original Windows® CD ROM.

Whatever decision you make, the TriCoder Setup parameter for *Computer Interface* will be changed to reflect your choice. Your choice will remain until you change the *Computer Interface*, (See **Chapter 6; TriCoder Setup**).

2. Start the software you are going to use to test the TriCoder. If it is a text editor or word processor, make sure to start with a new document. We suggest the use of the *Notepad* program (Windows or Mac).

Turn the TriCoder on. Press the NO key in response to all prompts until you see the NON PORTABLE mode prompt. Press the YES key. If you selected the PC High Speed USB in 1 above, and this is the first time you have used the NON PORTABLE mode, you will now be asked to install the USB Keyboard HID driver, which is probably on your hard disk, but if not, is on your original Windows CD ROM.

3. Type several numbers on the TriCoder keypad, then press the ENTER key. You should see the keyed data on the TriCoder screen AND on your computer screen.
4. **Traditional keyboard users** - If you do NOT see your data displayed on your computer screen, or you see partial data (letters or numbers missing), indicating timing between the TriCoder and keyboard is not quite right. Next try the "LEARNING" mode settings in **Chapter 6; Computer Interface**, which allows the TriCoder to match the timing of the keyboard. If "LEARNING" mode does not solve the problem, see the *Intercharacter Delay* parameter for a possible solution. (Do **not** use the "LEARNING" mode settings for USB.)

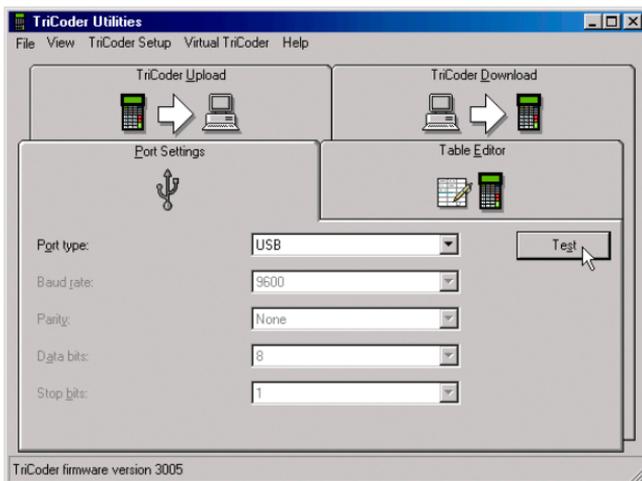
Using TriCoder Utilities to test Fast USB Data Upload and PC Serial Interface

Testing communication between PC and a TriCoder with fast USB interface or serial interface needs special software. Windows users should use the *Windows TriCoder Utilities* program that is shipped with TriCoder on CD ROM, (also on our website, www.barcodehq.com under *Downloads*). If using a Unix dumb ASCII terminal configuration, the testing is identical to keyboard testing in the previous section. *Serial and Fast USB Upload on a Macintosh are not supported with programs from Worth Data.*

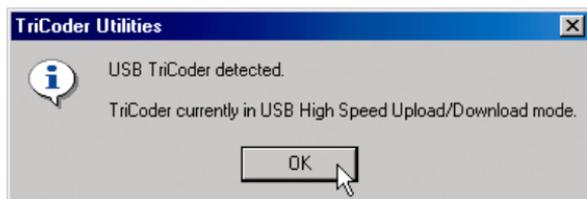
Windows® Users

1. Install the *Windows TriCoder Utilities* program by inserting the CD ROM; Windows should sense the CD ROM and offer you the installation automatically. If not, click on **Start**, then choose **Run**. Type in **D:/Setup.exe** (substitute your drive letter if not D) then click on OK. Follow the directions on your screen to install the program.
2. After installing the *Windows TriCoder Utilities* program, make sure your TriCoder is connected and turned on, then run the program by clicking on the *TriCoder Utilities* icon.

3. If you are connected to the USB port, TriCoder Utilities will detect the USB and no other configuration parameters are required. If you are connected to the serial port, you need to click the Port Settings tab, choose the port type and then set the corresponding RS-232 settings for your serial port.



Once you have selected the correct *Port Type* as shown above, you should test your connection. If you are connected via USB, clicking on the **Test** button tells the TriCoder Utilities to check to see if there is a TriCoder attached to one of the host computer's USB ports. If it is correctly attached, you will see the following advisory message:

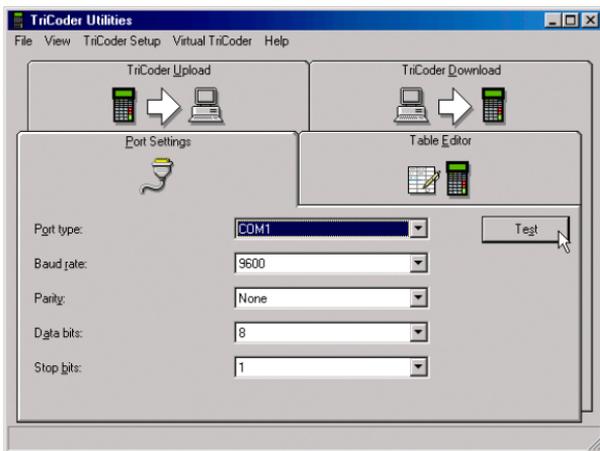


If your test was successful, you can now skip the remaining material in this chapter and proceed directly to **Chapter 4, Uploading Data**.

Any of the following conditions will cause TriCoder Utilities to generate an error message:

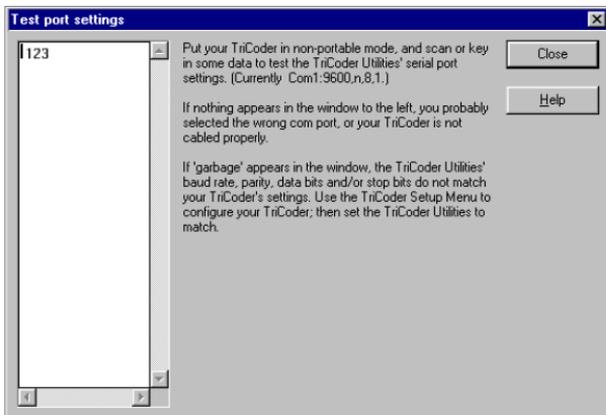
1. Your TriCoder is not attached or it does not have firmware DMA 2001 or above.
2. Your TriCoder is not properly cabled or attached.
3. Your TriCoder is not *Setup* with *Computer Interface-6* (Fast USB Upload).

If you have specified a COM port, you will see the following screen where you can change all the serial port parameters. (Since the TriCoder's default serial parameters are 9600,N, 8,1, you should probably not change the default parameters on the screen.)



TriCoder Utilities Serial Port Settings

4. After specifying finishing the serial port configuration, click on the "Test" button. Click on the test window so that a flashing cursor appears. Scan the test label or, if you have no scanner, type **123** on the TriCoder keypad, then press the TriCoder **ENTER** key.



TriCoder Utilities Test Screen

5. You should see the data displayed *both* on the TriCoder display and in the test window on the PC. If you do not see the data displayed on your PC, follow the *TriCoder Utilities* suggestions on the screen, check your TriCoder Setup and try again. If you still have problems, go to the **Troubleshooting** section of this manual. Otherwise, you are ready to move on with your data collection or custom programming.

Chapter 4

Uploading Data

If you are ready to upload data, we assume you have established correct communication between your TriCoder and host and have collected some sample data, preferably using the Program #0 or Program #1 Tutorials. By default, the TriCoder uploads using a *Carriage Return Separated* format. For many users, the default file format works fine, but others may require more complex or even custom upload file formats. For different file formats, see the last section in this chapter, *File Formats*.

Uploading into Excel®

If you are planning to upload your data into an Excel® worksheet, you may want to consider using our KwikCount/EX program. KwikCount/EX is an Excel add-in that makes updating worksheets faster and easier. If you are trying to update several columns of data, need accumulation or subtraction functions, or are using the TriCoder for physical inventory, you should definitely look into using KwikCount/EX. You can find more information on KwikCount/EX at <http://www.barcodehq.com/kwikcountex.html>.

Data Upload

DATA UPLOAD mode is used to extract the data collected while in **DATA COLLECTION** mode. **DATA UPLOAD** mode uses keyboard upload (wedge and USB keyboard), or uploading through the **TriCoder Utilities** (high speed USB and serial).

Before collecting and uploading large amounts of data,

1. test the TriCoder data communication in Non-Portable Mode detailed in *Chapter 3, Non-Portable Mode*, and
2. try a small amount of data to make sure your upload works correctly.

Data can be uploaded either into a separate file that is then merged or processed by your application or it can be uploaded into your application directly. Before you upload directly into an application, back up any files that will be altered by the upload – work only with copies, not with your actual data, until you know your upload works correctly.

For this tutorial, first we will describe a keyboard/USB interface upload using Windows® or the Mac, then a high speed USB or serial upload using the TriCoder Utilities *If you wish to do a Windows high speed USB or serial upload to a file, turn to page 4-3.*

Uploading via USB or PC Keyboard

Keyboard uploads are usually required because an application program will not accept file imports, hence you must upload directly into an application. We will illustrate the USB/Keyboard Data Upload using **Notepad** in Windows. If you want to use another text editor or Word Processor, the specifics may vary but the basic upload will be the same.

To get to DATA UPLOAD mode on the TriCoder, answer NO to all prompts until you see:

**DATA UPLOAD?
KEY [YES/NO]?_**

*DO NOT press YES until you have your computer ready for the data upload to begin. If you have chosen USB Computer Interface, and then press YES to the Data Upload prompt and are **not** connected to the USB port on your computer, you will get the following message:*

**USB not Connected
Connect, Hit any key
or F1 – Exit
or F2 – Delete File**

*If you really want to upload your data to the computer, connect to the USB port and press any key. If you want to exit **Data Upload** mode, press F1. If you want to delete the data file **without** transferring it to your computer, press F2.*

- Open **Notepad** (or program of your choice).
- If you have a USB cable, plug the USB cable between TriCoder and your host computer's USB port and turn on the TriCoder. If this is the first time you have plugged in a USB cable, you may be asked to choose the desired USB Interface and if running Windows, you will be required to install a USB driver, (See *Chapter 3, First Time USB Users*. If the Computer Interface is set to 6, the Fast USB Upload, you will not be able to upload data through the keyboard; **Non-Portable** mode operates exclusively through the USB keyboard.
- If you are using a Y-cable with a legacy keyboard port (5 or 6 pin din on the PC), make sure your T54/LT54 TriCoder is jumpered correctly for legacy keyboard upload (Appendix F) - after attaching the Y-cable to the PC, remove the jumper block from the end of the Y-cable (the jumper block allows you to use your keyboard while the TriCoder is not attached), turn on the TriCoder, and attach it to the Y-cable. The jumper block has to be reattached to the Y-cable when the TriCoder is removed.

- By default, the TriCoder's *Terminator Character* is set to **CR**, which means the TriCoder will insert a *Carriage Return* (like pressing the **ENTER** key on your PC) after each record of data it uploads. If you have changed the *Terminator Character* to a setting other than the default and are uploading data collected in the Tutorials, change it back to the default now.
- After verifying the setup of your TriCoder, follow the prompts until you get to the **DATA UPLOAD?** prompt. If you are ready to upload your data, press the **YES** key on the TriCoder. Watch the computer screen to see your data appear - one piece of data per line. When the TriCoder is done uploading your data it will display the following message:

**END OF TRANSMIT
DEL FILE [Y/N]?_**

- If all of your data appears correct on the PC screen, first save the file. Then you can press the **YES** key on the TriCoder to delete the data in the TriCoder. If you need your data in a different format (i.e. *Comma delimited* or *Flat File* formats) go to the end of this chapter and read the section on **File Formats**. If deleting the data, the TriCoder will display:

**ARE YOU SURE?
KEY [YES/NO]_**

- Press **YES** again to delete the file from the TriCoder. If your data does not appear on the PC screen or is incorrect, press the **NO** key on the TriCoder, check your TriCoder setup and try the upload again. If you still have problems, consult the *Troubleshooting* section of this manual.

DATA UPLOAD with the TriCoder Utilities

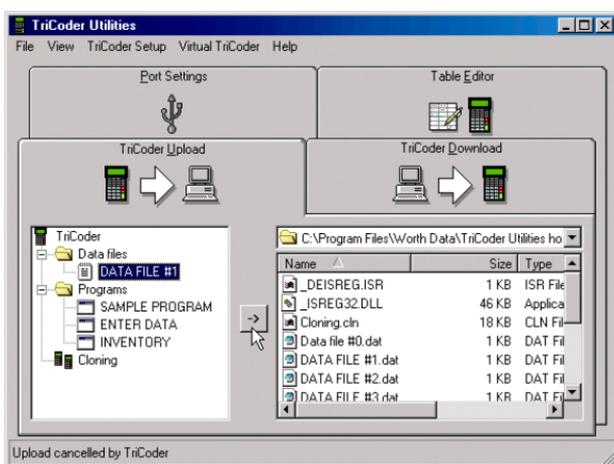
The Windows *TriCoder Utilities* program has the ability to upload the TriCoder via USB or serial ports. (The USB upload is at forty times faster than the serial upload.) If you are uploading via USB, the TriCoder Utilities program will completely control the TriCoder, all you need to do is connect it and turn it on. If connected via the serial port, there are additional steps to follow.

High Speed USB upload

- Connect the TriCoder to the host computer with the USB cable and turn the TriCoder on. If this is the first time you have plugged in a USB cable to the TriCoder, you will be asked to choose the desired USB interface and install a USB driver on your computer, (See *Chapter 3, First Time USB Use* for instructions).

- After installing the *TriCoder Utilities* (see **Chapter 3, Non Portable Mode** for installation instructions) run the program by clicking on the *TriCoder Utilities* program icon. If you are connected via USB, the TriCoder Utilities will sense it and no other configuration is required.

To upload your data, click on the **TriCoder Upload** tab, then click on the **Data files** folder under the TriCoder and choose the file you want to upload. You must then choose the folder on the right side of the screen that you want the data file to be saved in. Once you have chosen each, click the arrow button in the center to transfer the file. After you have uploaded the file, you can rename it or leave it as is.

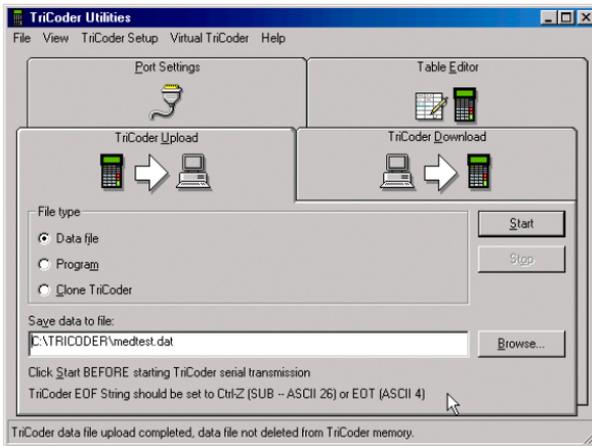


Serial Upload

If you selected a COM port for serial uploading: (not USB)

- Make sure the serial port is configured the same as the TriCoder defaults - **baud 9600, parity none, data bits 8, stop bits 1**. Verify that you are choosing the correct *COM port* 1, 2, 3 or 4. For the purposes of the tutorial, we assume you have tested the TriCoder communications in **NON PORTABLE** mode. If you have not, go to **Chapter 3; Non Portable Mode**, establish communications in **NON PORTABLE** mode, and then continue with the tutorial.
- Click on the **TRICODER UPLOAD** tab. Choose **Data File** as the “File Type”, then enter the name (and directory path if needed) of the file you want to upload to or click **Browse** to select an existing file. If you upload to an existing file, you will be asked whether you want to **Add** to the file (will not overwrite existing data in file) or **Replace** the file (will completely replace the old file with the new data).

- Click on the **START** button to start the program. You *must* start the upload program before you start the TriCoder.



- Follow the prompts on the TriCoder until you see the following:

**DATA UPLOAD?
KEY [YES/NO]?_**

- Press the YES key to begin the upload on the TriCoder. Wait for the TriCoder and the uploading program to indicate that the upload is finished. Close the *TriCoder Utilities* program, then open Windows **Notepad** and open the file you created. The TriCoder should be displaying:

**END OF TRANSMIT
DEL FILE [Y/N]?_**

- If the data in **Notepad** is correct, press the **YES** key on the TriCoder to delete the data in the TriCoder. If there is a problem with the data in the file, press the **NO** key on the TriCoder, check the TriCoder setup and try the upload again. If you still have a problem, go to the *TROUBLESHOOTING* section of this manual.

You have now successfully collected, reviewed and uploaded data using the TriCoder as a portable device. If Program #0 or Program #1 is sufficient for your needs, you are ready to continue by collecting your own data and doing a test run with your data and application. If your data collection needs are more complex, **Chapters 8 and 9** of the *PROGRAMMING* section of this manual provide detailed information concerning the more advanced programming features of the TriCoder. If you want a different file format from CR-separated data items, refer to the below section.

File Formats

By default, the TriCoder transmits its data in the following order:

ID + Prefix + data + Checksum chs + Suffix + Terminator

You should keep the above order in mind when determining how to upload your data. Before we actually upload any data, lets discuss some of the most common file formats.

The program you are using to process your data will determine what format the uploaded file needs to use. There are several commonly used formats – *Carriage Return separated*, *Comma separated*, *Tab separated*, and *Flat File* formats. By default, the TriCoder uploads using the *CR (Carriage Return) separated* format. We will cover each format in order of ease of use, with the default uploading format first.

Carriage Return Separated Files

By default, the TriCoder uploads its data in the following format:

DATA(CR)	11111111
DATA(CR) <i>data looks like:</i>	22222222
DATA(CR)	33333333

This format is called *Carriage Return separated*. Each piece of data is followed by a *Carriage Return* (or *Carriage Return/ Line Feed* if Serial Interface), causing each piece of data to appear on a separate line. The TriCoder does this by using the **Terminator Character**. The **Terminator Character** is the character that follows each piece of data either when the TriCoder is uploaded or when data is transmitted in NON PORTABLE mode. The default **Terminator Character** for a keyboard wedge is **CR** (carriage return) and **CR/LF** (carriage return/line feed) for a serial interface.

To upload the TriCoder with a *Carriage Return delimited* file, simply leave the **Terminator Character** set to the default settings and upload the TriCoder.

Comma Separated Files

Another common file format is a *Comma Separated File*. A TriCoder setup to upload in this format uploads data like this:

“DATA”,“DATA”(CR)	“111111”,“22”
“DATA”,“DATA”(CR) <i>data looks like:</i>	“222222”,“33”
“DATA”,“DATA”(CR)	“333333”,“44”

Each data item is surrounded by *double quotes*, creating a **field**. Fields of data are separated by commas. The *double quotes* allow commas to be used as actual data as well as separators (see the example below). At the end of

all of the fields of data, a *Carriage Return* is added to create a complete **record**. Modifying Program #1 as an example, the data uploaded would look like this:

```
“ITEM NUMBER”, “QUANTITY”    “0123456,12oz”, “15”  
“ITEM NUMBER”, “QUANTITY”    “889384,8oz”, “940”  
“ITEM NUMBER”, “QUANTITY”    “32834,20oz”, “7”
```

where ITEM NUMBER is the first *field*, QUANTITY is the second *field*, and both fields together make a *record*.

To program the TriCoder to upload in this format, the first thing we must do is set the *Terminator Character* to “None”. The idea is first, to stop the TriCoder from automatically sending the same character after each field of data, then second, customize the program in the TriCoder to transmit a double quote before and after each data item, a comma after each field and a carriage return after each record. To customize the program in the TriCoder, we use the *Upload Suffix* to specify which character we want to precede or follow each particular field. Using Program #1 as our example, we will walk through the steps required to upload Program #1 in a *Comma delimited* format:

1. *Set the Terminator Character to NONE*

Change the *Terminator Character* either by scanning the bar coded setup menu , by TriCoder keypad in PROGRAMMING MODE, or if you are using High Speed USB, you can change the TriCoder setup via the **TriCoder Utilities** program. To change it using the bar coded Setup Menu; scan these bar codes in the following order:

- Scan **START SETUP**
- Scan **TERMINATOR CHARACTER**
- Scan **2** (*sets it to None*)
- Scan **END SETUP**

To change the *Terminator Character* using the keypad:

- get into **PROGRAMMING MODE**
- choose **5** for **Change Setup**
- choose **1** for **Computer**
- Press **ENTER** until you see **TERMINATOR CHAR.**
- Press **2**
- Press **F1**
- Press **F1** again to exit **PROGRAMMING MODE**

To change it using **TriCoder Utilities** and high speed USB:

- open **TriCoder Utilities**
- choose **Tools**, then **TriCoder Setup** from the menu.
- Click the **Computer** tab, then click the button that corresponds to "no Terminator Character"
- Click **OK**

2. Program the Upload Prefix and Upload Suffix

After setting the *Terminator Character* to **NONE**, the next step is to enter **PROGRAMMING MODE** and program the *Upload Prefix* and *Upload Suffix* for each field of data. For Program #1, we will program the *Upload Prefix* and *Upload Suffix* as follows:

Statement Prompt	Upload Prefix	Upload Suffix
ENTER ITEM NO.	" (double quote)	", (double quote comma)
ENTER QUANTITY	" (double quote)	"CR (double quote carriage return)

- Put the TriCoder in **PROGRAMMING MODE**
- Press **1** at the **Create Programs** prompt (to edit program #1)
- Press **YES** at the **EDIT PROGRAM #1?** prompt

If you have no data collected in the TriCoder, press **ENTER** until you see:

UPLOAD PREFIX 01

—

If you have data collected in the TriCoder (assuming you are following the tutorial), you will see the *Upload Prefix* prompt immediately. This is because the TriCoder will allow you to edit **ONLY** the *Upload Prefix* and *Upload Suffix* if data is currently in memory. At the *Upload Prefix 01* prompt, scan the "double quote" bar code on the *Full ASCII Menu*.

UPLOAD PREFIX 01

“
—

Press the **ENTER** key to complete the change. Press the **ENTER** key again until you see:

UPLOAD SUFFIX 01

—
Scan the bar code for “*double quote*” then scan the bar code for the “*comma*”.

UPLOAD SUFFIX 01

“,—

Press the **ENTER** key until you get to the UPLOAD PREFIX 02 prompt. At the prompt scan the “*double quote*” bar code.

UPLOAD PREFIX 02

“—

Press the ENTER key until you see the UPLOAD SUFFIX 02 prompt. Scan the “*double quote*” bar code, then, scan the “**CR**” bar code if using the TriCoder as a keyboard wedge, or the “**CR**” and the “**LF**” if using the TriCoder as a Serial interface:

UPLOAD SUFFIX 02

“?—

Press **ENTER** to complete the change. If you do not press **ENTER** after each change, the change will not be permanent. Press the F1 key to exit the program, then F1 again to exit **PROGRAMMING MODE**. The TriCoder is now programmed to upload its data in a *comma separated* file format.

Tab Separated Files

Occasionally it is necessary to have Tab Separated files. Some requirements can be met by just changing the Terminator Character to Tab.

1. Set the Terminator Character to TAB

Change the *Terminator Character* either by scanning the bar coded setup menu ,by TriCoder keypad in PROGRAMMING MODE or if using high speed USB, via the **TriCoder Utilities** program. To change it using the bar coded Setup Menu; scan these bar codes in the following order:

- Scan **START SETUP**
- Scan **TERMINATOR CHARACTER**
- Scan **2** (*sets it to TAB*)
- Scan **END SETUP**

To change the *Terminator Character* using the keypad:

- enter **PROGRAMMING MODE**
- choose **5** for **Change Setup**
- choose **1** for **Computer**
- Press **ENTER** until you see **TERMINATOR CHAR.**
- Press **2**
- Press **F1**
- Press **F1** again to exit **PROGRAMMING MODE**

To change the Terminator Character using **TriCoder Utilities** and high speed USB:

- Start the **TriCoder Utilities**
- Click **Tools** then **TriCoder Setup** from the menu
- Click the **Computer** tab, then click the button for **HT** in the **Terminator Character** section.
- Click **OK**

When uploading as a keyboard into an Excel spreadsheet, it is not quite as simple. You will have to set the Terminator Character to None, and then you will have to Upload Prefixes in each for each program data collection step. Excel usually requires delays between moving to the next column. Let's assume we are going to upload data collected in the default Program #1, Item and Quantity, into Excel. The suffixes in the default program are none. We will change them to adapt to Excel.

2. Program the Upload Prefix and Upload Suffix

After setting the *Terminator Character* to **NONE**, the next step is to enter **PROGRAMMING MODE** and program the *Upload Suffix* for each field of data. For Program #1, we will program the *Upload Suffix* as follows:

Statement Prompt	Upload Suffix
ENTER ITEM NO.	TAB (HT on the full ASCII menu) DEL (ASCII 127) 05
ENTER QUANTITY	CR (Enter) •(Left Arrow, ASCII 19) DEL (ASCII 127) 05

- Put the TriCoder in **PROGRAMMING MODE**
- Press **1** at the **Create Programs** prompt (to edit program #1)
- Press **YES** at the **EDIT PROGRAM #1?** prompt

If you have no data collected in the TriCoder, press **ENTER** until you see:

UPLOAD SUFFIX 01

Scan the bar code on the Full ASCII Menu for TAB, the one labeled HT (ASCII10). Then scan the bar code DEL (ASCII 127) on the Full ASCII

Menu, followed by 0 and 5; this puts a ½ (0.5) second delay after the TAB key to give Excel time to reposition and update its files.

Press the ENTER key until you see the UPLOAD SUFFIX 02 prompt. Now we are going to simulate the positioning of the cursor to the first column of the next row. To get back, we would key ENTER followed by the Left Arrow key. To make the bar code reader simulate those keystrokes, we will first scan the bar code for CR (ASCII 13), followed by Left Arrow (ASCII 19), followed by DEL (ASCII 127) and then 0 and 5 for a ½ (0.5) second delay.

Press **ENTER** to complete the change. If you do not press **ENTER** after each change, the change will not be permanent. Press the F1 key to exit the program, then F1 again to exit **PROGRAMMING MODE**. The TriCoder is now programmed to do a keyboard data upload to an Excel spreadsheet.

Flat File Formats

Flat Files are the most complicated file format of the three we are covering in the tutorial. The format of a *Flat File* is mostly dependent upon the host program you will use to process the data you are uploading.

A *Flat File* uses what we call “*Refer-backs*”. Each record has at least one field that remains constant while other fields may contain variable data. “*Refer-backs*” allow the operator to enter the data for the constant fields only once, letting the TriCoder append the data to each record as it uploads. “*Refer-backs*” are specified in the *Upload Prefix* and *Upload Suffix* of each field. We will use a program that prompts for **operator name**, **item number** and finally a **quantity** to demonstrate how “*Refer-backs*” work.

Lets say that the data for the first field in every record must be the operators initials (3 characters). The second field in each record must be an item number and the third field is a quantity. It doesn’t make sense to require the operator to enter their initials every time they scan an item number and enter a quantity. The solution is to create a program that uses a “*Refer-back*” to attach the data from prompt #1 (**operator name**) and the data for prompt #2 (**item number**) to the data for prompt #3 (**quantity**) every time. We do this by using the upload prefix or upload suffix.

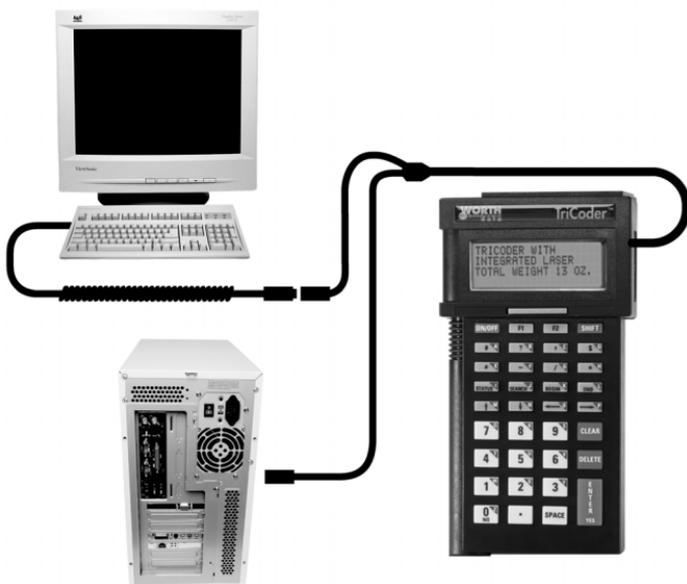
Specifying these characters:

}xx

where **xx** is the *number of the statement* you want to take data from, in the *Upload Prefix* or *Upload Suffix* of the statement you want to attach the “*Refer-back*” data to. The following *TriCoder Coding Form* shows the program we have described above (only the relevant entries on the form are shown):

and the keyboard – do not plug the Splitter cable into a mouse port or any port other than the keyboard port. Take the 3rd end of the Splitter cable with the modular (telephone style) connector and plug it into the port on the TriCoder labeled COMPUTER.

3. Plug the 5-volt power adapter (included with the TriCoder) into the port labeled PWR at the bottom of the TriCoder. Turn the TriCoder on by pressing the ON/OFF key. Now turn on the computer. The TriCoder ships with a small black plastic block with a female modular connector in it called a **Jumper Block**. When removing the TriCoder from the cable for portable operation, place the **Jumper Block** on the now free end of the Splitter cable. This allows your keyboard to function even though the TriCoder is not attached.



PC Keyboard Wedge Installation

Configuring the TriCoder for Keyboard Wedge

Once the hardware is connected, the next step is to configure the TriCoder and test your communication.

The TriCoder setup allows the user to configure the TriCoder for different *Computer Interfaces*, and the reading of different bar code types, as well as configuring some of the more advanced features of the TriCoder. If you have a PC with a T64 or LT64 TriCoder, the default **Computer Interface** is 1- PC Keyboard. If you have a T54 or LT54 TriCoder you will need to do a jumper change - See Appendix F, and change the Computer Interface to 1.

TriCoder Connection

Interfacing with the computer is possibly the most critical operation. Without proper communication between the computer and TriCoder, all that data you collected for hours and hours really isn't doing you much good. Whether you are using the USB interface, serial interface, or the keyboard wedge interface, before you even begin collecting data you need to establish communication in NON PORTABLE MODE, (See **Chapter 3; Non-Portable Mode**), and then move on to uploading stored data. There are several steps involved in establishing communication:

- Connecting the hardware
- Configuring the TriCoder
- Testing in NON-PORTABLE MODE

We will explain each of these steps for the USB, Serial Interface, and Keyboard Wedge. If you are using your TriCoder with a USB connection, continue on with the next section. For serial interface, go to page 5-3, and if you are using your TriCoder as a Keyboard Wedge, turn to page 5-9 and begin there.

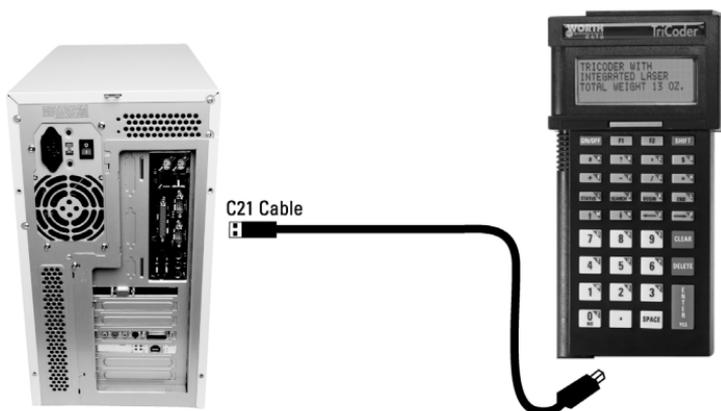
USB Interface – PC and Mac

The TriCoder can be attached to a PC or Mac via a Universal Serial Bus (USB) port. The USB connection offers several advantages, which are:

- A Jumper Block is not needed when TriCoder is removed from PC as with a Keyboard Wedge,
- There are no “Timing” settings required as with Keyboard Wedges,
- In Windows®, you have the convenience of keyboard interface in Non-Portable Mode, but you can still download new firmware releases, upload/download programs, and download tables.
- The USB cable is less expensive than a PC Y Cable or serial cable. You don't have to use our USB cable—any USB A to B cable will work, and
- With the high speed USB interface, data uploads and program transfers are up to 40 times faster than serial and 1000 times faster than keyboard. See **Chapter 3; Non Portable Mode, First time USB use** regarding Windows XP and USB.

The C21 USB Cable is required to connect the TriCoder to a USB port. The USB port does not power the TriCoder – it will operate on batteries or the Worth Data 5V power supply.

1. Plug the flat end of the **C21** cable into the USB port located on the back of the PC or Macintosh. Only one end of the cable fits. If you don't have Worth Data's C21 cable, any USB cable will work.
2. Plug the other end of the C21 USB cable into the USB port on the bottom of the TriCoder.
3. If this is the first time you have connected the TriCoder to a USB cable, you could be asked to select the exact USB interface you desire, and you will be asked to install Windows® USB driver(s). See **Chapter 3: Non Portable Mode, First Time USB Use**, especially if using Windows® Vista or XP.



Testing Communication using NON PORTABLE mode

To test communication as a keyboard wedge or USB, go to **Chapter 3; Non Portable Mode** for detailed instruction on how to use NON PORTABLE mode to establish communication between the TriCoder and the host computer. The key to testing communications is to keep it simple – you don't want to have to determine whether it's your software or the TriCoder causing a problem.

Serial Interface

Connecting the Hardware

The TriCoder can operate as a serial interface reader on a PC. To use the serial interface, you must have software reading the serial port directly, or a keyboard emulation program like **PortKey**, (allows a serial interface TriCoder to look like it's working as a keyboard wedge). The *TriCoder Utilities* disk that is included with each TriCoder has Windows utilities that are extremely useful on a PC serial port. Use the following procedures and illustrations to connect the TriCoder to the PC serial port

Serial Installation on a PC

The RS-232 serial ports on a PC are commonly called COM ports and are referred to as COM1, COM2, COM3, and COM4. Typically you will be using COM1 or COM2.

1. If you ordered the TriCoder for serial upload and planned to use it on a PC, you should have also ordered one of two cables, either the 25 pin F34 cable or the 9 pin F36 cable. The F34 25pin female null modem cable is designed to work directly off of a 25 pin PC serial port. The F36 9pin female straight cable is wired to connect directly to a 9 pin PC serial port. Both cables have a female 9 pin or 25 pin end and a RJ-45 modular (telephone style) 8 pin end.
2. If the host port is female, it's not serial port.
3. If you have the wrong cable (9 pin cable and you have a 25 pin port, or vice versa) you can get a 9 to 25 or 25 to 9 adapter at your computer store.
4. The easy part is the connection – simply plug the 25 pin or 9 pin end of your cable into the open serial port in the back of your computer. Plug the modular end of the cable into the port labeled COMPUTER on the side of the TriCoder. If your serial ports are labeled (COM1 or COM2), make a note of which port you are plugged into – the software you use will need to know which COM port you are using.

Using the bar coded TriCoder Setup Menu

To use the bar coded TriCoder Setup Menu, scan these bar codes in this order:

- **Start Setup**
- **Setup Parameter bar code** (i.e. “Beep Tone”)
- **Bar code of number that corresponds to the appropriate setting** (i.e. 3 to change the Beep Tone to “high”)
- **End Setup**

More than one Setup Parameter can be changed before you scan END SETUP. For example, scan START SETUP, then “Beep Tone”, then 3, then “Operation Mode”, then 0, then END SETUP. This series of scans changes the beep tone to “high”, and puts the TriCoder into NON PORTABLE mode. For details on TriCoder Setup Parameters, see *Chapter 6; TriCoder Setup*.

Using Programming Mode to change the TriCoder Setup

The same Setup Parameters can be changed using the TriCoder keypad (no bar codes necessary) by going into PROGRAMMING MODE. Answer NO to all of the prompts until you see:

**PROGRAMMING MODE
KEY [YES/NO]?_**

Press the **YES** key; then enter the password, *WDTRI*. At the menu prompt, press the **5** key to **CHANGE SETUP**. Once in the *TriCoder Setup*, press the number of the group you want to enter. Press ENTER until you see the *Setup Parameter* you want to change (i.e. BEEP TONE), then enter the number for the correct setting (i.e. 3 to change the BEEP TONE to “high”).

More than one *Setup Parameter* can be changed before you exit the setup. Pressing **F1** while in a *Setup Parameter* will take you back to the *Setup Menu*; from there choose a new group of settings. Pressing **F1** again at the *Setup Menu* will exit PROGRAMMING MODE.

PC Serial Interface

The *Serial Interface* requires certain setup parameters. To set up the TriCoder, you need to know some basic information about the serial port you will be using, as well as the software you will use to test the TriCoder. If possible, **use the TriCoder at its default settings**. Whether or not you can do this often depends upon the software you are using. If using **PortKey** or the *TriCoder Utilities*, use the default settings. If your software requires you to set your own *baud rate*, *parity*, *data bits* and *stop bits*; simply set them to match the TriCoders default settings. See *Chapter 6; TriCoder Setup* for details on changing the serial parameters using the bar coded setup menu or by the keypad in PROGRAMMING MODE. The serial default settings on the TriCoder are:

Setup Parameter	Setting	Description
Computer Interface	3	Default setting on all T54/LT54s. RS-232 ASCII Data Format
Baud Rate	5	9600
Parity	0	None
Data Bits	1	8 bits
Stop Bits	0	1 bit
Protocol	0	None

Default Serial Parameters

Only the default settings for each *Setup Parameter* are shown above. See **Chapter 6; TriCoder Setup** for detailed information.

Testing Communication using NON PORTABLE mode

Testing communication between a serial interface TriCoder and a PC needs some kind of software to read the serial port. If using a dumb terminal/host configuration, the testing is almost identical to that of a PC keyboard wedge. To establish communication between a serial TriCoder and its host, go to **Chapter 3; Non Portable Mode** for detailed instructions. The key to testing communications is to keep it simple – you don't want to have to determine whether it's your software or the TriCoder causing a problem.

Keyboard Wedge Interface (not USB)

Connecting the Hardware

The TriCoder can operate as a legacy keyboard wedge on both a PC and a Macintosh using a keyboard Y-cable plus a jumper change (see Appendix F).

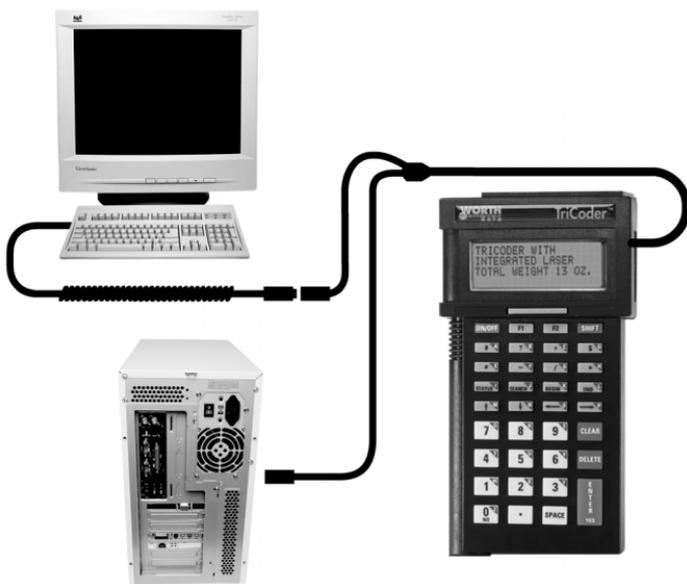
PC Keyboard Installation (does not apply to USB)

To install the TriCoder as a keyboard wedge, use a Splitter cable, F30/1 for the PC. Use the following procedure and the diagram on the following page to install the TriCoder between the keyboard and computer:

1. Before unplugging or plugging in *anything*, the computer **must be turned OFF**. With the power OFF, locate the cable coming out of the keyboard and follow it to the back of the computer where it plugs in. Unplug the keyboard cable, look at the connector and note whether it is large and has 5 pins or small with 6 pins. Take the F30-1 Y cable and check whether the female end of the cable matches (5 pin or 6 pin) the male end of the keyboard cable. If it does not, remove the adapter from the Splitter cable (it may be on either end), flip it over and place it on the correct end. You should now have the two ends of the Splitter cable and the keyboard cable all with the same size connector.
2. Take the end of the keyboard cable you unplugged from the back of the computer and plug it into the female end of the F30-1 Splitter cable. Take the male end of the F30-1 Splitter cable and plug it in to the back of the computer where the keyboard had been plugged in. The Splitter cable must sit in between the computer

and the keyboard – do not plug the Splitter cable into a mouse port or any port other than the keyboard port. Take the 3rd end of the Splitter cable with the modular (telephone style) connector and plug it into the port on the TriCoder labeled COMPUTER.

3. Plug the 5-volt power adapter (included with the TriCoder) into the port labeled PWR at the bottom of the TriCoder. Turn the TriCoder on by pressing the ON/OFF key. Now turn on the computer. The TriCoder ships with a small black plastic block with a female modular connector in it called a **Jumper Block**. When removing the TriCoder from the cable for portable operation, place the **Jumper Block** on the now free end of the Splitter cable. This allows your keyboard to function even though the TriCoder is not attached.



PC Keyboard Wedge Installation

Configuring the TriCoder for Keyboard Wedge

Once the hardware is connected, the next step is to configure the TriCoder and test your communication.

The TriCoder setup allows the user to configure the TriCoder for different *Computer Interfaces*, and the reading of different bar code types, as well as configuring some of the more advanced features of the TriCoder. If you have a PC with a T64 or LT64 TriCoder, the default **Computer Interface** is 1- PC Keyboard. If you have a T54 or LT54 TriCoder you will need to change a jumper change to convert the computer port to Keyboard Output. See Appendix F for more information.

Using the bar coded TriCoder Setup Menu

To use the bar coded TriCoder Setup Menu, scan these bar codes in this order:

- **Start Setup**
- **Setup Parameter bar code** (i.e. “Beep Tone”)
- **Number bar code that corresponds to the appropriate setting** (i.e. “3” to change the Beep Tone to “high”)
- **End Setup**

More than one *Setup Parameter* can be changed before you scan END SETUP. For example, scan **START SETUP**, then “**Beep Tone**”, then **3**, then “**Operation Mode**”, then **0**, then **END SETUP**. This series of scans changes the beep tone to “*high*”, and puts the TriCoder into NON PORTABLE mode. For details on TriCoder *Setup Parameters*, see **Chapter 6; TriCoder Setup**.

If you are using a Laser Scanner to setup the TriCoder, the beam will often cover more than one bar code. Cover any adjacent bar codes before scanning. Check the TriCoder display to make sure the correct setting was entered.

Using Programming Mode to change the TriCoder Setup

The same Setup Parameters can be changed using the TriCoder keypad (no bar codes necessary) by going into PROGRAMMING MODE. Answer NO to all of the prompts until you see:

PROGRAMMING MODE KEY [YES/NO]?_

Press the **YES** key, and then enter the password, **WDTRI**. At the menu prompt, press **5** to **CHANGE SETUP**. Once in the *TriCoder Setup*, press the number of the group you want to enter. Then press **ENTER** until you see the *Setup Parameter* you want to change (i.e. **BEEP TONE**), and then enter the number for the correct setting (i.e. **3** to change the **BEEP TONE** to “*high*”). To enter an alpha character (i.e. “A”), press the **SHIFT** key, and then press the corresponding alpha key (the alpha character is in the upper right corner of each key). You will know if the TriCoder is in “shifted” mode by the cursor – it will be a black square when shifted, a straight line when a narrow underline.

More than one *Setup Parameter* can be changed before you exit the setup. Pressing **F1** while in a *Setup Parameter* will take you back to the *Setup Menu*; from there choose a new group of settings. Pressing **F1** again at the *Setup Menu* will exit PROGRAMMING MODE.

Legacy Keyboard Interface Configuration

To change a T54/LT54 from Serial Upload to a Legacy Keyboard using a keyboard Y-Cable you will need to change a jumper inside the unit (see Appendix F), then set the Computer Interface to 1. Test scans with garbled or incomplete data are not the result of the wrong interface, but rather

are keyboard BIOS timing sensitivities. If you have garbled or incomplete data, try the “**Learning**” mode setting #8. “**Learning**” mode will make the correct adjustments for keyboard timing problems; see *Chapter 6*; **TriCoder Setup: Computer Interface** for details.

To use the TriCoder as a *Keyboard Interface*, use the following chart to determine what the correct setup parameters are for the type of computer you are using:

Computer Interface	Setting	Description
PCs and Compatibles	1	Default Setting on T64/LT64. Used with all IBM PCs and compatibles unless you are choose a USB setting.
PC Learned timing	8	If you power the TriCoder with external power supply, you can use LEARNING mode. On the setup menu, scan START SETUP, Computer Interface , and then scan the 8 . Press any key on the PC keyboard. (the TriCoder should beep once) then scan END SETUP . The TriCoder then watched the key codes coming from the PC and “learns” the timing, setting it in the EEPROM until you change it.

Testing Communication using NON PORTABLE mode

To test communication as a keyboard wedge, go to *Chapter 3*; **Non Portable Mode** for detailed instruction on how to use NON PORTABLE mode to establish communication between the TriCoder and the host computer. The key to testing communications is to keep it simple – you don’t want to have to determine whether it’s your software or the TriCoder causing a problem.

Chapter 6

TriCoder Setup

Most, but not all of the Setup Parameters can be changed by either using the TriCoder keypad in *Programming Mode* or scanning the appropriate bar codes on the *TriCoder Setup Menu*. You can also "clone" your setup from one TriCoder to another if you have the appropriate cables and if you are using high speed USB you can change your setup parameters using the *TriCoder Utilities* program.

Using the bar code TriCoder Setup Menu

To access the Setup using the bar coded *TriCoder Setup Menu*, scan the START SETUP bar code in the upper left hand corner of the bar coded *TriCoder Setup Menu*. You should hear two beeps from the TriCoder upon scanning START SETUP and the words START SETUP should appear on the TriCoder display. At this point you are ready to scan and change as many parameters as you wish, following this order:

1. Scan the bar code for the parameter you want to change
2. Scan the number on the Barpad Table (to the right) that corresponds to the setting you want to choose.
3. If the parameter requires it, scan the SET bar code. SET is normally used to terminate a setup parameter that can have variable input, i.e. Preamble or Postamble.
4. If you want to make more changes, go back and start at step 1
5. If you are finished, scan the END SETUP bar code in the upper right hand corner. You should hear 3 beeps at END SETUP.
6. To reset the TriCoder back to the default settings at any time, scan START SETUP, RESET, then END SETUP. Resetting the TriCoder will lose any changes you have made and set the TriCoder to the default settings (indicated by a * on the bar coded setup menu).

Using the keypad to setup the TriCoder

To use the keypad to setup the TriCoder, you must first get into PROGRAMMING MODE. To do this, answer NO to all Mode Menu prompts until you see:

PROGRAMMING MODE
KEY [YES/NO]?_

Press the **YES** key. A password is required to proceed into PROGRAMMING MODE:

PROGRAMMING MODE
PASSWORD?_

Enter the password, **WDTRI** using the TriCoder keypad, then press **ENTER**. The TriCoder now displays the PROGRAM FUNCTION menu:

Create Programs->1-3
Voice -> 4 Setup -> 5
Automation ----->7
Data File Names---->6

Press the 5 key to select Change Setup. The keypad setup menu is now displayed:

BarCodes-->0 DateTime->4
Computer->1 Speaker--->5
RS-232----->2 Other----->6
Security---->3 Exit----->F1

The setup parameters are distributed in the groups as follows:

Menu Selection	Setup Parameters	Menu Selection	Setup Parameters
BAR CODES "0"	Code 3 of 9	DATE TIME "4"	Set Time
	UPC & EAN		Set Date
	Code 25 / I 25		Date Format
	2 of 5 Length		Display of Year
	Code 128		
	Codabar		
	MSI/Plessey		
COMPUTER "1"	Code 93	SPEAKER "5"	Speaker /Batteries
	Computer Interface		Beep Tone
	Intercharacter Delay		Speaker Volume
	Terminator Character		
	Beep Tone		
	Single Cycle Transmit		
RS232 "2"	Country Code	OTHER "6"	Shut Down Time
	Baud Rate		Preamble
	Protocol		Postamble
	Dialing String		EOF String
	Parity		Partitions
	Data Bits		Voice Messages
	Stop Bits		Scanner Options
	Set ID Character		Aiming Dot Duration
	Host Response Delay		
	Modem Redial Delay		
SECURITY "3"	Transmit Mode		
	Data Security		

To select a particular category, press the corresponding number key on the TriCoder keypad. Once you are in a category, pressing ENTER will scroll through the parameters in the order shown above. When you get to the one you want to change, enter the new character (see the Parameter details later on), then press ENTER. Some changes must be made by scanning bar codes from the FULL ASCII MENU. You can set a parameter back to the default settings by pressing the CLEAR key. You can use the arrow keys to

help you navigate the menu:

Up Arrow *moves to beginning of category*

Down Arrow *moves to end of category*

Left Arrow *moves up one in the category*

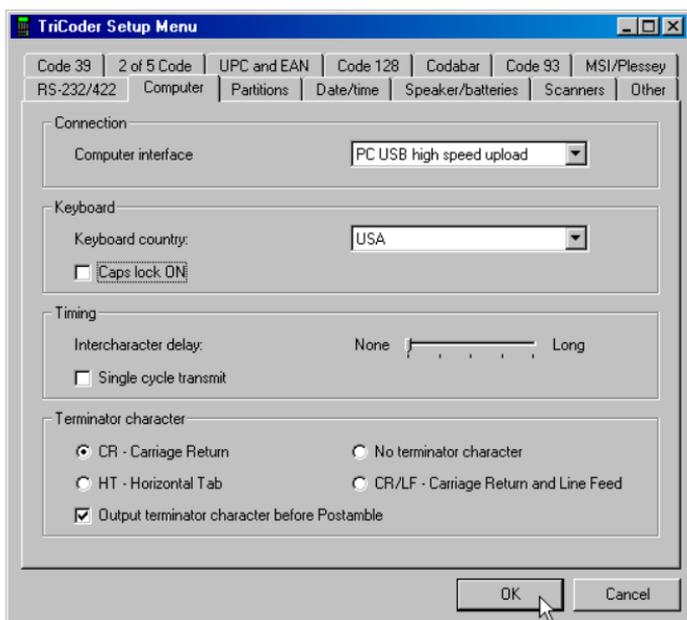
Right Arrow *moves down one in the category*

Press the **F1** key to go back to the category selection screen.

Using the TriCoder Utilities and USB to change Setup Parameters

If you are using the **High Speed USB** interface, you can use the *TriCoder Utilities* program to change your setup parameters.

To use the TriCoder Utilities, you must make sure your TriCoder is turned on, plugged into the USB cable and is set for High Speed USB interface. In the TriCoder Utilities program, choose *Tools* from the pull-down menu, and then choose *TriCoder Setup*.



Click on any of the tabs to change settings for that section. Once you have made your changes, click OK and the changes are automatically made in your TriCoder.

Cloning from one TriCoder to another

If your programs, tables and setup are complex or large, transmitting them from TriCoder to TriCoder is faster and easier than manually entering all of the information every time. Transmitting programs and setup to a host

computer allows you to store a back-up copy (excluding Voice Messages) available for download if anything happens to your TriCoder.

Transferring programs, tables and setup directly from one TriCoder to another is called Cloning. Cloning also allows you to copy voice messages from one TriCoder to another (transferring programs and setup to the host computer does not allow you to do this).

There are several things you need to do before receiving programs or setup from another TriCoder:

- Receiving and transmitting programs from one TriCoder to another requires the correct cables. The **TriCoder Data Cloning Cable** (F38) is needed to clone or transmit/receive programs, tables and setup information. The **TriCoder Voice Cloning Cable** (T15) is required to "clone" or transmit and receive voice messages. Voice messages can only be transmitted or received from TriCoder to TriCoder. They cannot be transmitted via host computer. The **Data Cloning Cable** is attached to each TriCoders *Computer* port. The connector on the **Voice Cloning Cable** that has two black rings on the tip plugs into the auxiliary jack on the bottom of the **receiving** TriCoder. The tip with the single ring plugs into the transmitting TriCoder.
- Make sure all data is uploaded and deleted from the **receiving** TriCoder. The TriCoder will not allow you to receive data unless the TriCoders data files are empty.
- Plug in the 5-volt power adapter(s). You want to make sure you don't have a low-battery situation in the middle of a transfer.
- For serial and keyboard cloning, *always* start the **receiving** TriCoder first. For USB cloning to a host computer, follow the instructions on the TriCoder's display.
- When transmitting between two TriCoders, both TriCoders must be configured to use the same **Computer Interface**. If configured as serial interface, the serial parameters must be the same on both TriCoders; baud rate, parity, data bits and stop bits must match. Two USB TriCoders cannot be cloned together.

Starting the Receiving TriCoder

Make sure all cables are attached correctly and the 5-volt power adapter is plugged in. To start the *receiving* TriCoder, answer NO to all prompts until you see:

**PROGRAM RECEIVE?
KEY [YES/NO]?_**

Press YES to get to the RECEIVE PROGRAM menu:

RECEIVE PROGRAM KEY
----- -----
Programs [1-3]?----->1 - 3
Clone TriCoder?-----> 0

Press **0** to Clone the entire TriCoder. Cloning receives the programs, tables, Setup, and voice messages (if using a voice cloning cable T15) from another TriCoder.

Press **1, 2 or 3** to receive a program only. Pressing **1, 2 or 3** determines *which program number you are assigning* - it does not have to correspond to the program number being transmitted from the other TriCoder or host.

After making a selection, the TriCoder displays:

**RECEIVING PROGRAM
PLEASE WAIT→**

Once the transmission is complete, the receiving TriCoder displays:

**END OF PGM. RECV
HIT ANY KEY_**

Press any key to return to the *Mode Menu*.

If the TriCoder has a problem during the transmission, the transfer will end and the TriCoder will display the following error message:

**DATA XMIT ERROR
CYCLE POWER**

If you receive this message while receiving a program, the program transfer is incomplete and the transmit/receive session will have to be restarted. To avoid any problems, **do not press any keys on the TriCoder once the transmission has started.**

Starting the Transmitting TriCoder

At this point, you can start the transmitting TriCoder. To start transmitting programs or setup from a TriCoder, answer NO to all prompts until you see:

**PROGRAM TRANSMIT?
KEY [YES/NO]?_**

Press YES to get to the TRANSMIT PROGRAM menu:

TRANSMIT PROGRAM KEY
----- -----
Programs [1-3]?----->1 - 3
Clone TriCoder?-----> 0

Press **0** to Clone the entire TriCoder. Cloning transmits the programs, tables, Setup and voice messages (if using a voice cloning cable T15) to another TriCoder.

Press **1, 2 or 3** to transmit a program only. Pressing **1, 2 or 3** determines *which program number you are transmitting* - it does not have to correspond to the program number chosen by the receiving TriCoder or host.

After making a selection, the TriCoder displays:

**SENDING PROGRAM
PLEASE WAIT→**

Once the transmission is complete, the transmitting TriCoder displays:

**END OF PGM. XMIT
HIT ANY KEY_**

Press any key to return to the Mode Menu.

The serial protocol for program transmission is different than that for data transmission. During serial program transmission, the TriCoder transmits each character one at a time, expecting the receiving TriCoder to echo the character back. If the characters match, then the transmitting TriCoder sends the next character. If the characters don't match, the transmitting TriCoder sends a NAK to the receiving unit. At that point, the transmitter re-sends the last character. If the transmitter ends up sending 10 NAKS, it will abort the transmission (there is obviously something wrong) by sending EOT (ASCII 4) and display the following error message:

**DATA XMIT ERROR
CYCLE POWER**

If all data is echoed back correctly, the last character sent to the receiving unit is ASCII 128.

If you see this message while transmitting a program, the program transfer is incomplete and the transmit/receive session will have to be restarted. To avoid any problems, **do not press any keys on the TriCoder once the transmission has started.**

TriCoder Setup Parameters

Default settings are shown in bold print. The number or letter associated with the setting is the same whether configuring the TriCoder using the bar coded Setup Menu or via the keypad in PROGRAMMING MODE. Some parameters are set only by the bar code setup menu or only by the TriCoder keypad.

Beep Tone

Lowest	0
Low	1
Medium	2
High	3
Highest	4
No Beep, No LED on tethered scanner	5
No Beep, but LED on tethered scanner shows good read	6

The TriCoder allows five different beep pitches or no beep at all.

Speaker Volume

Speaker and beeper volume are also controlled by keyboard Setup in PROGRAMMING MODE. The default is 5, a medium setting. If you want it louder, enter a larger number. If you want it less loud, enter a lower number.

Code 3 of 9 (Code 39)

Enable Code 3 of 9	0
Disable Code 3 of 9	1
Enable Full ASCII Code 39	2
Disable Full ASCII Code 39	3
Enable Code 39 Accumulate Mode	4
Disable Code 39 Accumulate Mode	5
Enable Start/Stop character transmission	6
Disable Start/Stop character transmission	7
Enable Mod 43 Check Digit	8
Disable Mod43 Check Digit	9
Enable Check Digit transmission	A
Disable Check Digit transmission	B
Caps Lock ON	C
Caps Lock OFF	D

- The Start and Stop character for Code 39 is the * character. Settings **6** and **7** determine whether or not those characters are transmitted to the computer along with the data. For example, at setting **6**, the data of **1234** would be transmitted as ***1234***. Transmitting the start and stop

characters can be useful if you need to differentiate between data that comes from a bar code versus data coming from the keyboard.

- Enabling use of the Mod 43 check character requires that the last character of your bar code conform to the Mod 43 check character specifications. See **Appendix H; Code 39** for more information. Enable transmission (A) will send the check digit data along with the rest of the bar code data to your computer. To use A, you must also be using 8.
- **Caps Lock ON** causes lower case letters read as data to be transmitted to the computer as UPPER CASE, and upper case letters to be transmitted as LOWER CASE. Numbers, punctuation and control characters are not affected. This setting applies to **all** bar code types.

UPC/EAN

Enable UPC/EAN	0
Disable UPC/EAN	1
Enable UPC/EAN Supplements	2
Disable UPC/EAN Supplements	3
Enable transmission of UPC-A NSC or EAN 2 Flags	4
Disable transmission of UPC-A NSC or EAN 2 Flags	5
Enable transmission of UPC-A and EAN-13 check digit	6
Disable transmission of UPC-A and EAN-13 check digit	7
Enable transmission of UPC-E NSC and EAN-8 Flag character	8
Disable transmission of UPC-E and EAN-8 Flag ch.	9
Enable transmission of UPC-E and EAN-8 Check digit	A
Disable transmission of UPC-E and EAN-8 check digit	B
UPC-E Compressed	C
UPC-E Expanded	D
EAN-8 observing 9&A	E
EAN-8 forced to transmit 8 digits always	F

- Use setting **2** to enable reading of the 2 and 5 digit UPC/EAN supplements commonly found on magazines and paperback books. Using this setting forces left to right reading of UPC codes to assure that the supplement code is not missed. This setting also allows for reading of the *UCC/EAN 128 Extended Coupon Code*. The *Extended Coupon Code* consists of a UPC code with a NSC of 5 or and EAN code with a country code of 99 along with a Code 128 supplemental code to the right. This setting allows you to read the Code 128 supplement with the UPC/EAN, providing the UPC has a NSC of 5 or the EAN code has a country code of 99. Without the correct NSC or country code, the Code 128 portion will be ignored; UPC code with an NSC of 5 or EAN codes with country code of 99 will not be read unless there is a readable Code 128 supplemental code read also.

- ISBN (International Standard Book Numbering) bar codes are EAN-13 with a 5-digit supplement. If the “Bookland” bar code uses 978 (books) or 977 (periodicals) as the first three digits, then it can be transmitted by the TriCoder in the ISBN format. The settings for this can be found under the **Terminator Character** parameter. For details on ISBN, see **Appendix K; UPC/EAN**.
- Use setting **4** and **9** to enable transmission of the NSC character to your computer. The **Number System Character** is the leading character in the bar code. For details, see **Appendix K; UPC/EAN**.
- Use setting **6** and **A** to enable transmission of the check digit character to your computer. The check digit is the last character and is based upon a calculation performed on the other characters.
- Setting **C** transmits UPC-E0 bar codes as is; setting **D** transmits them with inserted zero’s to make them the same length as a UPC-A bar code. A NSC of 0 is assumed. It is possible to read UPC-E1 bar codes; by default this option is disabled. Do not enable UPC-E1 if you plan on reading EAN-13 bar codes; you may experience partial reads when reading EAN-13. The UPC-E1 option is set in the **2 of 5 Code** parameter. To enable UPC-E1 reading, set the **2 of 5 Code** parameter to **8**. To turn *off* UPC-E1 reading, set it back to the default of **9**.
- If you prefer to transmit UPC-E bar codes in a 6 digit format while EAN-8 is transmitted in its original 8 digit format, use setting **F**. This will allow you to use settings **9** and **A** and still transmit EAN-8 as 8 digits.
- UPC-A can be transmitted in EAN-13 format by adding a leading 0 (USA county code) to the UPC-A data. This setting is found in the **Terminator Character** parameter.

Codabar

Enable Codabar	0
Disable Codabar	1
Enable CLSI Codabar	2
Disable CLSI Codabar	3
Disable Start/Stop character transmission	4
Enable Start/Stop character transmission	5

- CLSI is a form of Codabar often used by libraries.
- Setting 5 will transmit the Codabar start and stop characters with the bar code data to your computer. If you are varying the start and stop characters to differentiate between different labels, transmitting the start and stop can be helpful. See **Appendix L; Codabar** for more information.

2 of 5 Code

Enable Interleaved 2 of 5	0
Disable Interleaved 2 of 5	1
Enable Interleaved 2 of 5 check digit	2
Disable Interleaved 2 of 5 check digit	3
Enable check digit transmission	4
Disable check digit transmission	5
Enable Standard 2 of 5	6
Disable Standard 2 of 5	7
Enable UPC- E1	8
Disable UPC- E1	9

- Setting **2** requires that the last digit in your bar code conform to the specifications for the 2 of 5 check digit calculation. See *Appendix J; 2 of 5 Code* for more information.
- Transmission of the check digit (**5**) requires the use of setting **2** and will transmit the check digit along with the bar code data to the computer.
- Settings 8 and 9 enable and disable the reading of UPC-E1 codes. See the UPC/EAN setup parameter for more information.

2 of 5 Length

Default setting	06
Valid entries	00-98
To read variable length 2 of 5 codes (temporarily ONLY!)	00

- 2 of 5 codes are so susceptible to partial misreads that only one length of code should be read, and that should be checked by the TriCoder.
- The default setting of **06** causes the TriCoder to read **only** 2 of 5 codes that are 6 digits in length. To set the TriCoder to read a different length, scan any two digit number from the bar pad table. For example, to change the TriCoder to accept an 8-digit bar code, scan **0** then **8** from the bar pad table. 2 of 5 code must always be an even number of digits so the length setting must always be an even number.
- If you have to read variable length Interleaved 2 of 5 codes, specify a 2 of 5 length of **00**, however, you will want to use other checking features (Data ID, etc.) when creating a program for data collection. Reading variable length I 2of5 or 2 of 5 codes is to be avoided if at all possible. The **00** setting is supplied for the purposes of reading codes of unknown length, counting the digits, and setting the length to the proper number.

MSI/Plessey

Disable MSI & Plessey bar codes	0
Enable MSI, 1 Mod 10 check digit	1
Enable MSI, 2 Mod 10 check digits	2
Enable MSI, 1 Mod 11/ Mod 10 check digit	3
Transmit no check digits	4
Transmit 1 check digit	5
Transmit 2 check digits	6
Enable Plessey bar code (mutually exclusive with MSI)	7
Enable LabelCode5 (mutually exclusive with MSI & Plessey)	8
Enable LabelCode4 (mutually exclusive with all above codes)	9

- LabelCode 5 and LabelCode 4 are proprietary bar code types used by Follet.
- For more information regarding MSI or Plessey Code, see *Appendix M; MSI Plessey Code*.

Code 128

Disable Code 128	0
Enable Code 128	1
Disable UCC/EAN-128	2
Enable UCC/EAN-128	3
Enable Storage Tek Tape Label Code (TriOptic Code 39)	C
Disable Storage Tek Tape Label Code (TriOptic Code 39)	D
Bar Code ID's transmitted	E
Bar Code ID's not transmitted	F

- UCC/EAN-128 is a subset of Code 128 that follows certain specifications regarding character content, length and check digits. Enabling UCC/EAN-128 (2) causes the TriCoder to look for a Code 128 bar code that begins with the Code 128 F1 (Function 1) character. See *Appendix I; Code 128* for more details.
- The StorageTek Tape Label code (also called TriOptic Code 39) is a proprietary variation of Code 39 code used for the storage of computer data tapes. Enabling the tape label code (C) does not disable reading of Code 128 bar codes.
- Bar Code ID's are characters assigned to each bar code type to identify that particular type of code. These Bar Code ID's can be used to identify what type of bar code you are using when you are not sure or you want your application to differentiate between the different types. This applies only when the TriCoder is used in NON PORTABLE mode.

The Bar Code ID's are assigned as follows:

Bar Code	ID	Bar Code	ID
Codabar	a	Code 39	b
UPC-A	c	EAN-13	d
I 2of5	e	2 of 5	f
Code 128	g	Code 93	i
MSI	j	UPC-E(0)	n
UPC-E (1)	o	EAN-8	p
RSS-14	r	StorageTek	s
Plessey	x	LabelCode 4	y
		LabelCode 5	z

The ID character is transmitted in front of the bar code data.

Code 93

Enable Code 93	0
Disable Code 93	1
Enable Full ASCII Code 93	2
Disable Full ASCII Code 93	3

- Code 93 is similar in character set to Code 39. See **Appendix N: Code 93** for more information. Code 93 is not a commonly used bar code symbology.

RSS-14

Disable RSS-14	0
Enable Standard 14 digits	1
Enable 14 plus Identifiers	2
Enable 14 plus UCC 128 Emulation	3

- By default, standard RSS-14 is disabled, scan 1 to enable. Options 3 and 4 enable the alternate RSS-14 formats. For more information on RSS-14, see the AIM website at:
http://www.aimglobal.org/standards/symbinfo/rss_overview.asp

Preamble and Postamble

*The **Preamble** and **Postamble** apply to data entered in **NON-PORTABLE MODE** only. **Upload Prefixes** are used in programs for portable data collection.*

- **Preambles** are user-defined data that is transmitted at the beginning of data (bar code or keyed) that is entered in the TriCoder in NON PORTABLE mode. For example, if you set a preamble of @@ and scanned bar code data of **12345**, @**12345** would be transmitted to the computer.
- **Postambles** are user-defined data that is transmitted at the end of data (bar code or keyed) that is entered in the TriCoder in NON PORTABLE mode. For example, if you set a preamble of @@ and scanned bar code data of

12345, 12345@@ would be transmitted to the computer.

- By default, the TriCoder has no preambles or postambles configured. Preambles and Postambles can each contain up to 15 characters scanned from the bar coded FULL ASCII Menu. **To set a preamble or postamble:**
 1. Scan the **Preamble** or **Postamble** bar code or select **Preamble** or **Postamble** from the keypad menu.
 2. Scan the desired characters (up to 15) from the FULL ASCII Menu.
 3. Scan the **SET** bar code, or if using the keypad, press **ENTER**.
 4. To clear the **Preamble** or **Postamble** and return to the default (no Preambles or Postambles defined), scan **CLEAR** at step #2, then continue with your setup.
- You can use the **Preamble** or **Postamble** to trim characters from the data you are entering into the TriCoder in NON PORTABLE mode. *The Upload Prefix and Suffix is used to trim data in portable mode (data collection).* You can trim from 1-15 characters from the data by creating a preamble or postamble of:

~x

where ~ is ASCII 126 and *x* is a single hex digit 1-F (corresponding to 1-15). Data that is shorter than the trim amount are transmitted without trimming. **Preambles** trim data from the front; **Postambles** trim characters from the end.

Here are some examples, with and without trimming included:

Data Scanned	Preamble Value	Data Transmitted
123	XYZ	XYZ123
12345678	~3XYZ	XYZ45678
12345678	~9	12345678
12345678901	~A	1
123456	~5	6

Preamble affects leading (high order) characters

Data Scanned	Postamble Value	Data Transmitted
123	XYZ	123XYZ
12345678	~3XYZ	12345XYZ
12345678	~9	12345678
12345678901	~A	1
123456	~5	1

Postamble affects trailing (low order) characters

- Using the Bar Code ID feature and the **Preamble** or **Postamble**, you can trim data selectively, trimming characters only on the bar code type specified. To use selective trimming, enter:

~bx

where *b* is the Bar Code ID character (see the *Code 128 setup parameter*) and *x* is the number of characters to trim from the

front of the data. For example, **~b2~c1** says “trim 2 characters from Code 39 data and 1 character from UPC-A data”.

Remember that the **Preamble** trims leading data and the **Postamble** trims trailing data.

- The **Preamble** and **Postamble** can also be used to create “line feeds” on the TriCoder display before the data is displayed. To enter “line feeds” before or after your data enter:

}x

where *x* is 1-3, depending on how many lines you want to scroll. For example, if you wanted skip 3 lines, you would enter }3.

- Lastly, the **Preamble** and **Postamble** can be used to check a minimum and maximum character length for data entered in NON PORTABLE mode. In portable data collection, min and max character lengths are set using the Max Data Len and the Min Data Len in the programming statements. To check for length in the **Preamble or Postamble**, enter:

|nnmm

where | is ASCII 124, *nn* is the two-digit minimum and *mm* is the two-digit maximum. |0210 would check for a minimum of 2 characters and a maximum of 10.

Terminator Character

CR - Carriage Return	0
HT - Horizontal Tab	1
None	2
CR/LF - Carriage Return/Line Feed	3
<i>Do not transmit EAN-13 data with 5 digit supplement as ISBN</i>	<i>C</i>
<i>Transmit EAN-13 data with 5 digit supplement as ISBN format</i>	<i>D</i>
<i>No country code transmitted for UPC-A</i>	<i>E</i>
<i>Transmit UPC-A in EAN-13 format (Country Code 0)</i>	<i>F</i>

- The **Terminator Character** is the character sent at the end of each data entry in NON PORTABLE mode and at the end of each field when uploading after data collection (Portable use). Your application will determine what Terminator Character (if any) you use.
- In Keyboard Wedge mode, **CR (0)** is the default. For Serial Interface, **CR/LF (3)** is the default.
- Settings **C, D, E** and **F** correspond to settings for UPC bar codes only. See the UPC/EAN section for details.

Computer Interface

PC USB Keyboard Upload	0
PC compatibles Keyboard Wedge	1
RS-232 ASCII Data Format	3
RS-422 ASCII Data Format	5
PC USB High Speed Upload	6
If setting 1 or setting 2 and Non-Dedicated Server	7
Learning Mode for Timing with PC Keyboard Wedge	8
Macintosh USB Keyboard	9

T64/LT64s are shipped with the *Computer Interface* set to **1**. T54s/LT54s are shipped with the *Computer Interface* set to **3**. All models of the TriCoder have a built-in USB port.

USB Selections

If you have a Mac, you must choose **9**. You are limited to Non-Portable Mode and Data Upload as a Mac USB Keyboard.

If you are using Windows-98 or later (2000, ME, XP, etc.) and you wish to upload your files directly into your application through the keyboard, you must choose **0**, (USB keyboards are still superior to keyboard wedge because there are no timing delays and no jumper block is necessary). After specifying 2, the first time you plug in a USB cable to the TriCoder and host, you will be asked to install the USB Keyboard HID driver, which is probably on your hard disk, but if not, is on your original Windows CD ROM; just keep clicking on NEXT until you are forced to supply the original Windows CD ROM. Data uploads through the keyboard will be slower than serial and high speed USB, but you will still be able to use the High Speed program uploads/downloads, firmware upgrades, and table downloads; the first time you attempt a high speed USB operation, you will be required to install another driver for high speed support, TRICODERUSB, which is supplied on your TriCoder Utilities CD ROM, (also on our website, www.barcodehq.com under *Downloads*).

If you are using Windows and you wish to use the *TriCoder Utilities* to upload data to a file in high speed, choose **6**. You will also be able to do program uploads/downloads, firmware upgrades, and table downloads. The first time you plug in a USB cable between the TriCoder and a host, you will be required to install the high speed TRICODERUSB driver that is supplied on your TriCoder Utilities CD ROM, (also on our website, www.barcodehq.com under *Downloads*). The first time you attempt to use Non-Portable Mode, you will be asked to install the USB Keyboard HID driver, which is probably on your hard disk, but if not, is on your original Windows CD ROM.

Other Interfaces

Depending upon the setting of the Interface Jumper (see pages K-2 and K-3), the TriCoders Computer Interface is set to either RS-232 or PC compatible Legacy Keyboard Wedge.

- The easy way to select an interface if using Keyboard Wedge mode (*not USB*) is to use **Learning Mode** (8). Follow these instructions:
 1. **Scan** Start Setup
 2. **Scan** Computer Interface
 3. **Scan** 8
 4. Press any key **on your PC keyboard**
 5. **Scan** End Setup

The TriCoder watches the key codes coming from the computer, “learns” the keyboard timing, and beeps to signify it has captured the timing; it then sets it in the EEPROM until you change it.

- RS-422 is for use with RS-422 boards only. If your computer is using a RS-422 board, you must order the 422 option at the same time you order your TriCoder, as this feature is not field-installable. RS-422 also requires special cables. RS-422 and RS-232 are mutually exclusive; only one or the other is available.
- If you are a Windows® with Window Vista, XP, ME, 2000 or 98SE, we suggest that you use the high speed USB interface, which offers the following advantages: (the first time you plug in your USB cable, you may be asked to choose the type of USB interface you wish to use)
 - 1) Data uploads at speeds 40 times faster than a serial upload.
 - 2) The ability to update your firmware at speeds 40 times faster than serial interface (its not even possible with the keyboard wedge). This includes all improvements available on our Website for the life of your TriCoder.
 - 3) The ability to download tables and upload/download programs from your PC at much faster speeds than serial, (not possible with keyboard wedge interfaces) and use the TriCoder Utilities to quickly change your TriCoder Setup.
 - 4) The ability to operate in Non-Portable Mode as a USB keyboard without having to add a jumper block to a Y-Cable when the TriCoder is removed from the Y-cable for portable data collection.

Intercharacter Delay

None	0
Short Delay	1
Medium-short Delay	2
Medium-long Delay	3
Long Delay	4

(This does not apply to USB. It **rarely** applies to serial.)

- Use **Computer Interface** setting **8** for **Learning Mode** whenever possible. This allows the TriCoder to figure out the timing on its own and set it in the EEPROM for you. Don't try this parameter unless **Learning Mode** fails.
- *Intercharacter Delay* is a setting that allows the TriCoder to match the keyboard timing on your PC. Most computers work fine with no delay at all, but due to the variety of BIOS and clock speeds, some PC's may need a timing delay.
- The best way to determine whether you need to program a delay or not is to start at setting **0 (None)**. Try reading a bar code in NON PORTABLE mode while connected to your computer. If your data transmits with no problems, leave your delay at **0**. If you have garbled or missing data, try each delay starting with **1** until you have complete and correct data. Between setting changes, try typing on your keyboard to make sure you still have correct characters coming from your keyboard. In some instances, you may need to re-boot the computer between delay setting changes.
- *Intercharacter Delay* settings are generally for Keyboard Wedge mode but will work in Serial Mode (usually only if using PortKey and emulating keyboard data). **Garbled data in Serial Mode is usually the result of the wrong Baud Rate or Parity setting.** Check these first before you start changing the *Intercharacter Delay*.

Speaker / Batteries

Speaker ON	0
Speaker OFF	1
Alkaline Batteries or Alkaline Rechargeables	2
Nickel Metal Hydride or NiCad Rechargeable Batteries	3

- If you are using the headphones in a noisy environment, you can conserve battery power by turning the Speaker OFF (**1**). You control the volume of the headphones by adjusting a variable resistor inside the TriCoder's case. See **Appendix F: Jumpers, Switches, and Adjustments**.

- For the TriCoder to know when to tell you to change batteries, you must select the correct battery type. The default is Alkaline (2). If you start using rechargeable batteries and fail change 2 to 3, your TriCoder will probably start acting very strange, (beeping, black bars on the display, no laser beam, etc.) as the batteries run down. Rechargeable batteries don't have the instant reserve power that alkalines do; therefore, without warning or indication they can be depleted unless the TriCoder knows to look for rechargeable batteries.

Battery Status can be displayed by pressing the STATUS key on the TriCoder keypad while in NON PORTABLE mode or while collecting data (portable).

Scanner Options

Switch Wand (no longer available)	7
Non-switched Wand (for NON PORTABLE mode only)	8

If using a "switch" wand (no longer available), you must set the decode light switch to "W", (See *Appendix F*). A "non-switched" wand can be used, but only with the 5v power supply and the decode light switch (see TriCoder diagram in *Appendix F*) must also be set to "L", (the default at shipping).

Aiming Dot Duration

If you have a DMA TriCoder with firmware version of DMA2018 or higher, board level F or greater, and an internal laser or the external LZ200-D scanner, you can get a aiming dot to project before the laser beam spreads over the bar code. This is useful when trying to read in direct sunlight (because the dot is brighter than the line), when trying to read at a distance, and when trying to read one of many bar codes on a page.

By setting the time in 1/10ths of a second that the aiming dot stays on after pulling the trigger and before the beam spreads, the bright dot can be used to position in the middle of the bar code. This feature is accessible only through the keyboard setup under *OTHER*. The default is set to 00, no aiming dot. You can enter any number from 01 to 99 (99 gives 9.9 seconds). Typically you will want 1 (10) or 2 (20) seconds of aiming dot. You also must make sure the decode light switch (see diagram on page M-3) is set to L.

To check your firmware version and board level, power up your TriCoder and note the opening screen display:

DMA TRICODER Xxxxx B
HIT ANY KEY_

X is **W** for a TriCoder jumpered for Keyboard Interface or
 R for a TriCoder jumpered for Serial Interface or
 K for USB Keyboard upload or
 H for USB High Speed upload

xxxx is the firmware version (i.e. **2018**) and

B is the board level(i.e. **F**).

Keyboard Country

US	00
French	01
German	02
Belgian	03
French Canadian	04
Danish	05
Dutch	06
Italian	07
Latin American	08
Norwegian	09
Portuguese	10
Spanish	11
Swedish	12
Swiss German	13
United Kingdom	14

- This does not apply to USB or Serial. In addition to keyboard wedge country emulation, it also controls the display of French, German, or English messages.
- This parameter applies **only** to TriCoders operating in Keyboard Wedge mode. The default setting is US (**00**) and requires a two-digit entry for all settings.
- Setting **01** (French) and **02** (German) also apply to the displayed messages on the TriCoder. Displayed messages will appear on the TriCoder in the language chosen. If you want to use a US keyboard and display messages in French or German, scan **51** for *French* or **52** for *German*.

Operation Mode

Non Portable Mode	0
Programming Mode	1
Data Collection Mode	2
Data Upload Mode	3
Program Transmit Mode	4
Program Receive Mode	5
Buffered Terminal Mode	6

- **Non Portable Mode** is used to read data directly into the Computer from the TriCoder, both in Keyboard Wedge, USB and Serial modes. If using the TriCoder as a serial interface, setting **Protocol** to *Host Response Accepted* can turn the TriCoder into a dumb terminal, displaying prompts from the host and transmitting data back.
- **Programming Mode** is used to create or modify a program, record and test voice prompts and to change the Setup using the TriCoder keypad. The TriCoder requires entry of a password before you are allowed to access Programming Mode. The password, **WDTRI**, is the same for all TriCoders.
- **Data Collection Mode** is a portable mode used to collect data using one of the TriCoder's four available programs. Program #0 and Program #1 are pre-programmed into the TriCoder when you receive it. Program #0 is a fixed program while Program #1 is a simple inventory program that is user-editable. Programs #2 and #3 are not set and are available for custom programming. See **Chapter 1** and **Chapter 2** for data collection tutorials using Program #0 and #1.
- **Data Upload Mode** is used to transfer data collected in the TriCoder to the host computer for Keyboard Wedge, USB and Serial mode.
- **Program Transmit Mode** is used to transmit a TriCoder program, setup or voice messages to another TriCoder or to a host computer. Voice messages can only be transferred from TriCoder to TriCoder. "Cloning" (copying the entire setup and programs) is handy when setting up multiple TriCoders.
- **Program Receive Mode** is used to receive a TriCoder program, setup or voice messages from another TriCoder or host computer. Voice messages can only be received from another TriCoder.
- **Buffered Terminal Mode** allows the TriCoder to function as an online intelligent buffered terminal using Program #1 and uploading upon request by a host computer polling with ACK/NAK protocol. This mode requires programming at the computer end.

Voice Messages

This parameter partitions the total amount of voice messages into different message lengths. The default setting is:

303015

xx yy zz

where:

xx is number of ½ second messages
yy is the number of 1 second messages
zz is the number of 2 second messages

The total time allotted must not exceed 75 seconds. To change the partitions, scan 6 digits total; 2 for the number of ½ second messages, 2 for the number of 1 second messages and 2 for the number of 2 second messages. See the default setting as an example.

WARNING: *changing this parameter after you have recorded messages could result in having to re-record some of them; they would still be there but longer messages may get cut up and shorter ones combined.*

Set Date

Using the barpad table, scan a 6-digit date in the *mmdyy* format. For example, to set a date of 1/1/99, you would scan **010199**. Press the STATUS key to view the current date and time in both NON PORTABLE mode and during data collection. To set the time in the TriCoder from a host computer, see **Appendix U; Using the TriCoder as a Time Clock** for details.

There are alternative date formats available for the TriCoder. See the **Protocol** parameter for details. Changing the date format requires resetting the actual date in that format also.

If you setup the TriCoder using the keypad in PROGRAMMING MODE, you can choose to have the TriCoder display the year in a 4-digit format instead of a 2-digit format. This setting will help you comply with Y2K requirements.

Set Time

Using the barpad table, scan a 4-digit time in the military *hhmm* format. For example, to enter a time of 3:35 p.m., scan **1535**. Press the STATUS key in NON PORTABLE mode or during data collection to view the current time. The time can also be set from a host computer; see **Appendix T; Using the TriCoder as a Time Clock** for details.

Batteries maintain the real-time clock. Fresh batteries will keep your real-time clock as accurate as possible.

Alternative Date and Time formats

See the **Protocol** parameter for details on how to set the TriCoder to use alternative Date and Time formats. The default formats use *mmddy* and *hhmm*. Formats include:

- **A** - short format - no separators between characters
- **B** - long format - date uses / separators, time uses: separator
- **C** - US format - mmddy, hhmm
- **D** - European Format- ddmmyy, hhmm

Combinations are AC, AD, BC and BD. To use the European format, first change the format in the **Protocol** parameter, then reset the date and time, entering the digits in the correct order. Follow the same procedure to set it back to the US format.

Single Cycle Transmit

Single Cycle Transmit OFF	0
Single Cycle Transmit ON	1

- **Single Cycle Transmit** allows the TriCoder to upload one field at a time to the host, controlled by the pressing of any key (except F1) on the TriCoder each time the operator wants to transmit a field.
- **Single Cycle Transmit** is used to test complex upload prefix and suffix sequences. This is typically used when a TriCoder is used in Keyboard Wedge mode and you are uploading directly into an application. **Single Cycle Transmit** allows you to test key sequences and delays before you collect a lot of data and try an upload. Pressing F1 terminates the upload session.

EOF String

The **EOF String** setting allows you to choose up to 8 characters to be transmitted at the end of a TriCoder file upload. It is typically used to signal to the receiving host program that the TriCoder is done uploading its data and has transferred its last piece of data. The characters chosen are often characters not available on the TriCoder keypad; they are scanned from the FULL ASCII MENU. To program an **EOF String**:

- Scan EOF String
- Scan up to 8 characters from the FULL ASCII MENU
- Scan the SET bar code

If you do not program an **EOF String**, the TriCoder sends a **Ctrl Z** (ASCII 26). Undisplayable characters are displayed on the TriCoder as ?. To view the ASCII equivalent (so you know what characters are there) press the **F2** key while in the **EOF String** parameter.

Shut Down Time

By default, if the TriCoder is inactive for more than 5 minutes, it will shut itself down in order to conserve batteries. To resume operation, you must turn the TriCoder back on using the ON/OFF key. To change the amount of time the TriCoder waits before shutting down:

- Scan **Shut Down Time**
- Scan two digits - the default is 05 (5 minutes)- to correspond to the length of time in minutes. For example, **01** would be **1 minute**.

If you want to prevent the TriCoder from shutting off automatically at all, set the **Shut Down Time** to **00**.

Partitions

The **Partitions** setting is where you specify how you want to divide the memory in the TriCoder. Memory can be allocated for data files (up to 3) and tables (up to 3). Memory is partitioned in 64K size pages. The TriCoder has 512k, or 8 pages, of memory to allocate. Partitions are specified using a six-digit number:

abcxyz

where:

- | | |
|-----------------|---|
| <i>a</i> | is the number of pages of memory allocated to Data File #1. |
| <i>b</i> | is the number of pages of memory allocated to Data File #2 |
| <i>c</i> | is the number of pages of memory allocated to Data File #3 |
| <i>x</i> | is the number of pages of memory allocated to Table #1 |
| <i>y</i> | is the number of pages of memory allocated to Table #2 |
| <i>z</i> | is the number of pages of memory allocated to Table #3 |

- The default is for all memory to be allocated to Data File #1.
- The total amount of memory partitioned must equal the total amount of memory available. You must specify 8 pages (in whatever combination) for the TriCoder.
- The **Partitions** cannot be changed while there is data collected in the TriCoder. You must upload and delete the data first.
- All **downloaded tables** currently in the TriCoder will be lost when the **Partitions** are changed. You will have to re-download the tables once the change is complete.

Characters

This setting allows the TriCoder to output chosen ASCII characters in place of the actual characters entered. For example, if you scanned the number **1** (*hex 31*) and wanted the TriCoder to output *hex 92* instead, you would enter **3192** for the **Characters** parameter. This would re-assign the output characters, with the TriCoder outputting *hex 92* every time it sees *hex 31*. To re-assign characters:

- Scan **Characters**
- Scan up to seven 4-digit pairings where the first 2 digits represent the hex number to replace and the second 2 digits represent the hex number to insert. You can have up to seven character re-assignments.
- Scan SET

You can eliminate the output of a character by using **FF** as the hex number to insert. For example, if you wanted to eliminate all \$, following the above instructions, enter **24FF**.

Data Security Features

The TriCoder has two features that are there to ensure the integrity of your data. The first feature is *Data Security*, which is found in the **Protocol** setup parameter. Turning *Data Security* **on** prevents the operator from editing data as well as not allowing them to exit Data Collection mode. There is another security feature called *Program Restriction* that restricts the user to one data collection program only. *Program Restriction* is set only by keypad – at the

NON PORTABLE MODE KEY [YES/NO]?_

prompt, press the following keys on the TriCoder keypad:

F1 *remember to press and release the key before pressing the next key*

SHIFT D *remember to press and release SHIFT before pressing D or P*

SHIFT P *you will see the prompt: ENTER PROGRAM # [0-3]_*

0,1,2, OR 3 *press the number of the program you want to restrict the user to*

F1

To reset the program restriction back to all programs, simply press the ENTER key at the “ENTER PROGRAM # [0-3]” prompt.

Protocol

Settings 0 - 6 apply only to *Serial Interface* TriCoders only.

None	0
XON / XOFF	1
ACK/ NAK without Polling	2
Polled - No ACK / NAK*	3
Polled - with ACK / NAK*	4
Host Response Accepted*	5
Host Response Ignored	6
Data Security ON	7
Data Security OFF	8
XMODEM	9
Date Format mmdyyhmm	A
Date Format mm/dd/yy hh:mm	B
US Date Format mm/dd/yy	C
European Date Format dd/mm/yy	D

*Requires the 5V Power Supply to be plugged into TriCoder.

None means that the TriCoder will transmit to the host computer without waiting for a request or a response. Unless you are using multiple TriCoders on one port (multi-dropping), **None** is the setting you will probably want to use.

XON / XOFF is a protocol where the host sends an **XOFF** (*Ctrl S / ASCII 19*) character to the TriCoder when it is busy, and an **XON** (*Ctrl Q / ASCII 17*) when it is ready to receive data again from the TriCoder. This allows the host to perform other tasks without missing data coming from the TriCoder. **XON / XOFF** should **not** be used with Linux or Unix terminals, even if they have XON/XOFF specified; if you do, the TriCoder will probably get hung.

ACK / NAK without polling adds the **ACK / NAK** protocol for data accuracy. This protocol causes the TriCoder to add 2 checksum characters to its data - calculated from *all* data (data ID + prefix + data + suffix) except the *Terminator Character*. The host compares calculated checksums to the checksums transmitted by the TriCoder. If they match, the host sends an **ACK**; if they do not match, it sends a **NAK**. If you need to use a protocol for data accuracy, **we recommend using XMODEM instead of ACK / NAK whenever possible.**

Polled - No ACK / NAK puts the TriCoder in a “polling” mode, waiting for the host to send the TriCoders ID character before the TriCoder sends its data.

Polled - with ACK / NAK adds **ACK / NAK** protocol to the “polling” mode described above. You can change the length of time the TriCoder will wait for a response by using the **Host Response Delay** setting.

Host Response Accepted causes the TriCoder to act upon data received from the host. Data received from the host can cause the TriCoder to *beep*, *display data* or *output a voice message*. These are the controls for this protocol:

Data from Host	Response by TriCoder
Ctrl G ("BEL" - ASCII 7)	one short beep
Ctrl R ("DC2" - ASCII 18)	two long beeps
nnDC4	-nn is the two-digit voice message
nnENQ	-DC4 is ASCII 20
	-ENQ is ASCII 05, used to send a voice message without data entry as the next step.
xxxxxxxxxxCR	-xxxxxxxxxx is variable-length data for display as a prompt on the TriCoder
	-CR is ASCII 13 - used to terminate the data prompt.

Selecting **Host Response Accepted** allows the TriCoder and host to operate interactively with prompts and error messages from the host. **Host Response Accepted** works with the other **Protocol** settings of **None**, **ACK** / **NAK**, and both **Polling** settings.

If your TriCoder is connected between a dumb terminal and host, select **Host Response Ignored** to prevent data intended for the *Terminal* from causing continual beeping on the TriCoder.

There are restrictions on the use of **Host Response Accepted**:

1. To prevent conflict between TriCoder ID characters (used to identify individual TriCoders for polling) and data characters, the displayable data characters are limited to ASCII 32 - 95. In other words, no lower case characters are allowed. TriCoder ID characters must be ASCII 96-127 only.
2. A displayable prompt must be terminated by a **CR** (carriage return) unless terminated by one of the other controls - **BEL**, **DC2**, **nnDC4** or **nnENQ**. A prompt can also be a single character of **CR**, **BEL**, **DC2**, **nnDC4** or **nnENQ**.
3. With **Host Response Accepted**, before data can be entered on the TriCoder, a valid prompt must have been received from the host. In order to keep from missing a message from the host, the TriCoder locks out keyboard or scanner input until it receives the prompt from the host. While the TriCoder is waiting for the host prompt it displays:

WAITING ON PMPT_

If you want to enter data without receiving the expected prompt from the host, press the CLEAR key.

Host Response Ignored tells the TriCoder to ignore all data received from

the host, except ACK/NAK and XON/XOFF if configured to use those protocols.

Data Security OFF allows the operator full access to all TriCoder functions.

Data Security ON prevents the operator from editing any data or leaving *DATA COLLECTION* mode. To exit *DATA COLLECTION* mode, **Data Security** must be turned off either by scanning the bar coded Setup Menu or by using the keypad - press **F1**, then **SHIFT**, then **D**.

XMODEM is a file transfer communications protocol widely supported and used by programs including Windows HyperTerminal and Procomm. **XMODEM** has significant data error-checking, making it reliable for data transmission over phone lines. **XMODEM** is the protocol of choice for file transfers.

The **Date and Time Formats** allow you to change the display and output formats of the date and time. When changing the TriCoder to use the European format, remember to change the format first, then go to the **SET DATE** parameter and enter the date using the European DD/MM/YY format. See **Alternative Date Formats** for details.

Baud Rate

Set the **Baud Rate** to match your terminal or serial port.

300	0
600	1
1200	2
2400	3
4800	4
9600	5
19,200	6
38,400	7

Parity

None	0
Even	1
Odd	2

The **Parity** should match the parity setting of your Terminal. Parity can vary on a PC serial port - **None** is usually used in conjunction with the **8 data bits** setting, while **Even or Odd** is associated with **7 data bits**.

Data Bits

7 bits	0
8 bits	1

Set the **Data Bits** to match the setting used by your terminal or serial port.

Stop Bits

1 bit	0
2 bits	1

Set the **Stop Bits** to match the setting used by your terminal or serial port.

Dialing String

This parameter allows you to program an automatic dialing string for use with a modem. The **Dialing String** can contain up to 24 characters scanned from the FULL ASCII MENU. To program the **Dialing String**:

- Scan **Dialing String**
- Scan up to 24 characters from the FULL ASCII MENU
- Scan the SET bar code

Typical **Dialing String** characters are modem control characters such as *ATDTInnnnnnnnn*; where *nnnnnnnnnn* is the phone number to be dialed. The last character should not be a **CR** (carriage return). The **Dialing String** is transmitted by pressing the **F2** key in response to the

**DATA UPLOAD?
KEY [YES/NO]?_**

prompt. When in SETUP MODE, you can display the three-digit ASCII value for any characters entered for the **Dialing String**. See *Appendix S; Modem Protocol* for details on TriCoder/ Modem communications.

Set ID Character

The **ID Character** is used with the polling functions only. It allows you to assign each TriCoder a unique ASCII character used by the host to poll the TriCoders. The TriCoder will not transmit its data until it has been polled with its **ID Character** by the host.

ID Characters are limited to ASCII characters 96-127. These characters are the lower case letters found in the last two columns of bar codes on the FULL ASCII MENU. To set the **ID Character**, simply scan the desired character from the FULL ASCII MENU (scan “a” to assign an ID Character of “a”). If polling, all TriCoders must be assigned an **ID Character**.

The order of the data transmitted in Non Portable mode is:

ID+Preamble+DATA+Postamble+Chksum chs+Terminator

Host Response Delay

This setting is used only with **ACK/NAK** protocol and **Buffered Terminal Mode**. It is used to set a time-out for the TriCoder while it is waiting for a response from the host. The default is infinite delay - it will wait forever for the host to respond. If you want the TriCoder to time-out rather than waiting forever, set the number of seconds you want to wait as a two-digit number. For example, to set a 5 second delay, enter **05**. Setting the delay to **00** sets an infinite delay.

Transmission Mode

The **Transmission Mode** setting is used only with a Terminal/Host configuration using a F45 or F45-1 Serial Y Cable.

Full Duplex	0
Half Duplex	1

Using the default setting (**0**), data is transmitted from the female DB25 end of the cable only. Using **half duplex (1)** causes data to be transmitted out of both ends of the cable. It is typically used for dumb terminal (Unix and Linux) troubleshooting transmission problems only.

Modem Redial Delay

Automatically, the TriCoder resets the modem before the first dialing attempt and between dialing attempts. You can vary the length of the delay between dialing attempts (*Retry Delay*) from the standard default of 30 seconds to anything from 01-99 seconds. You cannot make this change by scanning the bar coded TriCoder setup menu; **it can only be made through the keyboard setup** on the TriCoder.

Chapter 7

Using the TriCoder Utilities

The TriCoder Utilities for Windows program is a versatile application that gives you the ability to:

- Test communication (serial and USB High Speed)
- Upload data from TriCoder to computer
- Download programs and tables from the computer to the TriCoder
- Change TriCoder Setup parameters (High Speed USB only)
- Edit and Download tables
- Edit and download programs (Virtual TriCoder required for editing)

The TriCoder Utilities for Windows CD comes with every TriCoder. If you did not receive a disk or need the latest version of the TriCoder Utilities, visit our website at <http://www.barcodehq.com/downloads.html> to download the latest version.

Installing the TriCoder Utilities

The TriCoder Utilities is for Windows ONLY. There is no version for any other operating system.

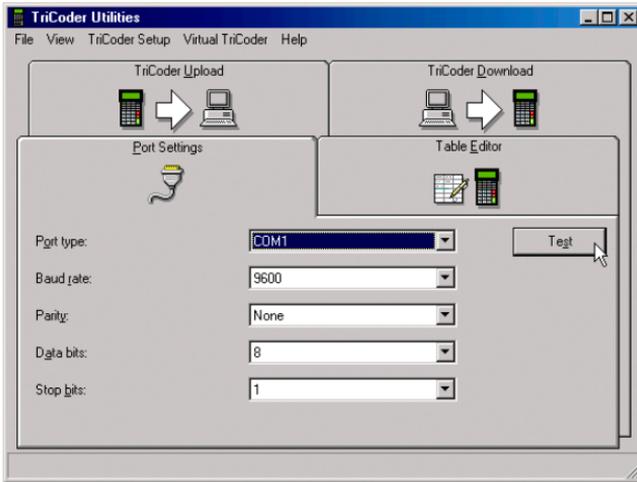
To install the TriCoder Utilities for Windows, insert the CD into your CD drive. If you have autoplay enabled, the installation should begin automatically. If it does not, or you have autoplay disabled, click on the Windows **Start** button, and then click **Run**. Click **Browse** to find your CD drive, then find the file named **setup.exe**. Click **Open**, then click **OK** and follow the installation instructions.

Running the TriCoder Utilities program

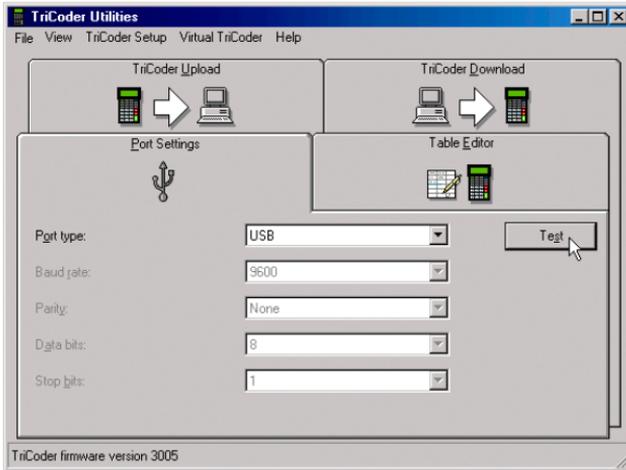
The first time you start the TriCoder Utilities, it will ask you whether you are connected to the Serial port or to a USB port. This should only show up the first time you run the program.

If you are physically connecting the TriCoder to the USB port for the very first time, see **Chapter 5; TriCoder Connection** for details on Windows USB driver installation.

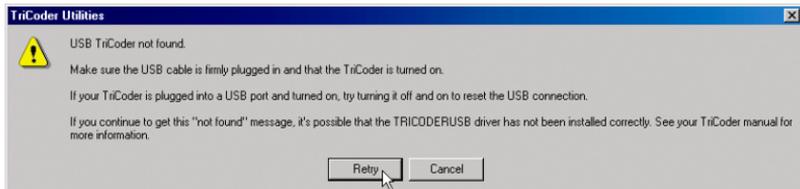
If you are connected to the serial port, click on the **Port Settings** tab and verify that the correct port name (COM1, etc.), baud rate, etc. are chosen.



If you are connected via USB, you should see USB chosen as the port type:

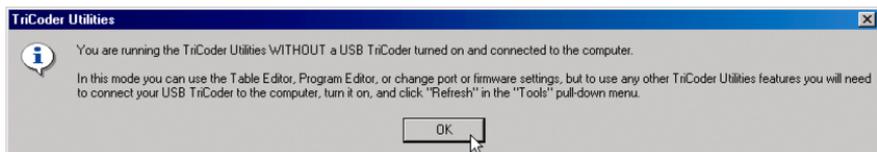


If you do not have your TriCoder turned on, or the USB driver is installed incorrectly, you will see this error message:



You can either turn your TriCoder on and click Retry, or click Cancel to exit the error message dialog box. If you click Cancel, and still want to work in TriCoder Utilities without having your USB TriCoder attached, just

click OK when you see this message:

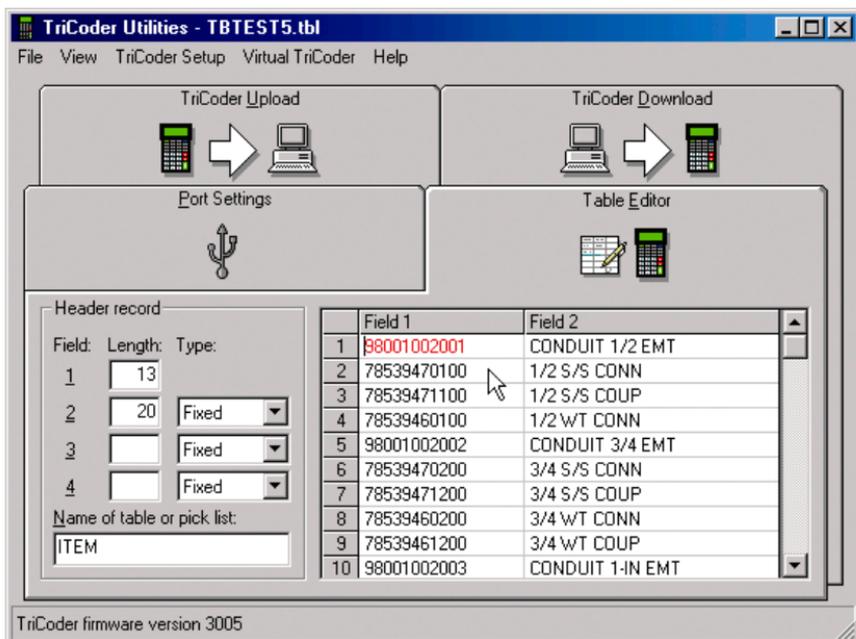


Using the Table Editor

The **Table Editor** allows you to:

- load and edit existing tables that are on your computer and download them into your TriCoder and
- create new tables and download them to your TriCoder

Once you have the table open in the **Table Editor**, you can change any of the parameters and fields and then download the table back into your TriCoder.



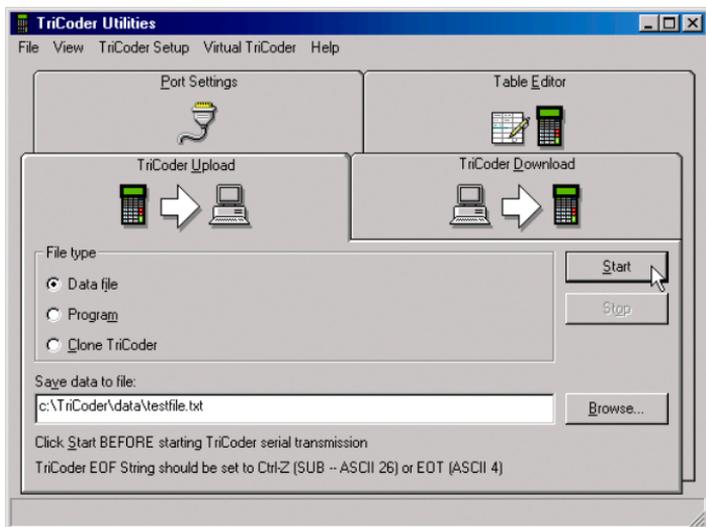
For more information on using Tables, see **Chapter 12; Tables and Picklists**. One thing to remember when using tables is that your TriCoder memory must be partitioned before you can download the table to your TriCoder. For more information on partitions, see **Chapter 11; Partitioning Memory for Data Files and Tables**.

Uploading from TriCoder to your Computer

You can upload programs, data and cloned setup information to your computer from your TriCoder by either the serial port or the USB port.

Serial Uploading

If you are uploading your TriCoder from the Serial port, make sure your port settings are correct before you begin your upload. It is usually a good idea to check your port settings and test in Non-Portable mode before uploading information from your TriCoder.



- Make sure your TriCoder is connected and communicating.
- Select the type of file you will be uploading - Data file (collected data), a Program or a TriCoder Clone file (complete setup information including setup parameters and programs).
- Select the name for your file. We suggest using different file extensions for different types of files, for example, *.dat* for data files, *.pgm* for program files and *.cln* for clone files.

Data Files

1. On the TriCoder, press NO until you see the prompt

**DATA UPLOAD
KEY [YES/NO]?_**

2. Select **Data File** as the file type, then enter the name of the file (we recommend the extension *.dat* for data files)
3. Click the START button in the TriCoder Utilities.

4. At the **DATA UPLOAD** prompt on the TriCoder, press YES.
5. When the data is finished uploading, TriCoder Utilities will let you know it is finished. The TriCoder will display the message

**END OF TRANSMIT,
DEL FILE Y/N?_**

We suggest before you delete the data file from the TriCoder that you open the data file in Notepad to confirm the upload. If all is correct, you can press YES to delete the data file from the TriCoder. If your upload is not correct, press NO and try your upload again.

Program Files

1. On the TriCoder, press NO until you see the prompt

**PROGRAM TRANSMIT
KEY [YES/NO]?_**

then press YES.

2. In the TriCoder Utilities, choose **Program** as the File type, then specify the name of the file (we suggest the extension *.pgm* for program files)
3. Click the **START** button in the TriCoder Utilities.
4. On the TriCoder, press the number of the program you want to upload at the **TRANSMIT PROGRAM KEY** prompt. Remember that you cannot transmit program 0, you must choose 1, 2 or 3. Pressing 0 will clone your TriCoder.
5. TriCoder Utilities will let you know when your transmission is finished. The TriCoder will display the message

**END OF PGM,XMIT
HIT ANY KEY_**

Cloning the TriCoder

1. On the TriCoder, press NO until you see the prompt

**PROGRAM TRANSMIT
KEY [YES/NO]?_**

then press YES.

2. In the TriCoder Utilities, choose **Clone TriCoder** as the File type, then specify the name of the file (we recommend using the extension *.cln* for clone files)
3. Click the **START** button in the TriCoder Utilities.

4. On the TriCoder, press 0 at the **TRANSMIT PROGRAM KEY** prompt.
6. TriCoder Utilities will let you know when your transmission is finished. The TriCoder will display the message

**END OF PGM,XMIT
HIT ANY KEY_**

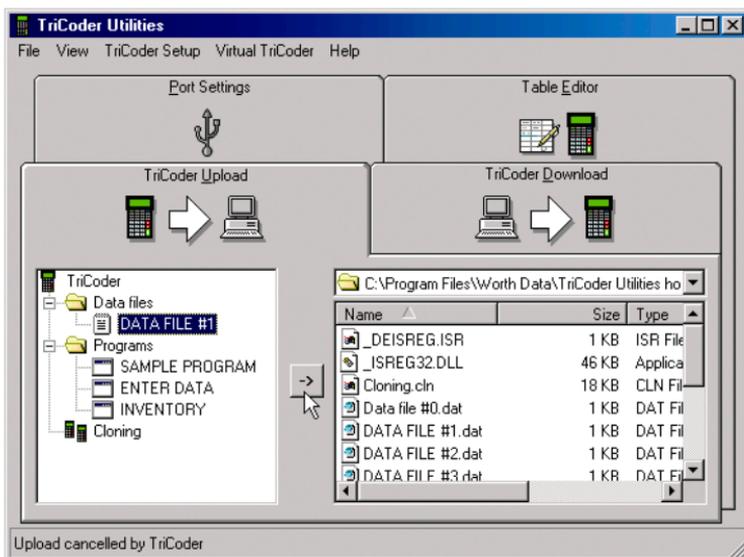
High Speed USB Uploading

If you are uploading information from your TriCoder via High Speed USB interface, you will be absolutely amazed at how easy it is! The TriCoder Utilities takes care of it all, your TriCoder just has to be turned on.

Data Files

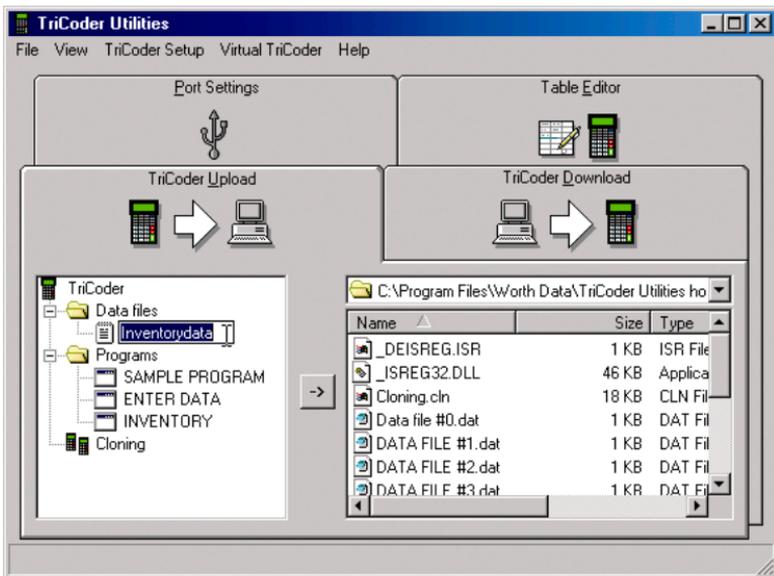
1. Make sure you are connected to the USB cable then turn on your TriCoder.
2. Start the TriCoder Utilities program
3. Click the TriCoder Upload tab

In the left panel, you will see what is currently in your TriCoder. The right panel will determine where your uploaded file will go. Make sure you are in the directory where you want to keep your file.



A unique feature of the USB interface is the ability to change the name of the data file in the TriCoder while in TriCoder Utilities. Renaming the data file is as simple as clicking the file name, typing in a new one and pressing ENTER. The example above shows the data file in the TriCoder named **DATA FILE #1**. In the next example, we have changed the data file name

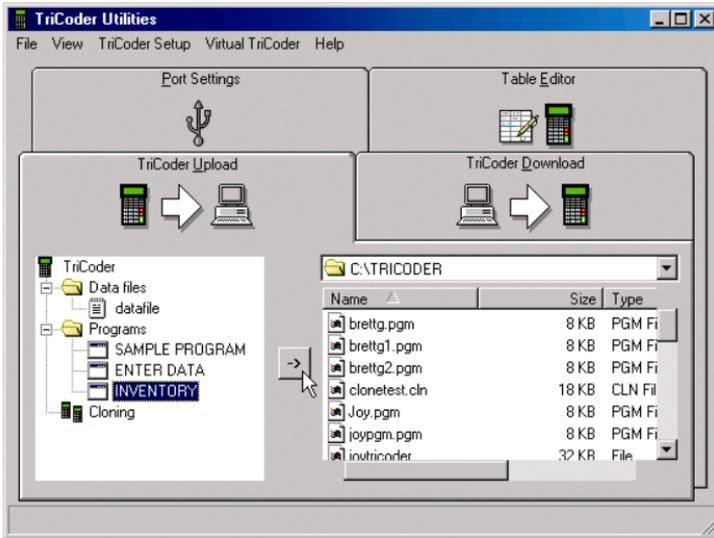
to **Inventorydata**.



4. Finally, to upload the file, click on the file you want to upload, and then click on the arrow button between the two panels. That's it! You don't have to do anything on the TriCoder!

Program Files

1. Again, make sure you are connected to the USB cable and that your TriCoder is on.
2. Start TriCoder Utilities if it isn't already running.
3. Click the **TriCoder Upload** tab
4. Highlight the program name you want to upload in the left panel
5. Choose the directory or folder you want to upload your file to in the right panel
6. Click on the arrow between the panels. That's it



Cloning your TriCoder

1. Make sure you are connected to the USB cable and that your TriCoder is turned on.
2. Start the TriCoder Utilities if it isn't already running.
3. Click on the TriCoder Upload tab
4. Highlight Cloning in the left panel.
5. Select the directory or folder you want to upload your cloning file to in the right panel.
6. Click the arrow between the panels. The file is saved as "**cloning.cln**" and you are finished!

Downloading from the computer to your TriCoder

You can download saved files on your computer back into your TriCoder using the TriCoder Utilities in either serial or high-speed USB mode. The files must be valid TriCoder programs, tables or clone files. TriCoder programs can be created on your computer using the Virtual TriCoder or created on the TriCoder itself. Tables must conform to the table format required by the TriCoder (see **Chapter 12: Tables and Pick Lists**) and your TriCoder memory must be partitioned before it can accept any tables.

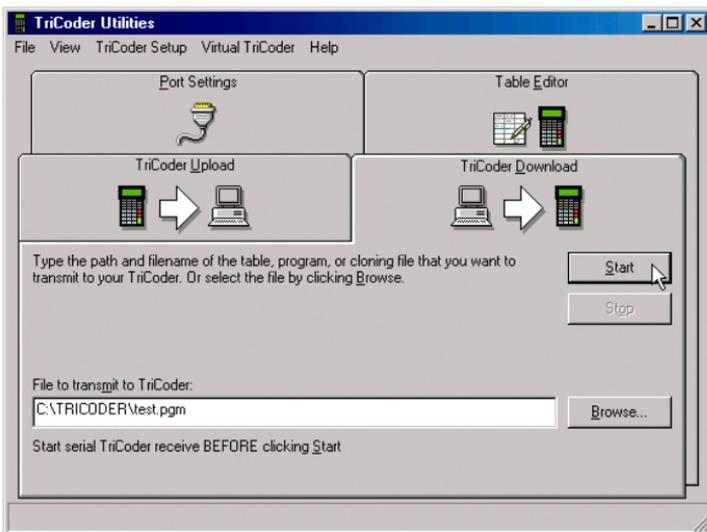
Also, you will not be allowed to download anything to your TriCoder if there is currently data stored in your TriCoder. Before you download anything to your TriCoder, make sure you upload any data files and delete them from your TriCoder. If there is data in your TriCoder and you try to download a file to it, you will see the message:

**NOT ALLOWED TO RCV
HIT ANY KEY_**

Serial Downloads

If you are downloading to your TriCoder from the Serial port, make sure your port settings are correct before you begin your download. It is usually a good idea to check your port settings and test in Non-Portable mode before downloading information into your TriCoder.

- Make sure your TriCoder is connected and communicating.
- Select the type of file you will be downloading - a Program (for collecting data), a TriCoder Clone file (complete setup information including setup parameters and programs) or a Table (for reference while collecting data).
- Select the file you want to download. We suggest using different file extensions for different types of files, for example, **.pgm** for program files, **.cln** for clone files and **.tbl** for table files. The TriCoder Utilities uses these file extensions by default.



Program Download

1. On the TriCoder, press NO until you see the prompt

**PROGRAM RECEIVE
KEY [YES/NO]?_**

then press YES.

2. In the TriCoder Utilities, specify the location and name of the file (we suggest the extension **.pgm** for program files)
3. Click the START button in the TriCoder Utilities.
4. On the TriCoder, press the number of the program you want to download to at the **PROGRAM RECEIVE KEY** prompt.

Remember that you cannot download into program 0; you must choose 1, 2 or 3. Pressing 0 will clone your TriCoder.

5. TriCoder Utilities will let you know when your transmission is finished. The TriCoder will display the message

**END OF PGM RCV
HIT ANY KEY_**

Table Download

1. On the TriCoder, press NO until you see the prompt

**TABLE DOWNLOAD
KEY [YES/NO]?_**

then press YES. If you have not partitioned your TriCoder memory, you will *not* see the Table Download prompt. Go back and partition your memory, then try again.

2. In the TriCoder Utilities, specify the location and name of the file (we suggest the extension *.tbl* for table files)
3. Click the START button in the TriCoder Utilities.
4. On the TriCoder, press the number of the program you want to download to at the **PROGRAM RECIEVE KEY** prompt. Remember that you cannot download into program 0; you must choose 1, 2 or 3. Pressing 0 will clone your TriCoder.
5. TriCoder Utilities will let you know when your transmission is finished. The TriCoder will display the message

**END OF PGM RCV
HIT ANY KEY_**

Cloning File Download

1. On the TriCoder, press NO until you see the prompt

**PROGRAM RECEIVE?
KEY [YES/NO]?_**

then press YES. If you currently have collected data still in the TriCoder you will not be allowed to receive. You must delete the data file from the TriCoder before you can accept a clone file.

2. In the TriCoder Utilities, specify the location and name of the file (we suggest using the extension *.cln* for cloning files.
3. Click the START button in the TriCoder Utilities.

4. On the TriCorder, press the **0** key to accept a clone file.
5. TriCorder Utilities will let you know when your transmission is finished. The TriCorder will display the message

**END OF PGM RCV
HIT ANY KEY_**

High Speed USB Downloads

If you are downloading from your computer to your TriCorder via the High Speed USB interface, the only thing you need to do on your TriCorder is make sure it is set for High Speed USB and turn it on! The TriCorder Utilities program will take care of the rest!

Program File Downloads

1. Make sure you are connected to the USB cable and that your TriCorder is on.
2. Start TriCorder Utilities if it isn't already running.
3. Click the **TriCorder Download** tab
4. The left panel is showing you your computer files. Find the folder and file name of the program you want to download in the left panel and click to highlight it.
5. Choose the program file in the right panel (these are the programs already in your TriCorder) that you want to replace
6. Click on the arrow between the panels. That's it!

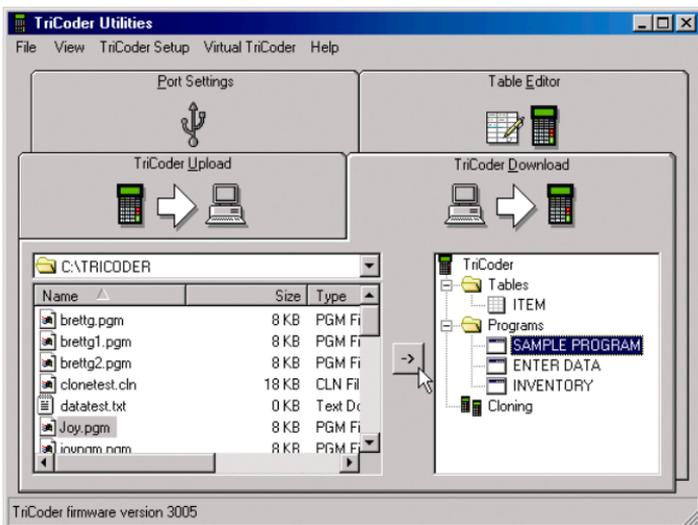


Table Downloads

1. Again, make sure you are connected to the USB cable and that your TriCoder is turned on.
2. Start the TriCoder Utilities if it isn't already running.
3. Your TriCoder memory must already be partitioned to accept a table file. If it is not, click on **Tools**, then **TriCoder Setup**. Click the Partitions tab, set the partitions and then click OK.
4. Click the **TriCoder Download** tab.
5. The left panel is showing you the files on your computer. Find the folder and file name of the table you want to download in the left panel and click to highlight it (we recommend using the file extension *.tbl* for table files).
6. Click on the table in the right panel that you want to download to (if you partitioned for just one table, you will only see one choice).
7. Click on the arrow between the panels and you are done!

Chapter 8

Creating a custom program

You can create a program in the TriCoder to prompt the operator for anything. You can tell the operator what to do next, notify them of errors, date and time stamp the data or review and edit previous data. The TriCoder has room for 4 programs; program #0 is fixed and cannot be changed or deleted, program #1 is editable and prompts for item and quantity, program #2 is based on Program #0 but with some editing allowed and #3 is not pre-set and can be programmed by the user as desired.

Programs are constructed of statements, with each program capable of containing up to 97 statements. Statements determine what happens at each step of the program - one statement might prompt the user to enter data, another statement may add a date stamp. Statements in turn are constructed of fields, each one determining certain properties of the statement.

Programs can be created on the TriCoder itself or created on your computer (if you have Windows) and downloaded to the TriCoder via serial or USB. The remainder of this chapter is directed towards programming the TriCoder itself; if after completing this chapter you decide you want to create programs on your PC, go to **Chapter 9; Creating programs on your computer** for details.

We have provided a form to help you chart out programs before they are entered into the TriCoder. *TriCoder Coding Forms* can be found at the very back of the manual. We will also use sections of the *TriCoder Coding Form* to illustrate coding of certain features. You may find it helpful to have a *TriCoder Coding Form* in front of you while using this section of the manual.

If you are using KwikAsset™...

If you are using the KwikAsset™ program, do NOT program your TriCoder according to the instructions here. The KwikAsset™ program itself will generate your program and download it to your TriCoder. See the KwikAsset™ manual for more information.

Program Statements

The following information is provided in the order in which it is referenced in the TriCoder when creating a program. To create a program in the TriCoder, the first thing that has to happen is to get the TriCoder into **PROGRAMMING** mode. After turning on the TriCoder, press NO in response to all of the prompts until you see:

**PROGRAMMING MODE?
KEY [YES/NO]?_**

If you were in **NON PORTABLE** mode when you turned on the TriCoder, press F1, then answer NO to all prompts until you see the **PROGRAMMING MODE?** prompt.

Press **YES** at the **PROGRAMMING MODE?** prompt, then enter the password, **WDTRI** to get to the Programming Menu. Entering the password incorrectly generates the message:

**INCORRECT PASSWORD
HIT ANY KEY_**

Entering the password incorrectly 2 times generates the following message:

**ACCESS DENIED
HIT ANY KEY_**

At this point, you will be returned to the Mode Menu to start again. If you have entered the password correctly, you see the **PROGRAM FUNCTION** menu:

**Create Programs ----->1-3
Voice --> 4 Setup --> 5
Automation -----> 7
Data File Names-----> 6**

Press the number of the program you wish to create; **1,2,** or **3.** The TriCoder then displays:

**EDIT PROGRAM x? (x is 1, 2, or 3)
KEY [YES/NO]**

Press **YES.** If you press **NO,** the TriCoder asks if you want to delete the program. Use this to delete an existing program and create a new one in its place. After answering **YES** to the **EDIT PROGRAM** prompt, the TriCoder is ready to create a program.

Parts of the TriCoder programming screen

Before you start programming the TriCoder, it helps to know what the TriCoder is asking you at each step. The text below is an example of what you see on the TriCoder screen when creating a program.

PROMPT 01

—

The word **PROMPT** describes what field in the program statement you are working on; in the example above we are at the *Prompt Text* field.

The **01** tells us what statement number we are working on. In the example, we are working on statement #01. If we were working on statement #03, the text would look like this:

PROMPT 03

—

The cursor beneath the word **PROMPT** is waiting for input. In our example above, we would then type the text we want to use for our user prompt for statement #03.

The remainder of this chapter will explain each step in creating program statements. They are described in the order that they appear when programming the TriCoder.

• Program Name

The first prompt the TriCoder displays when creating a program is the PROGRAM NAME prompt. The PROGRAM NAME entered at this prompt will be used to identify the program in the DATA COLLECTION menu. The PROGRAM NAME can consist of alphanumeric data and can be up to 20 characters.

The PROGRAM NAME prompt has another function besides simply naming the program. When collecting data, programs usually start with statement #1, or if data has already been collected, it starts at the statement number where the user left off. You can force the TriCoder to ALWAYS start at a particular statement number whether starting a new data file or resuming collection in an existing one. This is done using the first 3 characters in the PROGRAM NAME prompt. The first character must be ~, followed by the *two digit statement number* you want to start with. You can then follow with an actual program name if you want to. This feature can cause partial data records since resuming data collection after some data has been collected may start at a statement number other than where you left off. Because of possible partial records, the host program that processes this data needs to handle the partial records in a special way or ignore them completely. The following example shows a program named INVENTORY that always starts at statement #4:

```
PROGRAM NAME?  
~04INVENTORY
```

This example shows a program named RECEIVING:

```
PROGRAM NAME?  
RECEIVING
```

This program starts with statement #1 if the data file is empty. If you are resuming a previous data collection and you still have data present (you didn't upload and delete your data file), the program will resume at the statement number **following** the statement at which the user last entered data.

• Statement Entry Types

The next prompt in the program process is the ENTRY TYPE prompt. This prompt determines what type of data is entered for this statement. This is the most important prompt as it determines exactly what happens at this step in the program. After entering a name at the PROGRAM NAME prompt, you see:

```
ENTRY TYPE          01
```

```
—
```

These are the *Statement Entry* types available:

Statement Entry Type	Code used for TriCoder Coding Form
Data	D
Branch	B
Question	Q
Date and Time Stamp	S
Time Stamp only	T
Date Stamp only	Y
Xtra	X
None	N
Data AND Immediate Output	O
Compare	C
Printer Output	P
Arithmetic	A

Details on each *Statement Entry Type* are as follows:

Data

Data entry prompts are program statements that prompt the operator to enter data for storage in memory. A typical *Data Statement* would be prompting the operator for an Item Number or a Quantity. This is the most commonly used statement type.

A program statement used to enter data looks like this:

ENTRY TYPE 01
D_

The previous example indicates a *Statement Entry Type* of **Data** for statement #01.

Branch

A *branch statement* allows the program to jump to anywhere between 1 and 15 different statements depending on the character entered at the branch prompt. The data entered at a *branch statement* is not saved to memory; it simply acts as a pointer, directing the program to the appropriate statement. When creating a *branch statement*, the programmer will only see 3 program statement fields; ENTRY TYPE, PROMPT and STMT TO BRANCH.

The ENTRY TYPE for a branch statement should look like this:

ENTRY TYPE 01
B_

The next field is the PROMPT field. This field is the prompt text that the user will see when executing the *branch statement*. This is an example of a PROMPT field for a branch statement:

**PROMPT 01
TRANSACTION?_**

The final field for a *branch statement* is the STMT TO BRANCH field. This field tells the program what statements to go to when particular characters are entered. At this point you can enter up to 15 groups of 3 digit codes for a total of 45 characters.

- The first character in each 3 digit code is the conditional character; this is the character that determines the branch when entered. The * character is used to mean any character other than the conditional characters already specified.
- The next 2 characters in the 3 digit code determine which statement to go to when the conditional character is entered.

For example, lets say you wanted the following branches to happen:

Go to statement 18 if an R is keyed/scanned
Go to statement 34 if a 5 is keyed/scanned
Go to statement 02 if anything else is keyed/scanned

The STMT TO BRANCH field would look like this:

**STMT TO BRANCH 01
R18534*02_**

Question

A *question statement* creates a program prompt that the user answers YES or NO to. Data is not stored to memory for this type of statement; a YES answer directs the program to one statement number while a NO answer directs the program to another statement number. The question statement is answered by pressing the YES or NO key on the TriCoder keypad.

When creating a question statement, the programmer will only see 5 program statement fields; ENTRY TYPE, PROMPT, VOICE MESSAGES, YES/NEXT STMT and NO/END STMT. The ENTRY TYPE prompt for a question statement looks like this:

**ENTRY TYPE 01
Q_**

The PROMPT field determines what the user sees on the display screen for this field. Here is an example of a PROMPT field for a question statement:

**PROMPT 01
DAMAGED GOODS?_**

The MESSAGE NUMBER field defines the voice messages you want to play for this statement.

MESSAGE NUMBERS 01

0200_

The next field prompt, the YES/NEXT STMT prompt, determines which statement the YES key takes the program to. For example, if we wanted the program to jump to statement #05 if we answer YES to statement #01, the prompt should look like this:

YES/NEXT STMT 01

05_

The NO/END STMT prompt determines where the program goes if the question is answered with the NO key. If we wanted the NO key to take us to statement #03 in the example above, our NO/END STMT prompt should look like this:

NO/END STMT 01

03_

Date and Time Stamp

The *Date and Time Stamp* statement requires no action from the user. By specifying **S** as the statement ENTRY TYPE, the TriCoder accesses its internal real-time clock and writes the current date and time information to memory when the program statement is executed. By default, this information is not displayed by the TriCoder when the statement is executed, but it can be displayed simply by entering DIS in the DATA ID field of the program statement.

The default format of the date and time stamp is

MMDDYYHHMM (if USA)

The format can be changed using the *Alternative Date Formats* setup parameter.

If you want to add seconds to the time portion of the *Date and Time stamp*, use **s** instead of **S**.

ENTRY TYPE 01

s_

The *Date and Time Stamp* statement uses only 3 programming statement fields; ENTRY TYPE, DATA ID and YES/NEXT STMT.

Time Stamp

The *Time Stamp* statement type records only the time information to memory in the HHMM format. Just as with the *Date and Time Stamp* statement, using DIS in the DATA ID field will display the time information on the TriCoder screen when the statement is executed. Use **t**

instead of **T** to record seconds in addition to the hours and minutes:

ENTRY TYPE 01

t_

The *Time Stamp* statement uses the same program fields as the *Date* and *Time Stamp* statement.

Date Stamp

The *Date Stamp* statement stores only the date information in a **MMDDYY** format. As in the other Date/Time stamp statements, using DIS in the DATA ID field will display the Date information on the TriCoder when the statement is executed. The date format can be changed using the Alternative Date Format settings in the TriCoder setup.

ENTRY TYPE 01

Y_

The *Date Stamp* statement uses the same program fields as the other *Date* and *Time Stamp* statements.

Xtra

The *Xtra Statement* works with the "**ENTER QUANTITY**" prompt by automatically entering a quantity of "1" if the user enters another *Item number* instead of a quantity. The user has the option of entering an actual quantity if it is more than "1". Using this feature in Program #1 is a good way to demonstrate its value. The **XTRA Statement** must be set **before** you begin your data collection. To use the **XTRA Statement**, three things must happen:

1. The *statement type* for the "**ENTER QUANTITY**" prompt must be "**X**" (Xtra)
2. The *maximum data length* of the "**ENTER QUANTITY**" statement must be *less* than the *minimum data length* for the *next* statement to be executed - in program #1, the next statement to be executed is the "**ENTER ITEM NO.**" statement.
3. The length of the data entered at the "**ENTER QUANTITY**" prompt must be *between* the *minimum data length* and the *maximum data length* of the next statement to be executed (**ITEM** in program #1).

Using Program #1 as an example:

If the number of characters entered at the "**ENTER QUANTITY**" prompt is less than the *minimum data length* of the "**ENTER ITEM NO.**" prompt, then the data entered is stored as the quantity.

If the number of characters entered at the "**ENTER QUANTITY**" prompt is between the *maximum data length* and the *minimum data length* for the

“**ENTER ITEM NO.**” prompt, then a “**1**” is stored as the data for the “**ENTER QUANTITY**” and the data entered at the “**ENTER QUANTITY**” prompt is stored as the data for the “**ENTER ITEM NO.**” prompt. If it seems confusing, use the following *TriCoder Coding Form* as an example:

Stmnt #	Entry Type	Prompt	Min Data Len	Max Data Len	Next Stmnt
01	D	ENTER ITEM NO.	06	13	02
02	X	ENTER QUANTITY	01	04	01

While collecting data using the program shown above, if data between 6 and 12 digits in length is scanned or entered at the “**ENTER QUANTITY**” prompt, data of “**1**” is automatically entered. In other words, **if you continually scan your item numbers** (as long as they are all between 6 and 12 digits in length) **you will automatically enter a quantity of 1 for each item.** To enter a quantity other than 1, simply enter the quantity by using the keypad, making sure the length of the quantity data does not exceed the *maximum data length* for the quantity field (4 digits). The very last quantity entered at the end of data collection must be keyed in from the TriCoder keypad, even if it is 1. Also, in order to either scan an item or enter a quantity at this statement, you must change the “Input Type” statement to be blank instead of K or W. This is especially important if you are editing the default Program #1.

If you are using the “**selective bar code trimming**” feature with the XTRA Statement, the trimming must be specified in both the “DATA Statement” and the “XTRA Statement”. For example, if you wanted to eliminate the leading character on all UPC codes, you would have to specify:

{c1

in both the upload prefix for the DATA Statement (Statement 1 on the example above) and the upload prefix for the XTRA Statement (Statement 2 on the example above). If you do not specify the trimming in both upload prefixes, the trimming will not happen correctly.

None

The *None statement* entry type is used as a “dummy” statement, recording no data and transmitting only the *Upload prefix* and *suffix*. It is typically used as a destination for a *branch statement*, allowing you to record what action the operator took without recording any data. The program goes on without any input from the operator.

To illustrate it’s use, lets say that a *branch statement* (statement #3) goes to statement #04 (*None statement*) if the operator enters the letter A.

ENTRY TYPE 04
N_

Even though the operator enters the letter A at statement #3, the A will not be written to memory and uploaded because *branch statements* record no

data. What if your application requires the A as part of its data? By making statement #04 a *None statement* and entering an A as the *upload prefix* or *suffix*, an A will upload as the data for statement #04.

UPLOAD PREFIX 04
A_

The None statement can also be used to add more than 15 characters to an upload prefix or upload suffix when using refer-backs – many times 15 characters is not enough. See Upload Prefix in this chapter for more information on refer-back (appending data to another field) programming.

Data AND Immediate Output

The *Data AND Immediate Output* statement entry type is used when you want to create a regular Data entry prompt (see *Data*) where the data is stored in memory but also want the data to be output immediately (like NON PORTABLE mode) as well. The TriCoder must be connected to the computer for the *Immediate Output* portion of this statement type to work. An example of using this type of statement would be if you want to collect sales invoice data in the TriCoder (to later upload and update your inventory) but want to also transmit data immediately to the computer to create the actual invoice itself. You would be scanning directly into your invoice software while saving the same data in the TriCoder to upload later for inventory management.

Compare

The *Compare* statement will compare the data collected in that statement against data collected in a previous statement and take you to a new statement dependent upon whether the data in the two compared statements matched. The statement to compare to is referenced in the Data ID field. For example, you could enter data in statement 1, then in statement 2, enter new data. then compare that data to the data in statement 1. If the data matches, you could move on to statement 3; if it doesn't match, you could have it take you back to statement 1. An example of an application might be a pharmacy - where you would want to verify that the correct drug is being dispensed into the correct customer vial. Coding for this statement might look like this:

Stmnt #	Type	Prompt	Freq.	Voice Msg.	Data ID	Min. Len	Max Len.	Yes/Next	No/End
1	D	Scan 1st Item	A	41				02	09
2	C	Scan 2nd Item	A	42	01			01	03
3	D	Not Equal, Press Enter	A	62		00	01	01	00

According to the example, data scanned in statement 2 is compared to the data scanned in statement 1. If the two items match, the operator is taken back to statement 1 to scan the next item. If the items do *not* match, the operator is taken to statement 3, where an voice error message is played and the operator is instructed to press the ENTER key. Upon pressing the ENTER key, the operator is taken back to statement 1 and it starts over.

Even if compared data is wrong, it is still written to the data file for upload, so an audit trail is available to see where errors occurred.

Printer Output

The TriCoder supports output to the Zebra QL320 or Cameo portable label printer using the **P** statement (*TriCoder must have board revision level H - level G can be upgraded - contact Worth Data*). Using the LabelVista* software included with the Zebra printer, design a label format, identify the fixed and variable fields and download it to the QL320 or Cameo printer via USB using the TriCoder Utilities program. The printer is capable of holding several different label file formats, each one identified by filename.

The **P** statement is then used to:

- a) reference by filename the label format file in the printer, and
- b) provide data for the variable fields designated in the label format file. The **P** statement is limited to **70** characters and refer-backs (*see page 4-11*) can be used.

The **P** statement for a label using the filename "myfile" with 3 variable fields would look as follows (the *(space)* indicates an actual space character):

!(space)UF(space)myfile.fmtCRLFdata1CRLFdata2CRLFdata3

CR and LF are scanned from the Full ASCII Menu and the filename must end with ".fmt". No CRLF is required after the last data item. The TriCoder will do it for you. Here is a program example using refer-backs

Stmnt #	Type	Prompt	Min. Len.	Max Len.	Yes/Next	No/End
1	D	Scan Item Number	1	10	02	09
2	D	Scan price	1	10	03	99
3	D	Scan location	1	10	04	99
4	P	! UF myfile.fmtCRLR}1CRLF}2CRLF}3			01	99

* For details on creating label formats and specific commands for the printer, see the Zebra CD that comes with the QL320 or Cameo printers. If you do not have a label format, you can utilize line printing by leaving out the **! UF myfile.fmt** portion of the command.

Arithmetic

The TriCoder has the ability to act as a simple calculator, performing addition, subtraction and multiplication (no division). The **"A"** statement allows the user to input data (numeric only), press +(add), -(subtract) or *(multiply) and then input another piece of data (again, numeric only). The sum is displayed and the user has two choices; press +, - or * again and enter another number and get a new sum, or press the ENTER key to accept the sum as the final result. Here is an example of data entry for someone who is adding 2 numbers, subtracting a number and accepting a final result:

TriCoder Display	User Action
ENTER QUANTITY (<i>program prompt</i>)	press 5 + 8, then press ENTER
13 (<i>intermediate sum</i>)	press - 4, then press ENTER
9 (<i>final sum</i>)	if accepting result as final, press ENTER

There are several restrictions when using the "A" statement:

1. You cannot have a "negative" result - in other words, you cannot enter 100 - 115 (expected sum would be -15).
2. You cannot start an entry with a "negative number" - i.e. you cannot enter -100.
3. You can use whole numbers only - no decimals or fractions.
4. Only 1 calculation is allowed per sum; for example, you can enter $10 + 5$ and press ENTER, but you cannot type $10 + 5 + 3$ for one entry. You would have to enter $10 + 5$, press ENTER (sum displayed would be 15), and then type $+ 3$, then ENTER (sum displayed would be 18).
5. The maximum sum (intermediate or final) is 65,000.

• Prompt Text

The next field in the TriCoder programming is the PROMPT text. This prompt is asking you to enter the text you want displayed to the user. If you have chosen D (Data) for the STATEMENT ENTRY TYPE, typical PROMPT text might be something like "ENTER DATA" or "SCAN BARCODE". A "Q" (Question) statement might display text such as "DAMAGED GOODS?".

The PROMPT Text statement has other uses besides just displaying an operator prompt. By using an @ as the first character in the statement text, you can display the last data entered for this prompt as the default data. To accept this displayed data as the data you want to enter for the prompt, press the ENTER key. For example, if the PROMPT text is "ENTER ITEM NO.", and the data entered for the prompt is 1234, then the next time the PROMPT text is displayed, it would display as follows:

```
ENTER ITEM NO.?  
1234_
```

To accept 1234 as the actual data (instead of entering new data), simply press the ENTER key on the TriCoder.

Entering ! as the first character for the PROMPT text field will cause the TriCoder to increment the last data entered for the statement by 1. To accept this data, the user simply presses the ENTER key on the TriCoder. To enter different data, press CLEAR, then enter the new data via the scanner or the TriCoder keypad. Here is an example of how this works:

```
PROMPT      01  
ENTER ITEM NO.
```

Lets say that while collecting data in our program, we enter the number 12345 at the ENTER ITEM NO. Prompt when it is displayed on the TriCoder. By using the ! as shown above, the next time we see the ENTER ITEM NO. Prompt, the TriCoder will increment the last data entered and

display it as the input data:

ENTER ITEM NO.
12346_

To accept the data, press ENTER. To enter different data press CLEAR, then the new data.

• Voice Message Frequency

The next programming field is the FREQUENCY field. This field determines how often the voice messages for this statement are played.

FREQUENCY 01

There are two choices for the FREQUENCY field:

- E** Exception - the voice message is played the first five times that the prompt for this statement is displayed. If the Frequency field is left blank, E is the default.
- A** Always - the voice message is played every time the prompt for this statement is displayed.

Voice message prompts can be turned off while in data collection using the following key sequences:

- press **SHIFT**
- press **F1**
- press **P**

For total silence, including prompts and error messages, use this key sequence:

- press **SHIFT**
- press **F1**
- press **S**

• Message Numbers

The MESSAGE NUMBER field is where the voice messages are specified for the current statement. Up to 2 voice messages can be specified for each statement:

MESSAGE NUMBERS 01
0000_

Each voice message is identified using a 2 digit number. If two messages are specified, the first message is played, followed immediately by the second message. For example, the following program field would play message #5 (ENTER), then message #7 (ITEM):

MESSAGE NUMBERS 01
0507

To play no voice messages, specify **0000**.

At this point in programming, you can access the *Voice Operations* menu by pressing :

- press **SHIFT**
- press **F1**
- press **F2**

This allows you to record or listen to voice messages while you are programming. To exit back to programming, press the **F1** key.

For complete details and information on Voice Messages and their uses, see *Chapter 13; Voice Messaging*.

• Data ID

The next field in the programming is the DATA ID field.

DATA ID 01

—

The DATA ID field has 6 different functions, depending on what is entered at the prompt:

1. **Data Identifiers**
2. **UPC/EAN Check Digit verification**
3. **Table Access**
4. **Display Date/Time**
5. **Prevent Duplicate Entry**
6. **Compare Data**

1. Data Identifiers

The first function of the DATA ID field is to specify *Data Identifiers* for the data entered for the current statement. *Data Identifiers* are commonly used by the Automotive and Retail industries and are used to make sure the correct type of data is entered. For example, to make sure the TriCoder only accepts data for this prompt that starts with 1A1, put 1A1 in the Data ID field:

DATA ID 01

1A1_

Data Identifiers can be up to 3 characters long and can be position specific. To only accept data where the second character is “S”, put S in the second character position in the Data ID field:

DATA ID 01

S_ (data is “space” “S” “space”)

In this example, the data in positions 1 and 3 can be anything; but position 2 must be an “S”.

2. **UPC/EAN Check digit verification for keyed-in data**

The second function of the Data ID field is to have the TriCoder verify the check digit on an UPC or EAN bar code when the data has been entered on the TriCoder keypad (not scanned). This scenario happens often when bar codes are damaged or missing and the data has to be entered by hand. To avoid errors when the data is keyed in, the TriCoder will calculate a check digit for the data and compare it to the check digit that was keyed in. If the two digits do not match, the TriCoder generates the following error message:

**INVALID INPUT
HIT ANY KEY_**

To use this feature, enter the following characters at the DATA ID prompt:

U10 - Use this to verify UPC 12 or 8 digit entries

E10 - Use this to verify EAN 13 or 8 digit entries

B10 - Use this to check for both UPC and EAN 13, 12 or 8 digit entries.

UPC/EAN 2 and 5 digit supplements are not supported.

3. **Specifying Tables and Pick Lists**

The TriCoder can access downloaded tables and pick lists during data collection. Tables are lists of data that can be either validated (compares the entered data to the table data) or maintained (finds the entered data in the table and allows editing of associated data). Pick Lists serve as instruction to the user in order filling and warehousing applications. The TriCoder has room for up to 3 tables in memory at a time.

Table validation uses data records that consist of a single field. The user enters a piece of data into the TriCoder and the TriCoder checks the table to see if there is matching data. If so, the TriCoder writes the data to the data file and goes to the next program statement. To use Table Validation enter the following characters at the DATA ID prompt:

A1A, (*validates data from table #1*)

A2A or (*validates data from table #2*)

A3A (*validates data from table #3*)

Not only can the TriCoder validate the data but can prevent the user from entering the same data twice by entering these characters at the DATA ID prompt:

D1D

D2D or

D3D

Table maintenance uses tables of data that contain records made up of multiple fields. An example would be a price checking application that lists the item number, a description, a size and a price. Upon scanning the item number, the associated data (description, size and price) would be displayed on the TriCoder. Any of these fields may be designated as updateable and can be then edited and written to the data file. To use Table maintenance, enter these characters:

M1M (table 1)

M2M or (table 2)

M3M (table 3)

Pick Lists are a specific type of application that is usually associated with order filling or other warehouse activities. Pick Lists typically tell the user where to go to find an item, the item number and how many to pick for the order. To access a Pick List, use:

P1P

P2P or

P3P

To transfer the order number from the pick list to the data file to be uploaded, use:

O1O

O2O or

O3O

4. **Display Date and Time**

Normally, a date or time stamp statement does not display any data when executed but sometimes you may want the user to see the data being written to the data file. To display the date and or time, use:

DIS

in the DATA ID field.

5. **Prevent duplicate entry of data**

To prevent the duplication of data entered at a particular statement, use

DUP

in the DATA ID field. During Data Collection, if data is entered at a statement prompt that had been entered previously for the same statement prompt, the user will see the message:

**DUPLICATE ACCESS
PRESS ENTER_**

Press ENTER to discard the data and repeat the statement prompt. To accept the data and write it to the data file, press the **F1** key. The

program will then advance to the next statement prompt.

6. Compare Data

The Data ID field is used to compare entered data when the *Compare* statement type C is used. Enter the statement number you want to compare the currently entered data to. For example, if you wanted to compare the data you scanned in statement 2 to the data you scanned in statement 1, you would choose the statement type C for statement 2 and enter **01** for the Data ID. See the example under the *Compare* statement for a programming example.

• Data Type

The DATA TYPE field determines what kind of data - alphabetic, numeric or both - is accepted for a particular statement. There are five options for the DATA TYPE field:

- D** Digits Only; digits are 0-9
- N** Numeric Only; numeric data is 0-9, SPACE + - / \$, .
- A** Alphabetic Only; alphabetic data is A-Z a-z SPACE - , .
- ENTER** Allow input of *all characters*
- S** Start the data entry Shifted for *all characters*

If the data is alphabetic (A), data entry is started with the cursor shifted to allow for entry from the TriCoder keypad.

The DATA TYPE field is intended to work in a manner similar to the DATA ID field - it is meant to minimize operator data entry errors. For example, if the statement prompt text is QUANTITY, and you want only digits entered at this statement, use D in the DATA TYPE field.

• Maximum Data Length

The next field in the TriCoder programming is the MAX DATA LEN field. This field determines the maximum number of characters allowed for a statement.

The TriCoder reserves memory for a data field based on the *Maximum Data Length*. If you specify a maximum data length longer than you know you'll need, you will be able to collect less data due to the extra memory. For example, specifying 10 characters instead of 12 would allow for almost 100 more pieces of 10-character data.

Maximum Data Length can be between 01 and 99 and should include Data Identifiers if your data uses them.

MAX DATA LEN **01**
01_

To clear the MAX DATA LEN and enter a new value, press CLEAR on the TriCoder keypad and enter the new value.

The MAX DATA LEN is important when using the Xtra Statement. See the section on the XTRA STATEMENT for more information.

• Minimum Data Length

The MIN DATA LEN field tells the TriCoder the fewest number of characters to accept for a particular program statement. Specifying a *Minimum Data Length* can reduce data entry errors and is particularly important when using an Xtra Statement. The *Minimum Data Length* should take into consideration Data Identifiers if your data uses them.

MIN DATA LEN **01**
01_

The minimum data length can be anywhere from 00 to 99. 00 would be used if you wanted the user to be able to simply press the **ENTER** key without actually entering any data for the statement. To enter a minimum data length, press the **CLEAR** key (or use the **DELETE** key) to clear the current setting and enter the new value using the TriCoder keypad.

• Input Device

The INPUT DEVICE field tells the TriCoder where the data will be coming from. There are 3 valid entries for this field:

- K** TriCoder **keypad** entry only
- W** **Wand** input only. This includes any bar code scanner Laser, wand, CCD) attached or built into the TriCoder.
- R** **Serial device** input. Use for scales or other serial interface instruments. Data must be terminated by carriage return (CR). Upload prefix /suffix and max/min data length are not supported.

Pressing ENTER allows for both keyboard and wand/scanner input.

• Yes/Next Statement

The YES/NEXT STMT field allows you to tell the TriCoder which statement to go to next or, in the case of a Question statement, where to go if the question is answered by the YES key.

YES/NEXT STMT **01**
02_

Make sure the statement number you specify is a valid statement. If your program is a simple one statement program (assuming it is statement #01), you would specify statement #01 as the YES/NEXT STMT.

When editing a program, you cannot delete or remove statements, but you can simply not go to them. For example, lets say statement #01 is the item number, statement #02 is the bin number and statement #03 is the quantity. Maybe you decide you don't need to prompt for the bin number anymore and want to remove the statement. Change the YES/NEXT STMT field for statement #01 to go to statement #03. See the coding form example below to see how this would work.

Stmt #	Prompt Text	Yes/Next Stmt
01	ITEM NUMBER	03
02	BIN NUMBER	03
03	QUANTITY	01

• No/End Statement

The NO/END STMT field determines where the program goes if the END key is pressed, or in the case of a question statement, where the program goes if the NO key is pressed.

NO/END STMT **01**
99_

For a question statement, this field simply tells the TriCoder where to go next when the question is answered with NO. In the instance of the END key, what can happen next can vary.

Pressing the **END** key can have a different effect; depending on what statement you go to next:

- Go to any valid statement by specifying that statement number in the NO/END STMT field. Besides simply going to another statement, this allows you to use the **END** key to break out of complex data collection loops. For example, say you have a program that prompts for (1)BLDG., then (2)AISLE, then (3)ITEM, then (4)QUANTITY, with a loop that goes back to ITEM after QUANTITY. To break out of the loop at ITEM and go back to BLDG, use 01 in the NO/END STMT for ITEM. To break out of the loop at QUANTITY and go to AISLE, use 02 in the NO/END STMT for QUANTITY.
- If you want to exit data collection when the **END** key is pressed, specify 99 in the NO/END STMT field.
- If you want to disable the **END** key (have it do nothing), specify statement #00 in the NO/END STMT field.

• Upload Prefix

The Upload Prefix field allows you to specify a unique 1-15 character string to be uploaded BEFORE the data for this statement, every time the statement is executed. The Upload Prefix is an extremely useful tool, as it has more uses than simply adding characters to a field of data. Here are the six functions of the *Upload Prefix* field:

1. **Identification of a field**
2. **Adding key sequences for uploading into an application**
3. **Timing Delays**
4. **Appending data to another field**
5. **Trimming data from the front of a field**
6. **Padding data with spaces or zeros at the front of a field**

1. Identification of a field

By specifying particular characters in the Upload Prefix, you can help the host computer program identify or distinguish one field of data from another. For example, if your software identifies part numbers by seeing the letter P before each part number, specify P in the Upload Prefix. Think of it as a way to add Data Identifiers when they aren't already part of your bar code.

UPLOAD PREFIX 01
P_

2. Adding key sequences for uploading into an application

If you are uploading your data directly into an application, the upload prefix (and suffix) can add any keystrokes necessary for your program to accept the data. You would have to get the application to the point where you would normally type the data in, then upload the TriCoder and let it type it for you. For example, if you are uploading into a program that requires that you press the F1 key before you enter a particular field of a data, you would program an "F1" into the Upload Prefix for that statement by scanning the correct bar codes on the TriCoder FULL ASCII MENU.

If you use the *Upload Prefix* or *Upload Suffix* to emulate keystrokes, the first thing you must do is carefully note (we suggest writing it down) which keys must be pressed at what point in your application to get the data in the TriCoder to go into the right spots in your program. The SINGLE CYCLE TRANSMIT feature can help you with this process by uploading one piece of data at a time, allowing you to check each field as it uploads.

3. Timing Delays for this field only

Timing delays of .10 seconds to 9.9 seconds can be programmed into the *Upload Prefix* (and *Suffix*). This inserts a time delay before or after a field of data, allowing your application to keep up with the data

coming from the TriCoder. This is especially important when uploading directly into an application using the TriCoder as a keyboard wedge. As well as giving your application time to process the data coming from the TriCoder, delays also allow you to keep pace with screen changes and avoid overloading the keyboard buffer. Delays are often required when uploading into programs such as EXCEL. Timing delays are programmed by scanning the DEL (ASCII 127) from the *Full ASCII Menu*, then entering two characters - use any combination between 01 (.10 seconds) and 99 (9.9 seconds). Use as small a delay as possible to avoid a slow upload.

UPLOAD PREFIX 01
?05_

The previous example shows a .5 second delay.

4. Appending data to another field

A very common use of the *Upload Prefix* (or *Suffix*) is to append data to a field every time that field is uploaded. Use the characters:

}xx

where **xx** is the number of the statement you want to attach. To save space (you are allowed only 15 characters in a prefix or suffix), a single digit can be used when the statement number is a single digit - }2 is the same as }02 - as long as it is not followed by another valid digit.

As an example, let's say you wanted to attach an aisle number as a prefix to every item number you entered. Assuming the aisle number is statement #02, entering }02 in the Upload Prefix of the item number statement would attach the aisle number to every item number. Only the data in statement #02 would be attached; any *Upload Prefix* or *Upload Suffix* characters for statement #02 will not be uploaded.

The field that is appended (#02 in our example) is typically not uploaded by itself - it is only uploaded in conjunction with another field. To suppress the transmission of a field entirely upon uploading, use:

~0

in the *Upload Prefix* or *Upload Suffix* (either will work) for that field.

UPLOAD PREFIX 03
}01

The example above would upload the data in statement #01 attached in front of the data for statement #03 every time it is uploaded.

5. Trimming data from a field

The *Upload Prefix* can be used to trim 1-15 leading characters from the specified statements data. Trimming can happen in 3 ways:

- ~x -where x is a single hex digit corresponding to the number of characters you want to remove from the data. Valid entries are 1 - F (corresponding to 1-15). Trimming characters using the ~ waits to trim the data until it is uploaded.

UPLOAD PREFIX 01
~A

The example above would trim 10 characters from the front of the data for statement #01. The data is not trimmed until it is uploaded; the TriCoder displays and stores the data in its original form. If the data in statement #01 was less than 10 characters, no trimming would occur and the data would be transmitted in its entirety.

- {x -where x is a single hex digit corresponding to the number of characters you want to remove from the data. As above, valid entries are 1-F. Trimming characters using the { character trims the data BEFORE displaying it on the TriCoder screen and before checking data lengths and data ID's.

UPLOAD PREFIX 01
{4

The example above would trim 4 characters from the front of the data in statement #01. The trimming would occur immediately, displaying the trimmed data on the TriCoder screen. If the data is less than 4 characters, no trimming would occur and the data would display in its entirety. Because the data is trimmed BEFORE it is checked for its data length and data ID's, remember to take those fields into consideration when trimming your data.

- {zx -where z is the bar code ID character and x is a single hex digit corresponding to the number of characters you want to remove from the data. As above, valid entries are 1-F. This type of trimming is called "selective" trimming. It only trims characters from the specified bar code type if it is scanned. See **Chapter 6; TriCoder Setup - Code 128 Parameters** for the correct bar code ID characters for each bar code type.

UPLOAD PREFIX 01
{b3

The example above would trim 3 characters off of a Code 39 bar code scanned for statement #01. If you scanned a UPC bar code instead, no trimming would occur.

6. Padding data with zeros or spaces

The *Upload Prefix* can be used to add zeros or spaces before the data up to the *Maximum Data Length* specified for the statement. Padding and Trimming are mutually exclusive; trimming always takes precedence. To pad data with zeros, use:

^0

To pad data with spaces, use:

^S

For example, if statement #01 has a *Maximum Data Length* of 10 and you scan the number 12345, the following *Upload Prefix* for statement #1 would produce data of 0000012345.

UPLOAD PREFIX 01
^0

When programming an *Upload Prefix*, you must press the **ENTER** key on the TriCoder to terminate the entry, whether you have entered data from the keypad or scanned it from the *Full ASCII Menu*. If you try to scan **ENTER** from the *Full ASCII Menu*, the TriCoder will think you want to add an **ENTER** (carriage return) to the *Upload Prefix*.

When entering unprintable characters from the *Full ASCII Menu* as *Upload Prefix* data, each character will display on the TriCoder as ?. If you want to know what ASCII character is there, press the **F2** key and the three-digit ASCII equivalent of your entry will appear. For example, if you scanned the **CR** from the *Full ASCII Menu*, it would display on the TriCoder as ?. Pressing **F2** will display the **CR** as **013** (the ASCII for CR). See **Appendix O; ASCII Code Equivalent Table** for a chart of all ASCII characters.

Upload Prefixes and *Upload Suffixes* are the only program statement fields that can be edited after data has already been collected in the TriCoder. All other statement fields are not editable until the current data file is deleted.

• Upload Suffix

The *Upload Suffix* is just like the *Upload Prefix*; only it is appended **AFTER** the data for the statement.

All of the properties of the *Upload Prefix* apply to the *Upload Suffix* also:

1. **Identification of a field**
2. **Simulating keystrokes**
3. **Timing Delays**
4. **Appending data to another field**
5. **Trimming Data (from the END of the data)**
6. **Padding Data (padding at the END of the data)**

For details on any of the above uses, see the previous section on *Upload Prefixes*.

By default, *Upload Suffix* data is transmitted AFTER the data but BEFORE the *Terminator Character*. The default transmission format when using *Upload Prefixes* and *Suffixes* is as follows:

(ID)(Prefix) DATA (Checksum Chs)(Suffix) (Terminator Ch)

To transmit the *Upload Suffix* after the Terminator, change the *Terminator Character* to **5** (the default is 4).

Programming the TriCoder by scanning bar codes only

A program can be entered into the TriCoder entirely by scanning a sequence of bar codes. This is particularly useful for resellers who want to distribute a program that their users can scan in at any time. Using a bar code printing program such as Worth Data *Label RIGHT*, you can print a sheet of bar codes that when scanned in sequence, creates an entire program in the TriCoder. This method can also be used to edit existing programs.

You can find out what bar codes you need to print (i.e. Code 39, Preamble etc.) by scanning the bar coded *TriCoder Setup Menu*. To do this, you must first set the TriCoder to **Disable Full ASCII Code 39** (Code 39 Setup parameter). The only code you will not be able to read is **Start Setup** (see below for the bar code equivalent).

There are some functions needed to create a program that you will not find corresponding bar codes for on the *TriCoder Setup Menu*. See **Appendix H; Specification for Code 39** for help in creating Code 39 bar codes. Here is a listing of the functions (many of which are keys on the TriCoder keypad), along with their associated bar codes:

Function	Bar Code
Start Setup	/+/
CLEAR key	--+
F1 key	-/-
DELETE key	-B-
Down Arrow key	-D-
Right Arrow 01 to 15 fields, set <i>nn</i> to number of fields	-nn-
ENTER key to terminate string (for Pre/Postamble, EOF String)	-C-
YES	CR (\$M)
NO	0
END	CAN (\$X)
End Setup	/-/

Finishing and checking your program

When you have finished entering your program, press the F1 key to have the TriCoder check your program for errors. If you have referenced a statement number that doesn't exist or hasn't been defined properly, you will see the message:

**INVALID STMT. #
HIT ANY KEY_**

Pressing a key will take you to the statement number where the TriCoder found the problem. Make the appropriate corrections then press the F1 key again. If the TriCoder finds no other problems, you will see the Programming menu prompt:

**Create Programs-> 1-3
Voice -> 4 Setup -> 5
Automation -----> 7
Data File Names--> 6(hidden)**

You can now create another program by pressing 1-3, or exit PROGRAMMING MODE entirely by pressing the F1 key to return to the Mode Menu.

If you don't press the F1 key when you are finished creating your program and the TriCoder shuts off (goes to sleep in the middle of programming – maybe you were interrupted and left to do something else), when you turn the TriCoder back on, you may get the following message:

**INCOMPLETE PROGRAM
HIT ANY KEY_**

Press a key to get to this prompt:

**PROGRAMMING MODE
PASSWORD?_**

Enter the password (WDTRI), then choose the number of the program you were working on when you see the PROGRAM FUNCTION menu:

**Create Programs->1-3
Voice -> 4 Setup -> 5
Automation -----> 7
Data File Names-->6(hidden)**

Press the number of the program you were working on. Answer YES to EDIT PROGRAM?. Once inside the program, press the F1 key to locate the problem. If the program doesn't resemble what you were working on before, it is possible you have had some kind of memory problem. See

Chapter 14; Troubleshooting for more information. Otherwise, fix the problem, then press F1 to check and exit.

Reviewing and Modifying programs

You can review or modify a program at any time. If you have data collected for that program, the only portions you can review or modify are the *Upload Prefix* and *Upload Suffix*. This is a safeguard to make sure you do not damage data already collected before it is uploaded. If you need to modify a program field other than the *Upload Prefix and Suffix*, upload your data then proceed.

To review or modify your program, get in to **PROGRAMMING MODE** just as you did when you originally created your program. Enter the number of your program at the **Create Programs-->1-3** prompt, then press YES at the **EDIT PROGRAM?** prompt.

- Use the arrow keys (down, up, right, left) to move through your program. The DOWN and UP arrows move you to the next/previous statement of the same prompt; the RIGHT and LEFT arrows move to the next/previous prompt entry.
- You can use the SEARCH key to search for a particular pattern of data (i.e. all prompts starting with ENTER). Press the SEARCH key and enter the data you want to search for at the **SEARCH PATTERN** prompt. The search begins at the beginning of the file and moves forward until a match is found. Once you press the SEARCH key, you will stay in *Search* mode until you press the SEARCH key again. While in *Search* mode, use the arrow keys as follows:

Right Arrow	next matching field
Left Arrow	previous matching field
Down Arrow	next matching statement numbers' matching field
Up Arrow	previous matching statement numbers' matching field

The BEGIN key takes you to the first statement in your program file. Pressing END takes you to the END OF FILE - the last statement filled out with an *Entry Type*. You may have unused statements in a program; maybe you deleted a statement (remember that it reserves the statement number even though you have cleared all prompts) or you may have left gaps on purpose, to insert new statements later.

If you attempt to edit a program but can only see the *Upload Prefix* and *Upload Suffix*, you have data collected in the TriCoder and need to upload before you can edit other fields in your program.

Chapter 9

Creating TriCoder Programs on your PC using the Virtual TriCoder

You can also create custom TriCoder programs on your PC and download them to the TriCoder using our *Virtual TriCoder Utility*. The program is configured to download the files through a USB port or a serial port. **For simple programs, entering them directly on the TriCoder is faster and easier.** If you are using your TriCoder as a keyboard wedge only, you will have to enter programs on the TriCoder, or consider changing to USB.

The *Virtual TriCoder Utility* creates programs using the same program prompts that you would use if creating the program on the TriCoder itself. You can even test your program by running the *Virtual TriCoder* as you would the real TriCoder.

Since the *Virtual TriCoder* uses the same prompts and format as the real TriCoder, using a TriCoder Coding Form to plot out your program (especially if it is a complicated one) still makes sense. In fact, the *Virtual TriCoder Utility* includes an interface that looks like the TriCoder Coding Form. Simply use the TriCoder Coding Form to enter the correct data into the *Virtual TriCoder*.

The TriCoder does not know the difference between a program created on the TriCoder and one created using the *Virtual TriCoder Utility*. Programs can be uploaded from the TriCoder to the *Virtual TriCoder*, edited, then downloaded back into the TriCoder. Voice messages can only be recorded on the TriCoder and only transferred from TriCoder to TriCoder.

Installing the *Virtual TriCoder Utility*

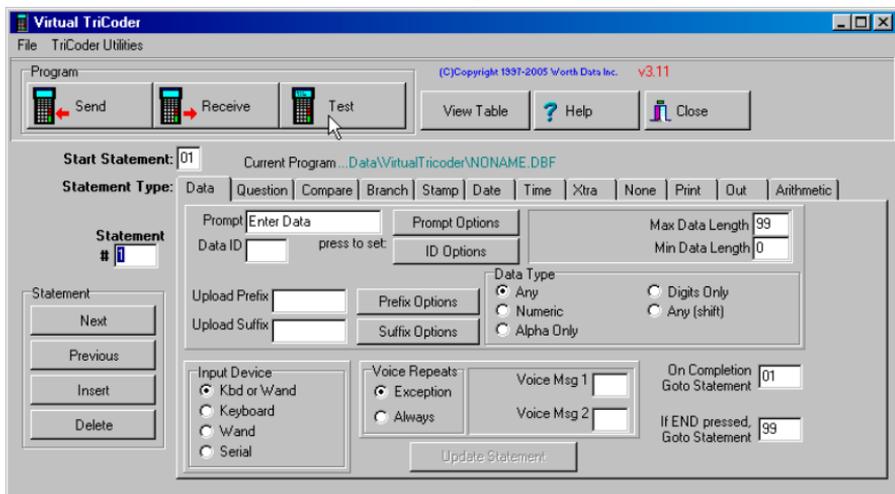
- Insert the Utilities CD into your CD-Rom drive.
- If you have autoplay enabled, the CD should begin by itself. If not, Click on **Start**, then **Run**, then type D:\setup.exe at the prompt (use your drive letter in place of "D" if it is different).
- Follow the directions on screen to install the *Virtual TriCoder Utility*

Starting the *Virtual TriCoder Utility*

To start the Virtual TriCoder Utility:

- Click on **Start**, then **Programs**
- Choose the **Virtual TriCoder** group, then click on **Virtual TriCoder**.

The Virtual TriCoder Utility Screen

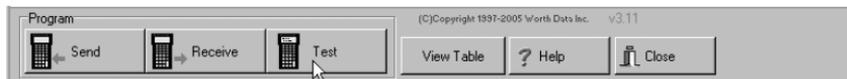


File Menu

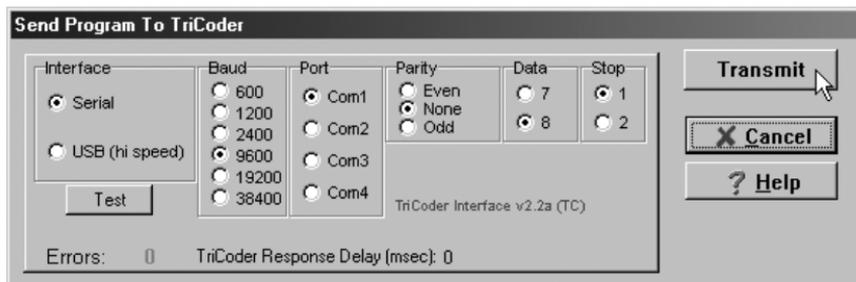


Not much to explain here - use **File** to create a new file, open an existing file, save a current file and exit the program.

Button Bar Menu



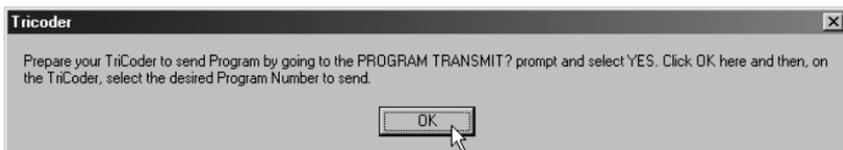
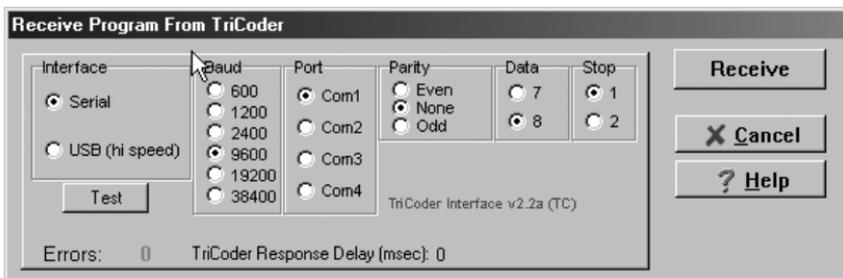
Send - Click on this button to send a program to the TriCoder. Make sure all parameters are correct (USB hi speed has no parameters). If sending via Serial port, start the TriCoder *Program Receive* first, then click on **Transmit**.





If transmitting via USB hi speed, simply click **Transmit** (you don't have to do anything on the TriCoder).

Receive - Click here to receive a program from the TriCoder. If receiving via the serial port, you must click the **Receive** button first, then you can start the TriCoder (*Program Transmit*). If USB, simply click **Receive**. After you receive the program, you can then edit it and send it back to the TriCoder (**Send** button).

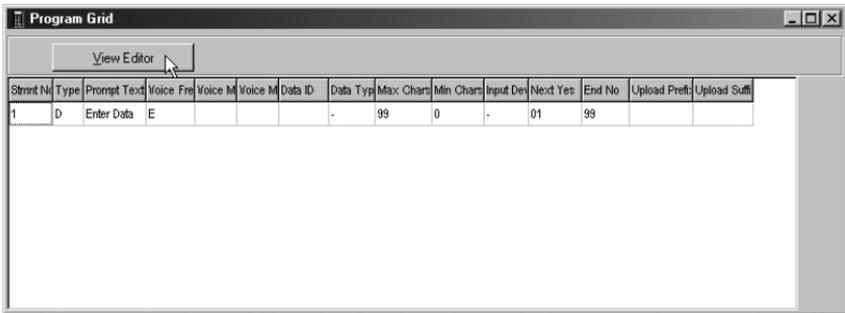


Test - Click on this button to test a program as if you were creating it in the TriCoder itself. This will alert you to any problems *before* you upload the program to the TriCoder. The screen looks like a real TriCoder and works like one too. It can help you plan and create programs that you know will work.

View Table - This view contains a grid similar to the TriCoder Coding Form contained in the manual. You can edit entries by clicking on the data itself, then entering new data. Move between fields using the right and left arrow keys. To transfer changes



made on this screen to the Editing screen, go back the editing screen and click on UPDATE STATEMENT.



Help - Click on the Help button to access the *Virtual TriCoders'* on-line help system.

Close – Click on this button to Close and exit the *Virtual TriCoder Utility*

Statement Functions

The *Virtual TriCoder Utility* program screen displays the number of the current statement you are working on. You can also set which statement number you want your program to start with. Most of the time you will start with Statement #1 but there may be instances where you will want to start at different statement.

You can choose the *Statement Type* by clicking on the Tab that corresponds to the type of statement you want to create – Data, Question, Branch, Stamp, Date, Time and Xtra. See **Chapter 8; Creating Custom Programs** for details on all Statement Types.

Scroll through all of your statements by clicking either the **Next** button or the **Previous** button. Insert a statement by clicking the **Insert** button; use the **Delete** button to delete a statement. The **Delete** button is unique to the *Virtual TriCoder*; the real TriCoder cannot delete statements, it merely avoids using them. See **Chapter 8; Creating custom programs** for details on YES/NEXT and NO/END.

Creating a program

We recommend reading **Chapter 8; Creating Custom Programs** to become familiar with all of the programming features before you try to create programs using the *Virtual TriCoder Utility*. After you are familiar with the program features, creating a program using the TriCoder Programming Utility screen is easy if you follow these simple steps:

- **Choose the type of statement you want to create for statement #1.** Click on the tab that corresponds to the type of statement you want to create. Each tab displays a screen with all of the required data for each type of statement. Fill in the data for the desired statement, then click on

Update Statement. To add another statement, click on *Insert*. For details on each statement type and all program prompts, see **Chapter 8; Creating custom programs.**

- **Continue to add statements until you have created your entire program.**
After adding a new statement, click on *Next* to advance to the new statement. As in Step 1, choose the statement type, then enter the necessary data. Decide which statement number you want to begin data collection with and specify that in the ***Start Statement*** box. Remember that if you choose a statement other than #1 for your ***Start Statement***, you may have partial records if you resume data collection without uploading and deleting the current data file. When you have added all the statements you want for your program, it is time to test your program using the Virtual TriCoder.
- **Test your program using the Virtual TriCoder.**
After you have completed your program, click on the ***Virtual TriCoder*** button to run the *Virtual TriCoder* to test your program. Use this utility to make sure your program flows correctly and is prompting your operator for the correct information.
- **Upload your program to the TriCoder.**
Click on the ***Upload to TriCoder*** button to transmit the program to your TriCoder. Programs can only be transmitted via serial port so your TriCoder must be configured as a serial unit. Be sure to start the Receiving program on the TriCoder *before* you begin transmitting the program from the *Virtual TriCoder Utility*. Click on ***File***,

The on-line help system of the *Virtual TriCoder Utility* goes into detail on all features. Use the *Windows TriCoder Utility* to download programs from the TriCoder to the host (see **Chapter 10; Transmitting and Receiving programs**), then edit and upload them using the *Virtual TriCoder Utility*.

Transmitting and Receiving Programs and Setup

The TriCoder has the ability to transmit and receive programs and setup information. Transmitting and receiving can occur between two TriCoders or between a TriCoder and a host computer. Transferring the entire setup configuration, voice messages and programs from one TriCoder to another is called “cloning”. If you want to clone only voice messages, see *Chapter 13; Voice Messages* for complete information.

If your programs are complex or large, transmitting them from TriCoder to TriCoder is faster and easier than manually entering all of the information every time. Transmitting programs to a host computer allows you to store a back-up copy (excluding Voice Messages) available for download if anything happens to your TriCoder.

You cannot clone from one TriCoder to another TriCoder using the *USB Computer Interface*. You can clone (everything except voice messages) from a TriCoder to the *Windows TriCoder Utilities* and back. If you have a requirement to clone from one TriCoder to another, you must change the *Computer Interface* from USB to either PC Keyboard Wedge (T64/LT64s) or Serial (T54/LT54), perform the cloning using the cloning cables (T15 and F38), and then set the *Computer Interface* back to the USB interface desired.

Receiving a program on the TriCoder or host

There are several things you need to do before receiving programs or setup from another TriCoder or host computer:

- Receiving and transmitting programs from one TriCoder to another requires the correct cables. The **TriCoder Data Cloning Cable** (F38) is needed to clone or transmit/receive programs, tables and setup information. The **TriCoder Voice Cloning Cable** (T15) is required to “clone” or transmit and receive voice messages. Voice messages can only be transmitted or received from TriCoder to TriCoder. They cannot be transmitted via host computer. The **Data Cloning Cable** is attached to each TriCoders *Computer* port. The connector on the **Voice Cloning Cable** that has two black rings on the tip plugs into the auxiliary jack on the bottom of the **receiving** TriCoder. The tip with the single ring plugs into the transmitting TriCoder.
- Transmitting and receiving programs from a host computer requires the cables normally used for TriCoder USB or serial communication.

- Make sure all data is uploaded and deleted from the **receiving** TriCoder. The TriCoder will not allow you to receive data unless the TriCoders data files are empty.
- Plug in the 5-volt power adapter(s). You want to make sure you don't have a low-battery situation in the middle of a transfer.
- For serial and keyboard cloning, *always* start the **receiving** TriCoder first. For USB cloning to a host computer, follow the instructions on the TriCoder's display.
- When transmitting between two TriCoders, both TriCoders must be configured to use the same **Computer Interface**. If configured as serial interface, the serial parameters must be the same on both TriCoders; baud rate, parity, data bits and stop bits must match. Two USB TriCoders cannot be cloned together.

Cloning to or from older TriCoders

If you are cloning to or from an older TriCoder that only has 64K or 256K with memory partitions, you may get a message telling you:

**Partitions Not Cloned
Press Any Key**

Press a key, then when your cloning is finished, go in and manually set up the partitions in your cloned TriCoder.

Receiving a program on the TriCoder from another TriCoder

Make sure all cables are attached correctly and the 5-volt power adapter is plugged in. To start the **receiving** TriCoder, answer NO to all prompts until you see:

**PROGRAM RECEIVE?
KEY [YES/NO]?_**

Press YES to get to the RECEIVE PROGRAM menu:

```

RECEIVE PROGRAM   KEY
-----
Programs [1-3]?----->1 - 3
Clone TriCoder-----> 0_

```

Press **0** to Clone the entire TriCoder. Cloning receives the programs, tables, Setup, and voice messages (if using a voice cloning cable T15) from another TriCoder. If cloning from a host computer, only the programs, tables and Setup can be received.

Press **1, 2 or 3** to receive a program only. Pressing **1, 2 or 3** determines *which program number you are assigning* - it does not have to correspond

to the program number being transmitted from the other TriCoder or host.
After making a selection, the TriCoder displays:

**RECEIVING PROGRAM
PLEASE WAIT-->**

At this point, you can start the transmitting TriCoder or host program. Once the transmission is complete, the receiving TriCoder displays:

**END OF PGM. RECV
HIT ANY KEY_**

Press any key to return to the *Mode Menu*.

If the TriCoder has a problem during the transmission, the transfer will end and the TriCoder will display the following error message:

**DATA XMIT ERROR
CYCLE POWER**

If you receive this message while receiving a program, the program transfer is incomplete and the transmit/receive session will have to be restarted. To avoid any problems, **do not press any keys on the TriCoder once the transmission has started.**

Partitioning memory for data files and tables

Storage memory in the TriCoder can be divided and used for different purposes. Some memory can be allocated to store collected data while the remaining memory might be set aside to store table data (see *Chapter 12, Tables and Pick Lists* for details). Memory is allocated or “partitioned” using the *Partitions* setup parameter.

Up to 3 data files and 3 tables can be defined in the *Partitions* parameter. The 512K of memory in the TriCoder is divided into eight 64K blocks called “pages”. The TriCoder can have a maximum of 3 data files and 3 tables which can be of varying memory sizes, as long as they add up to 512K.

Partitioning Memory

Each 64K block of memory is called a “page”. The TriCoder has 8 pages of memory available. Memory is partitioned by assigning a number of pages to a particular data file or table. Once you are in the *Partitions* setup parameter, you will see the following information on your TriCoder screen:

PARTITIONS?
abcdef_

where: a	is the allocation for data file #1
b	is the allocation for data file #2
c	is the allocation for data file #3
d	is the allocation for table #1
e	is the allocation for table #2
f	is the allocation for table #3

PARTITIONS?
700100_

The total number of pages must equal 8. In this example above, data file #1 is allotted 7 pages (448k), data files #2 and #3 none, table #1 is allotted 1 page (64K) and tables #2 and #3 are given none (0k). The size of a table will determine how much memory needs to be set aside for it. In our example, the largest table allowed would be 64K.

Using Multiple Data Files

Creating multiple data files in the TriCoder makes it easier to use different programs in the TriCoder concurrently. If you have your memory partitioned for only 1 data file, you can collect data for 1 program only – you cannot collect data for another program until you have uploaded and deleted the current data file. A good example might be that you have created separate programs for shipping and receiving and need to be able to

switch back and forth between them at any time. With only 1 data file defined, this is not possible. By partitioning the TriCoder memory into 2 data files, you can assign one file to your shipping program and the other file to your receiving program, switching back and forth as necessary.

Once you have partitioned the memory into multiple data files, when you begin data collection, you will see the following series of prompts:

DATA COLLECTION?_
KEY [YES/NO]?_ (press YES)

1. SAMPLE PROGRAM

2.

3.

PROGRAM NO. [0-3]?_ (enter the program number, if you have programs in slots 2 and 3, you would see their program names listed)

DATA FILE NO.?

KEY [1-3]?_

Linking a data file with a data collection program

Once you choose a data file number and collect some data, the TriCoder remembers which program you used. If you currently have data in the data file and try to use the same data file to collect data using a different program, the TriCoder displays:

FILE USED BY P_n
HIT ANY KEY_

where *n* is the program number, 0-3. This prompt forces you to choose another data file number to collect data in this program.

Continuing to collect data using an existing data file

If you have used a particular program and data file to collect data and have not uploaded the data, you have the option of collecting more data in that program and data file by “appending” the new data to the end of the existing file.

After selecting your program number and data file number (one that is still current in the TriCoder and has not been uploaded), the TriCoder will display the following prompt:

APPEND DATA FILE?_
KEY [YES/NO]?_

This prompt is simply letting you know that if you press YES, you will add data to an existing data file. If you press NO, you will go back to the DATA FILE NO.

If you try to select a data file number that has not been defined, the TriCoder will display:

**FILE NOT DEFINED
HIT ANY KEY_**

Using the STATUS key to view data file partitions

Once you have partitioned your memory, you can use the STATUS key to review the amount of memory left in each data file and to see which program a data file is linked to. Normally, pressing the STATUS key simply displays the date and time information along with the total amount of unused memory. When you have data files partitioned, the STATUS key returns a two-screen status report that looks as follows:

first screen:

```
mm/dd/yy hh:mm:ss
xxxk BYTES FREE
AAaBAT■■■■■■■■■■■■■■■■■■■■-xx%
LI – BAT■■■■■■■■■■■■■■■■■■■■-xx%
```

press ENTER

second screen:

```
AAaBAT■■■■■■■■■■■■■■■■■■■■-xx%
LI – BAT■■■■■■■■■■■■■■■■■■■■-xx%
P1-015K PX-064K
PX-000K
```

In the example above, the first screen displays the date (mm/dd/yy) and time (hh:mm:ss) on the first line, then the number of bytes of memory free (xxxk, where xxx is the number) on the second line. The third and fourth line is the battery status (see *Appendix A; Powering the TriCoder* for details).

The second screen again displays the battery status (lines 1&2), the displays the status of the data files on lines 3&4. In the example above it shows:

- **P1-015k** - Data file 1 is defined, is currently used by Program 1 and has 15k of memory available (some memory has been used).
- **PX-064K** - Data file 2 is defined, is not currently in use by any program and has 64K of memory available (no memory has been used). The **X** shows that a program does not currently use this file.
- **PX-000k** - Data file 3 has not been defined – the 000K designates that no memory has been allocated for this file.

The same rules that apply to single data files apply to multiple data files:

1. You won't be able to change anything in the program itself except for the Upload Prefix and Upload Suffix while you have data in the TriCoder.
2. You cannot re-define your memory partitions using the *Partitions* setup parameter while you have data in the TriCoder.

Partitioning memory for tables

Memory partitions for tables are specified in the second half of the *Partitions* setting and follow the same parameters as data files. Memory is allocated in 64K “pages” and is specified as the number of pages in the *Partitions* setting. The constraining factor in partitioning memory for tables comes from the table size itself – you must allow enough memory in the table partition to accommodate the table. See **Chapter 12, Tables and Pick Lists** for details on using and creating tables.

Tables and Pick Lists

The TriCoder has a valuable feature that allows you to download information into the TriCoder (a table) and then reference that table of information during data collection. There are 3 functions that the table feature performs:

- **Table data validation**
- **Table data maintenance**
- **Pick Lists**

Partitioning memory for table use

In order to use tables with the TriCoder, the TriCoder memory must first be partitioned into areas for table data and areas for data storage. Memory is allocated using the *Partitions* setup parameter, either by scanning the bar coded *Setup Menu* or accessing the TriCoder Setup via the keypad.

TriCoder memory is partitioned into 64K pages, with 8 pages total. The TriCoder *Partitions* parameter is as follows:

PARTITIONS?
abcdef_

- where: **a** is the allocation for data file #1
b is the allocation for data file #2
c is the allocation for data file #3
d is the allocation for table #1
e is the allocation for table #2
f is the allocation for table #3

PARTITIONS?
700100_

The total number of pages defined must equal 8. In this example, data file #1 is allotted 7 pages (224k), data files #2 and #3 none, table #1 is allotted 1 page (64K) and tables #2 and #3 are given none (0k). The size of the table will determine how much memory needs to be set aside. In our example, the largest table allowed would be 64K.

Data Validation using Tables

Lets say you have a warehouse application where you want to use the TriCoder to record items being loaded onto a truck. You can use a table of data downloaded into the TriCoder to validate what is being loaded on the truck. When the worker scans the item to be loaded, the TriCoder checks the item number against the item numbers in the table; if they match, the item number is written to the data file and he moves on to the next item. If the item number he scans is not found in the table, the TriCoder would alert the worker that the item he is loading is not on the list, avoiding a possible mis-shipment or loss.

Data Validation validates a single field of entered data against a table constructed of single pieces of data. The TriCoder uses the DATA ID field to specify which table you want to use to validate the data entered for that statement.

Data ID entry	Description
A1A	validate data using table 1
A2A	validate data using table 2
A3A	validate data using table 3

When the operator enters an item found in the table, the TriCoder writes the item to the data file and goes to the next statement in the program. If the item is not found in the table, the TriCoder displays:

**ITEM NOT FOUND
HIT ANY KEY_**

and displays the statement prompt over again.

Data validation table file format

The file format used to create a table for data validation is a simple ASCII text file with CR/LF delimiters. The first line in the data file is a variable-length header record that defines the data in the table. The first 2 digits indicate the data length of each record in the table. The next 9 digits are always 0's (zero), indicating that the data is for validation only. The following characters can be whatever you want - it is optional and for reference only, the TriCoder does not use it. The following header would indicate a 6-digit length data table, using the word EXAMPLE1 as the reference:

0600000000EXAMPLE1

After the header come the lines of data to validate. The only constraint on the file size is the amount of memory you have allotted for the table data. If the data file is created in DOS, the file needs to have a *Ctrl Z* (ASCII 26 or Hex 1A) to indicate the END OF FILE. A sample file using the example header above might look like this (*each line terminated by a CR*):

0600000000EXAMPLE1

111111

222222

333333

324211

365667

Ctrl Z (ASCII 26) (use if a DOS file)

In the example above, all data entries are 6 characters long, as specified in the header information. If you want to be able to use variable length data, you must set your header length to the longest number required (lets say your longest number is 8 digits long) and then any data shorter than 8 characters long, must be padded with TRAILING spaces; for example (x

indicates a “space” character):

0800000000EXAMPLE2

11111111

22xxxxxx

33333xxx

44444444

Ctrl Z (ASCII 26) (use if a DOS file)

EXAMPLE2 above would accept a scan or entry of 22 when **EXAMPLE1** would not.

Preventing duplicate entry of data

Sometimes you might want to make sure that an item in your table is not scanned or entered twice. You can prevent duplicate data when using a data validation table by specifying the following in the DATA ID field:

Data ID entry	description
D1D	prevent duplicate entry for table 1 data
D2D	prevent duplicate entry for table 2 data
D3D	prevent duplicate entry for table 3 data

If you have specified **DxD** in the DATA ID field and happen to enter the same data twice, the TriCoder will respond with the following error message:

**DUPLICATE ACCESS
HIT ANY KEY_**

Hit any key to return to the statement prompt again.

The file format to prevent duplicate access for table data validation looks almost identical to the above example for simple data validation with a few exceptions:

As with the original example, the header record uses the first 2 digits to specify the data length, but the next 3 characters are F01 (specifies duplicate entry) and each data record has an additional 0 added to the low order position:

06F0100000EXAMPLE1

1111110

2222220

3333330

3242110

3656670

Ctrl Z (ASCII 26)

The TriCoder uses the **0** (zero) at the end of each record to determine whether a record in the table has been accessed or not. When a record is accessed, the **0** (zero) changes to a **1**. If the user enters the same data twice,

the TriCoder will look at the table and see a **1** at the end of the matching data, indicating that the record had been accessed previously. Once accessed, the table cannot be reset to its original status. You would have to re-download the table to use the table in its original format.

Data Maintenance using tables

Data maintenance refers to using a table consisting of multiple fields per record to maintain or update a master file. Tables that are used for maintenance can consist of up to 4 fields per record, including the “key” field. The “key” field is the data that is entered while collecting data by scanning or keying and then looked up in the table by the TriCoder. An example of this type of application might be a retailer who wants to use the TriCoder to verify that their shelf prices match the prices in the computer, or that their inventory counts in the computer match what is actually on the floor. The retailer can download a table of data into the TriCoder that consists of the item number (the “key” field), a short description, the price and finally, the inventory count. He can choose to make any or all of the fields “updatable” or “fixed”.

Fixed fields cannot be changed by the user collecting the data; they are simply for information purposes only. The “key” field is also fixed as it is what the TriCoder uses to reference the data in the table.

Updatable fields are fields that the user can change or update in the TriCoder when they access that particular record in the table. When the operator scans the item number, the TriCoder looks up the number in the table and displays the entire record (description, price, quantity), with the cursor stopped on the first “updatable” field. The operator compares the data displayed by the TriCoder to the item information on the shelf and edits the data in the TriCoder if needed. Pressing ENTER takes the operator to the next “updatable” field and he repeats the process.

Once the record is edited, it is written to a data file for uploading to the host computer. The table maintenance may only be one step in a multi-statement program. After the table data is written to file, the TriCoder moves on to the next program statement.

While collecting data, if the operator wants to display the key field again, he/she can press the **F2** key, and then press it again to return to the rest of the data items in the table.

When finished, the retailer can now use the edited table information to update their master records in the computer when he uploads.

Table Maintenance is specified in the DATA ID field while programming the TriCoder:

DATA ID entry	description
M1M	data maintenance on table 1
M2M	data maintenance on table 2
M3M	data maintenance on table 3

Table Maintenance file format

The file format for a table used for maintenance is similar to that used by table data validation in that it uses a header record to describe the table format to the TriCoder. The header consists of at least 11 characters plus a comment or reference name. The table maintenance header uses the following format:

*aa**xb**xc**cc**dd**comment***

Position	data allowed	description
x	U Or F	U indicates field is UPDATABLE
		F indicated field is FIXED
aa	01-20	determines the data length of the key field
xb	x00-x20	determines data length of field #2, use x00 if field is not present
xc	x00-x20	determines data length of field #3, use x00 if field is not present
dd	x00-x20	determines data length of field #4, use x00 if field is not present
comment	1-15 alphanumeric	name of file or comment used for internal use; this field is not used by the TriCoder.

Lets say we wanted to create a file that had a 5 digit item number (the key field), a Fixed 16 character description, an Updatable 6 digit price, an Updatable 4 digit quantity count and a file reference of INVENTORY. The header for such a file would look like this:

05F16U06U04INVENTORY

The entire file might look something like this:

```

05F16U06U04INVENTORY
11111TWINKIES - 4OZ $1.39 21
22222CANDLES - 3FEET $10.95 180
33333SALMON, SOCKEY12 $5.95 48
Ctrl Z (ASCII 26)
    
```

There are several points to remember when creating a table maintenance file:

- If you want to use variable length data in your key field, you must pad the data with TRAILING spaces until you reach the length set in your header. In the example above, your key field length is 5, so if you want to be able to enter the number 123, the data must actually be 123xx where xx are “space” characters.
- There are no physical delimiters between fields; the TriCoder is using the field length from the header to determine each field length.
- If the length of your data for a field is not the same as the data length you have specified in the header, you must pad the data out to the specified data length by adding spaces to the end of the data. Field #1 must always be the same length, regardless of the length of the actual data. The same is true for all fields. The example above shows this. When the operator edits data in the table, they do not have to include the spaces.
- Each line in the file must be terminated with a CR/LF. CR is ASCII 13 and LF is ASCII 10. The file itself should be terminated with a Ctrl Z (ASCII 26)
- It is critical that the header and file use the correct syntax and format. The TriCoder checks the file before it downloads it and will display the appropriate error message if it finds a problem:

Error Message	Condition/Solution
INVALID HEADER HIT ANY KEY_	There is a problem with the format or syntax of the header. Check the header for syntax errors.
TABLE FORMAT ERR HIT ANY KEY_	There is a problem with the format of the actual table data. Check the table data for format and field lengths.
TABLE TOO BIG HIT ANY KEY_	The table size is larger than the amount of memory you have allotted in the TriCoder or, there is a format error in one of the records. Increase the memory in the PARTITIONS setup parameter and if using TBLSEND.BAS to download the table, check the record just after the one displaying on the screen.

Output data file format for Table Maintenance

When a record is accessed from the table during data collection, that entire record is written to one of the TriCoders data files. When it is time to upload the TriCoder, it is the data file, not the actual table that is uploaded. When a data file created during Table Maintenance is uploaded, it is uploaded in a “comma delimited” format. This format is used to make the data easier to process for most applications. The following example shows what the record looks like in the table:

11111TWINKIES - 4OZ \$1.39 21

and what it will look like when it is uploaded to the computer:

“111111”, “TWINKIES - 4OZ ”, “\$1.39 ”, “ 21”

Downloading a table to the TriCoder

Tables are downloaded to the TriCoder through a Windows supported high speed USB or a serial port. Before you can download a table, you must have:

- **partitioned the memory using the PARTITIONS setup parameter**
- **setup the TriCoder as either serial or high speed USB (Windows)**

A program to download a table to a TriCoder is supplied for Windows as part of the TriCoder Utilities CD.

See *Chapter 7; Using the TriCoder Utilities* for instructions and details on downloading a table using the TriCoder Utilities.

Pick Lists

Pick Lists are tables that provide instruction to the user. Typically they are used in an order-picking type application where the pick list instructs the user as to what product to pick, where to find it and how many to pick. The logic used for a pick list can be used for other applications such as meter reading (address of meter, where it is located, the meter reading).

A *Pick List* is really just a table, similar to that used for data validation and data maintenance. To access a *Pick List*, use

P1P-accesses table 1

P2P-accesses table 2

P3P-accesses table 3

in the DATA ID to reference the correct table. When the operator uses the data collection program, each item in the specified table (pick list) is sequentially displayed until all items are picked by the operator.

A *Pick List* is downloaded to the TriCoder much the same way a regular table is downloaded. Just as with a table, you can download the pick list using the Windows TriCoder Utilities program or the DOS utilities. Upon uploading, if the TriCoder sends and **SO** (ASCII 14) as the *EOF String*, the TriCoder can prompt the host to download a new pick list without user intervention.

Up to 4 fields are allowed in each pick list record. Each field can be from 1 to 19 characters long and can have one of the following properties:

- **Fixed Displayable Only** - nothing to enter or scan
- **Verifiable** - used to verify that the user is at the correct location, item, etc., or to force no partial picks.
- **Updatable** - items can be changed

If you do not want to use all four fields, put **00** in the field length.

Pick List Format

Just as with regular tables, the first line of the pick list is the header record which defines the pick lists format. The following header example is a pick list that states:

1. the location of the item
2. the item description,
3. the item number
4. the quantity to pick
5. the Pick List or Order Number

18F19V06U03PICK LIST 1

Aisle 23,Bin 14M Aspirin 12oz. PinkL111111014

Aisle 24,Bin 15H No-Doz Large Pills 222222012

Aisle 12,Bin 01L Vitamin C, Large Hi 333333005

Aisle 01,Bin 12L Soy Sauce Large Br444444001

The **18** in the header record is the length of the first field in the pick list. Since the first field in a table/pick list is always fixed, you don't have to specify F for fixed. In the example above, the first field is the location:

Aisle 23,Bin 14M

Aisle 24,Bin 15H

Aisle 12,Bin 01L

Aisle 01,Bin 12L

The next field is **F19** - a fixed field, 19 characters long. This field is for display only and requires no action by the operator. In the example above, it is the description of each item:

Aspirin 12oz. PinkL

No-Doz Large Pills

Vitamin C, Large Hi

Soy Sauce Large Br

The third field is **V06** - indicating a Verifiable field with a length of 6 characters. Verifiable fields must be entered by the operator *exactly* as they appear on the TriCoder. When the pick list record is displayed by the TriCoder, the cursor stops on the first Verifiable or Updatable field and waits for the operator to enter data. In this example, the third field is the Item Number - the operator is forced to enter the item number of the item he is picking. It is typically scanned off of the item or bin:

111111

222222

333333

444444

The fourth field is **U03** - describing a field that is three characters long and

is Updatable. Updatable fields can be changed by keying or scanning. The cursor of the TriCoder will stop at the Updatable field and wait for operator input. The fourth field in this example is the quantity to pick:

014
012
005
001

The last field in the header, **Pick List 1**, is the **Order Number** that may be uploaded as the first record in the data file. This allows the computer to tell which order was picked. This field can be from 1 to 20 characters long. If you do not specify that you want the Order Number written to the data file, it is ignored.

If you want the **Order Number** to be written to the data file for uploading, you must specify

O10 *-order number for table 1*
O20 *-order number for table 2*
O30 *-order number for table 3*

in the DATA ID field of the programming statement when programming the TriCoder.

Programming the TriCoder for Pick Lists

There are some special considerations to think about when programming the TriCoder to use a *Pick List*:

- When using **O10**, **O20** or **O30** to upload the order number for a pick list, remember that the program statement should be executed only once, and should be at the beginning of the program. This program statement will not cause the TriCoder to pause for operator input so the Prompt Text is not that important. An *Upload Prefix* and *Suffix* can be specified for the statement.
- When the TriCoder executes a statement with **P1P**, **P2P** or **P3P** in the *Data ID*, the TriCoder displays the next incomplete item in the Pick List. When all items in the Pick List have been picked, and the TriCoder executes the **PxP** statement again, the TriCoder will display:

PICK LIST COMPLETED
HIT ANY KEY_

Press a key and the TriCoder displays:

DATA UPLOAD?
KEY [YES/NO]?_

If you want to upload a partially picked Pick List, simply bypass the warning message the TriCoder will display indicating that the Pick List is

incomplete.

Pick List Examples

The following example illustrates a program that would both output the order number and output the items on the pick list:

Stmt #	Entry Type	Data ID	Yes/Next	No/End	Description
1	D	O10	02	00	<i>outputs order number</i>
2	D	P1P	02	02	<i>outputs items picked</i>

In the example above, if you press the END key while executing statement #2 you can bypass a record in the Pick List and go to the next one.

A program that uses a Pick List can still utilize other statement types. In the following example, not only does the program access the Pick List but also records the serial number:

Stmt #	Entry Type	Prompt Text	Data ID	Yes/Next	No/End	Description
1	D	Picker No.?		02	99	<i>outputs picker no.</i>
2	D		O10	03	00	<i>outputs order number</i>
3	D		P1P	04	03	<i>outputs items picked</i>
4	D	Scan Serial #		04	03	<i>loops on serial #</i>

In the example above, the program requires the operator to enter the number picked, then scan or enter the serial numbers of each item picked. When all serial numbers have been scanned or entered, the user presses the END key to get to the next record in the pick list. You can skip items in the Pick List by pressing the END key while executing statement #3. To prevent the user from skipping items, enter 00 in the No/END field of statement #3.

Computer/TriCoder Interface for Pick Lists

To the TriCoder, Pick Lists are simply tables to download. To really utilize Pick Lists, the system should be as automated for the operator as possible. Here's how we envision Pick Lists being used:

- Take the orders and create a pick list to downloaded to a system server, making the file available from remote locations.
- At the remote warehouse location, the user plugs the TriCoder onto a workstation (PC or terminal) and selects **Table Download** from the TriCoder *Mode Menu*.
- The user then starts a table-downloading program on the workstation, downloading a pick list that has been sorted by location to minimize the time needed to fill the pick list.
- When the download is complete, the user starts the Data Collection program that references the pick list on the TriCoder.

- When the Pick List is complete, the TriCoder displays

**PICK LIST COMPLETED
HIT ANY KEY_**

pressing any key brings this prompt:

**DATA UPLOAD?
KEY [YES/NO]?_**

At this point, the user takes the TriCoder back to the workstation, attaches the TriCoder, starts the uploading program on the computer, and then presses YES to start the Data Upload on the TriCoder. If the user has specified an EOF STRING of **SO** (ASCII 14), after finishing its upload, the TriCoder sends the EOF STRING of **SO**, indicating to the host computer that the TriCoder wants to receive a new Pick List.

- After receiving the **SO** (ASCII 14) from the TriCoder, the host computer can do one of 6 things by transmitting a particular ASCII character to the TriCoder:

ASCII Character	Action
ASCII 01	<i>Begins downloading pick list into Table #1, erases current data file.</i>
ASCII 02	<i>Begins downloading pick list into Table #2, erases current data file.</i>
ASCII 03	<i>Begins downloading pick list into Table #3, erases current data file.</i>
ASCII 04 (EOT)	<i>Does not download a new file. Erases current data file.</i>
ASCII 06 (ACK)	<i>Does not download a new file. Saves current data file.</i>
ASCII 21 (NAK)	<i>retransmits EOF String</i>

After completing the upload, the TriCoder waits for 10 seconds to receive one of the above characters from the host. If it receives nothing, the TriCoder displays:

**DELETE DATA FILE
KEY [Y/N]?_**

If the TriCoder receives ASCII 01, 02 or 03, the TriCoder displays:

**DOWNLOADING TABLE
PLEASE WAIT_**

- In order to make this operation truly automated, you need to have a way to for the TriCoder to query the host periodically as to whether or not the host has a pick list to download to the TriCoder. To do this, when the user sees the prompt:

**TABLE DOWNLOAD?
KEY [YES/NO]?_**

Instead of pressing YES or NO, the user presses the **F2** key, causing the TriCoder to transmit its EOF STRING to the host computer.

- If the user has set the EOF STRING as **SO** (ASCII 14), this transmission tells the host that the TriCoder is ready and waiting to receive a Pick List. The TriCoder will wait 10 seconds for a response from the host. If the host is not ready and does not respond, the TriCoder displays:

**HOST NOT RESPONDING
HIT ANY KEY_**

- If the host is ready for the TriCoder, it sends back the ASCII character that corresponds to the action it wants to take (ASCII 01, 02, 03, 04, 06 or 21).
- While a Pick List is downloading, the TriCoder displays

**TABLE DOWNLOADING
PLEASE WAIT_**

If there is no Pick List to download (ASCII 04 or 06), the TriCoder displays:

**NO TABLE AVAILABLE
HIT ANY KEY_**

- It is highly recommended that operators be cautioned against uploading an incomplete Pick List. If the operator attempts to upload an incomplete Pick List, the TriCoder displays:

**PICK LIST INCOMPLETE
ARE YOU SURE?
KEY[Y/N]?_**

If they press **Y**, the upload results may be unpredictable. If you key **N**, the TriCoder goes to the DATA COLLECTION prompt, allowing the operator to complete the Pick List.

- If the operator wants to see what **Order Number** they are working on, they can:

*Press **SHIFT***

*Press **F2***

*Press **O** (the letter O, not zero)*

to display the following information:

nnnnnnnnnn	-the order number or name
xxx	-number of items picked
yyy	-number of items remaining

- You can review data while using a *Pick List* but blank spaces are replaced with an asterisk (*) character while in data review mode in order to differentiate between items picked (data file) and items not picked (Pick List).

Uploaded Data File Format

In Pick Lists, the accessed records are written to one of the TriCoders three possible data files. When the TriCoder is finished with the Pick List and is uploaded, it is uploading the *data file* to the host computer, *not* the actual Pick List. When a Pick List data file is uploaded, it writes a “comma delimited” format, making it easy to process on the host computer. Table data is also uploaded with trailing spaces if they exist in the original table. For example, the following Pick List record looks like this when part of the Pick List:

Aisle 23,Bin 14M Aspirin 12oz. PinkL 111111014

but looks like this when it uploads to the host computer:

“Aisle 23,Bin 14M “,”Aspirin 12oz. PinkL ”,”111111”,”014”

Voice Messages

The TriCoder's exclusive use of voice prompts allows you to overcome problems such as literacy, language and lighting. With proper planning, voice prompting can make data collection significantly faster and simpler.

Why Use Voice Messages and Prompts?

- Voice messages can be in *any* language.
- The operator does not have to be able to read to perform some jobs.
- Audible instructions can be heard in poor lighting where it is difficult to read a LCD screen.
- MOST IMPORTANTLY, the data collection process is faster because the operator does not have to continually look at the screen for instructions. This is especially useful when you do not want or need to enter data from the keypad. Scanning bar coded numbers from a Quantity BARPAD can make keying unnecessary.

Voice messages and prompts are a good way to keep the operator's attention focused on the job at hand. Audible error messages and warnings also help to limit mistakes and downtime.

Tips for Using Voice Prompts

Voice prompts can make data collection easier and faster, but only if used wisely. Here are some tips on making your voice prompts user-friendly:

- **Short messages are preferable for prompts;** most English prompts can be stated in ½ second. Instead of saying, "Enter the Item Number" say "Item". During data collection, the typical TriCoder operator does not want to hear long messages thousands of times. Error messages are typically longer because they are the exception and need to provide more precise instruction to the user.
- **Record your voice prompts calmly.** A frantic sounding voice can become irritating, especially when heard repeatedly.
- **Speak clearly.** Correct pronunciation will make the voice prompts easier to follow for all users. Use common words that all users will understand.
- **Vary the tone of your voice for different prompts.** For example, the pre-programmed prompts for Program #1; "*Item*" and "*Quantity*", are recorded in a female voice while all error messages are recorded in a male voice. Using a different tone of voice or even a different voice for

consecutive prompts or error messages will make it easier for the user to distinguish between them.

- **Consider using the “Data Security” option** to prevent the operator from accidentally exiting “Data Collection” by pressing the **F1** key instead of the intended **F2** key (the **F2** key replays the current voice message).
- **Be sure to record error messages for all possible problems** that the user may encounter during a data collection session. Once the operator becomes accustomed to listening to the voice prompts, it may become easy to overlook a “display only” error message.
- **Use a barpad table and Accumulate Mode to enter numeric data.** This allows the operator to scan everything and avoid using the keypad. Data collection becomes a simple “listen and scan” operation. This has the potential to greatly speed up the entire data collection process.

TriCoder's Voice Message Mapping

The TriCoder is shipped with 75 seconds of total recording time. The time allotted for each message is partitioned as follows:

30 – ½ second messages (message numbers 01-30)

30 - 1 second messages (message numbers 31-60)

15 - 2 second messages (message numbers 61-75)

Messages are sequentially numbered beginning with the ½ second messages, followed by the 1 second messages, and finally the 2 second messages. You can change the partitions to allow for more or less of a particular length message. For example, if you decide you do not want *any* ½ second messages and you want 15 *more* 1 second messages, your allocation would look like this:

00 – ½ second messages

45 - 1 second messages (message numbers 01-45)

15 - 2 second messages (message numbers 46-60)

Voice message partitions are set in the TriCoder either from the bar coded *Setup Menu* or by the keypad setup. From the Setup Menu, scan the bar code for “Voice Messages”, and then scan six digits. The first 2 digits correspond to the ½ second messages, the second 2 digits for the 1 second messages and the last 2 digits for the 2 second messages. Remember that the total amount of time must add up to 75 seconds.

Accessing Voice Message Operations

Voice Operations are accessed two ways. The first way is the usual access from the *Programming Mode* menu. The second way is “hotkey” access when you are creating a program or assigning error messages

From the Programming Mode menu...

Enter the Programming Mode by answering “NO” to all Operation Mode prompts until you get to:

**PROGRAMMING MODE
KEY [YES/NO]?**

Press “YES”. The TriCoder then asks for a password. Key in the password **WDTRI** (this is the same password discussed previously in this manual). Entering the correct password produces the following prompt:

**Create Programs->1- 3
Voice -> 4 Setup -> 5
Automation -----> 7
Data File Names--> 6**

Press the “4” key to select *Voice Operations*. The next prompt displayed is:

**VOICE OPERATIONS KEY
Record/Playback->1
Assign Errors----->2**

Pressing the “1” key takes you into the voice recording and playback function. Pressing the “2” key allows you to assign voice message numbers to error conditions.

Using the "hotkey"...

The other way to get into the voice recording and playback function is by using a “hotkey” sequence. If you are in “**PROGRAMMING MODE**” and have chosen “*Create Programs*”, press the **SHIFT** key, then the **F1** key, and then the **F2** key. This key combination will take you to the “*Record/Playback*” function. This same “hotkey” sequence of **SHIFT F1 F2** will work if you are in the “*Assign Errors*” function and want to record or playback a message. Pressing **F1** while in the “*Record/Playback*” function will *take you back* to the program or error message you were working on.

Recording and Playback of Voice Messages

If you respond with a “1” at the *VOICE OPERATIONS* prompt or use the **SHIFT F1 F2** hotkey, you will see the following Record/Playback prompt:

**RECORD/PLAYBACK?
KEY [R/P]?**

First, we will playback a message that has already been recorded. Use message #01 for this example. Press the **P** key (for Playback) to get to the next prompt:

**KEY [R/P]?
MESSAGE #: _**

At this prompt, enter a two digit number for the message number you want to listen to. Enter “01” and then press the **ENTER/YES** key. You will probably hear the “ITEM” prompt recorded at the factory unless you have edited or reset the default messages. If you heard nothing, a new message can be safely recorded in the area assigned to message # 01. After you have heard the message (or static if no message has been recorded), the TriCoder displays the RECORD/PLAYBACK prompt again:

**RECORD/PLAYBACK?
KEY [R/P]?**

To record a message, get out the microphone (no, it’s not an earphone) shipped with the TriCoder and plug it into the AUX jack located next to the POWER jack on the bottom of the TriCoder. Answer the prompt by pressing the **R** key to record a message. The display now reads:

**KEY [R/P]?
MESSAGE #: _**

Enter the message number you are going to record. For this example, enter message #03 (by default this is a blank message) by pressing 03, then the ENTER/YES key. The TriCoder screen now shows:

**HIT ANY KEY TO
START RECORDING**

To record a message, press any key and hold it down. When you release the key, immediately start speaking into the microphone. To practice, let’s record something we can use in the default program #1.

Get ready to say ITEM (in English or your language) into the microphone of the TriCoder. When ready, press the ENTER/YES key and the *instant* you release it, speak ITEM into the microphone. Remember to speak clearly – you have plenty of time to say ITEM in ½ second. When the message time is over, you will hear two beeps. The display is back to the RECORD/PLAYBACK prompt:

**RECORD/PLAYBACK?
KEY [R/P]?**

Now you're ready to listen to your first recording. Press the **P** key and key in **03** for the message number. Do not be discouraged if you didn't record the entire message. Our first attempt produced "EM" in a very frantic tone of voice. Practice speaking clearly and calmly (think of the poor guy who has to hear it 10,000 times next week) as soon as the key is released. You will get the hang of it with just a little practice.

That is the way all messages – prompts *and* errors - are recorded. If you are not sure which message numbers are blank, you can listen to messages until you find a blank for recording.

Voice Message Options

To play back the voice messages you have recorded, they must be designated for use when creating a data collection program in the TriCoder. Once the programming is complete, the operator has the following options available from the TriCoder keypad:

Operation	Keypad Sequence
To turn OFF all voice messages	Press the SHIFT key Press the F1 key Press the S key
To turn ON all voice messages	Press the SHIFT key Press the F1 key Press the V key
To turn OFF prompt Messages but not error messages	Press the SHIFT key Press the F1 key Press the P key
To replay the current voice message	Press the F2 key

Default Voice Messages

The TriCoder comes from the factory with some voice prompts and error messages pre-recorded. You can change any of these messages but keep in mind that the error conditions that the voice error messages are linked to are fixed. For example, the “**Change Batteries**” message is located at message #31. Whenever the TriCoder detects very low batteries, it will play message #31, regardless of what is recorded there. You could record “Happy Birthday” and the TriCoder would broadcast it any time it detected the low battery condition. To avoid confusion, try to keep the error messages somewhat related to the error condition they represent. Here are the default messages and the message numbers they are recorded under:

Message Recorded	Message #
Prompts	
ITEM	#01
QUANTITY	#02
Error messages	
CHANGE BATTERIES	#31
DATA FILE EXISTS	#32
DATA TOO LONG	#33
DATA TOO SHORT	#34
DATA TYPE ERROR	#35
DUPLICATE ACCESS	#36
IDENTIFIER ERROR	#37
ITEM NOT FOUND	#38
OUT OF MEMORY	#39
WRONG INPUT DEVICE	#40
WARNING 2K LEFT	#61

Cloning Voice Messages from TriCoder to TriCoder

If you have several TriCoders, you can record all of your voice messages in one TriCoder and simply “clone” them to your other TriCoders. Cloning can also copy programs, tables, and the TriCoder setup. Cloning does have certain conditions that need to be met before you start:

- The TriCoders must be set to the same *Computer Interface* and if set for Serial instead of Keyboard, all TriCoders must be set to the same *baud rate*, *parity*, *stop bits* and *data bits*. TriCoders with USB *Computer Interface* cannot clone from one TriCoder to another, but you can change the *Computer Interface* on both units to serial or keyboard wedge and then clone, (remember to set it back to the appropriate USB *Computer Interface*).

- Upload any data in the TriCoders *before* you start. The TriCoder will *not* allow you to receive a program if there is a data file present.
- Plug in the power supply. This eliminates the possibility of your batteries running out during the cloning process.
- You need 2 cables to clone voice messages, the **Data Cloning Cable #F38** and the **Voice Cloning Cable #T15**. The Data Cloning Cable plugs into the “Computer” port on each TriCoder. One jack on the Voice Cloning Cable has two black rings on it – this end must plug in to the RECEIVING TriCoder.

If you want to clone voice messages *only*, follow these steps:

1. Plug in the Data Cloning Cable **AND** the Voice Cloning Cable.
2. On the TriCoder you are cloning *to* (the one *without* your custom voice prompts), answer **NO** to the MODE MENU prompts until you see:

**PROGRAM RECEIVE
KEY [YES/NO]?_**

3. Answer **YES** by pressing the **ENTER/YES** key. The TriCoder will display a message saying:

**RECEIVE PROGRAM KEY

Programs [1-3]?--->1-3
Clone TriCoder?----->0**

4. To clone only the voice messages, press the **9** key. The receiving TriCoder **MUST** be started first. The TriCoder will display the following message:

**RECEIVING PROGRAM
PLEASE WAIT**

5. On the master TriCoder (the one you have recorded your prompts in), answer **NO** to the prompts on the MODE MENU until you see:

**PROGRAM TRANSMIT
KEY [YES/NO]?_**

Answer **YES** by pressing the **ENTER/YES** key. The TriCoder will display a message saying:

**PROGRAM TRANSMIT KEY

Programs [1-3]?-- >1 - 3
Clone Tricoder?----->0**

6. Transmit only the voice messages by pressing the **9** key. The TriCoder will display:

**SENDING PROGRAM
PLEASE WAIT_**

The voice messages will play as they are transmitted. If you do not hear the correct messages or you hear no messages at all, **you may have transmitted from the wrong TriCoder.**

7. When the voice messages have been successfully transmitted and received, the TriCoders will display these messages:

**END OF PGM. XMIT
HIT ANY KEY**

and

**END OF PGM. RECV
HIT ANY KEY**

Pressing any key takes you back to the MODE MENU. If an error occurs (or you press any of the keys on the TriCoder) during the transfer, the TriCoder will display the following error message:

**DATA XMIT ERROR
CYCLE POWER**

If you get the DATA XMIT ERROR message, you have to restart the whole cloning procedure.

Troubleshooting

Display and Error Messages

The following is an alphabetical list of all messages the TriCoder can display. Some describe an error state; others are simply instruction.

Message	Meaning	Operator Action
ACCESS DENIED HIT ANY KEY	You have failed twice to enter the correct password	Press any key to go to Mode Menu
APPEND DATA FILE KEY [YES/NO]?_	Data file selected already has data in it. Do you want to append data to it?	Press YES or NO.
ARE YOU SURE? KEY [YES/NO]?_	You have asked to delete a file. Are you sure? Just checking.	YES deletes the file NO does not delete the file
BEGIN OF FILE HIT ANY KEY_	You are at the beginning of a data file or program file.	PRESS ANY KEY to view the beginning of the file.
CHANGE BATTERIES UNIT SHUT DOWN	The batteries are too low to continue. The TriCoder automatically shuts down.	Change the batteries and resume operation.
CHECK LITHIUM BATTERY Possible Data Loss Press Any Key	A minor memory problem has been detected - probably due to a low lithium battery.	Check STATUS of Lithium battery for anything less than 10%. Change if low.
CHANGE LITHIUM BATTERY Memory has been lost Press any Key	A major memory problem has been detected - probably due to a low lithium cell - Unit has been reset to factory defaults.	Check STATUS of Lithium battery for anything less than 10%. Change if low.
Choose USB Interface 1-PC USB High Speed 2-PC USB Keyboard 3-Mac USB Keyboard	USB plugged in; <i>Computer Interface</i> not set to any USB option.	Use 3 if Mac. Use 2 if you want to upload data through PC Keyboard. Use 3 for PC high-speed upload.
DATA COLLECTION? KEY [YES/NO]?_	Do you want to use Data Collection mode?	Press YES or NO
Data File Exist Delete Data File? KEY [YES/NO]?_	Firmware download had been requested, and a data file exists.	YES generates "ARE YOU SURE?" Deletion occurs with YES/YES. NO exits to <i>Mode Menu</i> .
DATA FILE EXISTS PRESS ANY KEY_	You are trying to edit a program or enter Data Collection with data already in memory.	Upload data file and delete it if you need to edit program other than prefix and suffix, or if you want to start new data file.
DATA FILE EXISTS CYCLE POWER_	You cannot enter Buffered Terminal mode with a data file in memory.	Upload the data file and delete it if you need to enter Buffered Terminal mode.
DATA NOT FOUND HIT ANY KEY_	You either hit BEGIN to review data and no data was found or you attempted to upload and no data was found.	HIT ANY KEY to resume
Data Review Request Press <BEGIN> key to Start or <F1> for Data Collection	You pressed the UP ARROW key.	Press the BEGIN key to enter Data Review Mode or press F1 to resume data collection.
DATA TOO LONG PRESS ANY KEY_	Too many characters were entered.	Enter fewer characters or increase your Maximum Character Length.
DATA TOO SHORT HIT ANY KEY_	Too few characters were entered.	Enter more characters or decrease your Minimum Character Length.

DATA TYPE ERROR HIT ANY KEY_	Alphabetic character entered when numeric is expected or vice versa.	Re-enter data or change Data Type in program.
DATA UPLOAD? KEY [YES/NO]?	Do you want to upload data?	Press YES or NO.
DATA XMIT ERROR CYCLE POWER	Data transmission error on upload or other data transmission.	Turn TriCoder off then restart
DELETE PROGRAM? KEY [YES/NO]?	Upon entering Programming Mode, you selected a program and answered NO to EDIT PGM? Do you want to delete?	Press YES to delete program. Press NO to go back to menu.
Downloading Firmware Please Wait	Firmware Download has started.	Wait 1.5 minutes for serial. Wait 0.1 minutes for USB.
DUPLICATE ACCESS HIT ANY KEY_	In a table where you have specified NO DUPLICATE ACCESS you have accessed a record twice.	HIT ANY KEY. Enter a different piece of data.
EDIT PROGRAM? KEY [YES/NO]?	In Programming Mode, do you want to edit a program? You can edit program #1, #2 or #3.	Press YES or NO.
END OF FILE HIT ANY KEY_	You are at the end of a data file or a program file.	Press any key to see last record.
END OF PGM RECV. HIT ANY KEY_	You have finished receiving a program from another TriCoder or a host computer.	Press any key to go to the Mode Menu.
END OF PGM XMIT HIT ANY KEY_	You have successfully transmitted a program to a host computer or another TriCoder.	Press any key to go to the Mode Menu.
END OF TRANSMIT DEL FILE [Y/N]?	A data file has been successfully uploaded. Do you want to delete the file?	Press YES to delete the file. Press NO to keep the file.
ENTRY TYPE ERROR HIT ANY KEY_	In Programming Mode, you have entered a character other than DQTYSX at the ENTRY TYPE prompt.	HIT ANY KEY and re-enter character.
EOT, FILE ERASED HIT ANY KEY_	During modem data transfer, <i>End of Transmission</i> occurred and data file was erased.	HIT ANY KEY to go to Mode Menu
EOT, FILE SAVED HIT ANY KEY_	During modem data transfer, <i>End of Transmission</i> occurred and data file was saved.	HIT ANY KEY to go to Mode Menu
FATAL ENTRY TYPE CYCLE POWER_	An invalid <i>Entry Type</i> has been detected in your program. Cycle power, see what happens.	Turn TriCoder OFF/On. Call for support if bad.
FATAL EXEC CALL 831-458-9938 NOW_	Something is definitely wrong. Cycle power, see what happens.	Turn TriCoder OFF/ON. Call for support if bad.
FATAL STMT #. CYCLE POWER_	An invalid <i>Statement Number</i> was detected. Cycle Power and see what happens.	Turn TriCoder OFF/ON. Call for support if bad.
FILE NOT DEFINED HIT ANY KEY_	You have selected a data file # that has not been defined in the PARTITIONS setup parameter.	HIT ANY KEY. Go to Setup and set PARTIONS.
FILE USED BY Pn HIT ANY KEY_	You have selected a data file # with data in it, collected by another program. n=1-3. Select another data file #.	HIT ANY KEY. Select another data file #.
Firmware Download Via Serial Port?	Appears at Fail-Safe download or normal download with serial <i>Computer Interface</i> specified.	Yes proceeds to download. No exits to Mode Menu or asks about USB download.
Firmware Download Via USB Port?	Firmware download has been requested with wedge <i>Computer Interface</i> or user has serial <i>Computer Interface</i> and has said NO to "serial firmware download?"	Yes proceeds to firmware download. No exits to Mode Menu.
HOST NOT RESPONDING HIT ANY KEY_	The TriCoder requested a table but the host is not responding.	Check host computer.
IDENTIFIER ERROR HIT ANY KEY_	You have entered data that doesn't match the DATA ID specified.	Re-enter your data or change the DATA ID.

IN DIAG MODE HIT ANY KEY_	TriCoder was shipped without being re-initialized. See Troubleshooting section.	Re-initialize TriCoder
INIT FAILED CYCLE POWER_	Initialization failed.	Power OFF/ON.
INCOMPLETE PGM PRESS ANY KEY_	Unit was shut off or went to sleep during programming.	Check program for errors.
INVALID DATA LEN HIT ANY KEY_	You have tried to enter 00 for Max Data Length. Entry must be at least 01.	HIT ANY KEY. Re-enter data length.
INVALID DEVICE HIT ANY KEY_	You have specified a character other than K W or ENTER for the <i>INPUT DEVICE</i> .	HIT ANY KEY. Enter a valid character.
INVALID FILE # HIT ANY KEY_	You have entered a character other than 0,1,2,or 3 at the <i>Data File No.</i> Prompt.	HIT ANY KEY. Enter a valid number.
INVALID HEADER HIT ANY KEY_	The <i>Header Record</i> in a table has an invalid format.	Check header record, fix and retry.
INVALID TABLE # HIT ANY KEY_	You have entered a character other than 1,2, or 3 for the <i>Table Number</i> prompt	HIT ANY KEY. Enter a valid number.
INVALID PASSWORD HIT ANY KEY_	You have not entered the correct password.	HIT ANY KEY. Enter the correct password - WDTRI.
INVALID PGM # HIT ANY KEY_	You have entered something other than 0,1,2, or 3 in Programming Mode or 1,2, or 3 for Data Collection Mode	HIT ANY KEY. Enter the correct number.
INVALID STMT. # HIT ANY KEY_	Your program has an undefined statement # in it.	HIT ANY KEY to go to error.
ITEM NOT FOUND <i>n</i> HIT ANY KEY_	An item entered in the TriCoder has not been found in table <i>n</i> .	HIT ANY KEY. Enter another item number or check table data.
LITHIUM BATTERY LOW Press any key_	The backup lithium coin battery is low and needs replacing	Press any key. Change lithium battery.
Memory has been lost Press any key_	BIG memory problems. This is not a low lithium battery problem.	Call for repair.
NMI ERROR Cycle Power_	This is not a problem unless it repeats itself.	Cycle Power. If error repeats itself, call for support.
NONPORTABLE MODE _	You are operating in Non Portable mode - the TriCoder transmits data immediately to the host computer without saving in memory.	Continue to enter data. Press F1 to get to Mode Menu.
NOT ALLOW TO RCV HIT ANY KEY_	You are trying to receive a program on the TriCoder but there is data still present in the TriCoder.	HIT ANY KEY. You must upload and delete any data in TriCoder before you can receive a program.
OUT OF MEMORY HIT ANY KEY_	You have filled the memory and must upload before you can collect any more data.	HIT ANY KEY. Upload data and continue with data collection.
PLEASE ENTER DIAG COMMAND_	TriCoder is in diagnostic mode, waiting for a command.	Enter the correct diagnostic code or press F1 to exit.
Possible Data Loss Press Any Key_	Slight memory problem. Not a problem with the lithium battery. Watch TriCoder closely.	Call for support if problem continues.
PROGRAMMING MODE? KEY [YES/NO]?_	Do you want to write, edit , review or delete a program? Also allows access to voice operations.	Press YES to enter PROGRAMMING MODE. Press NO to return to Mode Menu.
PROGRAMMING MODE PASSWORD?_	You are trying to enter Programming Mode and need to enter the password. The password prevents programming accidents.	Key in the password - WDTRI

PROGRAM FUNCTION KEY Create Programs---->1-3 Voice Operations---->4 Change Setup----->5	You have correctly entered the password and are in Programming Mode. Select the function you want by pressing the correct key.	Key the number that corresponds to what you want to do.
PROGRAM NOT SET HIT ANY KEY_	You have requested to collect data in a program that has not been defined, or you are trying to transmit a program that has not been defined.	HIT ANY KEY. Enter the correct program number or go to Programming Mode to create a new program.
PROGRAM NO.? KEY [0-3]?_	You are in Data Collection mode and need to select a program to use.	Key 0, 1, 2 or 3.
PROGRAM RECEIVE KEY [Y/N]?_	Do you want to receive a program from another TriCoder or host computer?	Press YES to go to Receiving Menu. Press NO to go to the Mode Menu.
PROGRAM TRANSMIT KEY [Y/N]?_	Do you want to transmit a program to another TriCoder or a host computer?	Press YES to go to Transmit Menu. Press NO to go to Mode Menu.
RECEIVE PROGRAM KEY Programs[1-3]?-->1-3 Clone TriCoder-->0	You have answered YES to program receive mode. Choose the program to receive into or choose to clone.	Press the Program # or 0 to Clone.
RECEIVING PROG. PLEASE WAIT>	A program is being received by the TriCoder.	Wait for next message.
RECEIVING INTERRUPTED Key Pressed In Error Restart Transmission Hit any Key_	A key was pressed on the TriCoder after program transfer had started, aborting the transmission. TriCoder contains invalid program information.	Hit any Key. Restart transmission. Do not press any keys on TriCoder once transmission has begun.
RTC ERROR Call 831-458-9938	This error should not occur and indicates a firmware problem. Try to record what led to this error.	Cycle Power to clear, Call for support.
SEARCH PATTERN _	The SEARCH key was pressed.	Enter data to search for or press ENTER key to exit.
SENDING PROGRAM PLEASE WAIT_	You are transmitting a program from the TriCoder. Wait for completion.	Wait for next message.
SRAM SIZE ERROR	You are trying to clone from a higher memory capacity TriCoder (i.e. 512K) to a lower memory capacity TriCoder (i.e. 256K)	You cannot do this. You can clone from lower to higher but not higher to lower. Use a lower capacity TriCoder as your master.
SRAM WRITE ERROR CYCLE POWER_	A serious error was detected. If persistent, call for RMA.	Turn TriCoder OFF/ON. Call for support if error continues to occur.
Start Host Program Then Hit Any Key	TriCoder is ready to receive from the host via USB, (i.e. Table, Program, or Firmware Download)	Start the host computer program, i.e. <i>TriCoder Utilities</i> , then Hit Any key.
Start Host USB Firmware Download Program First and Then Hit Any Key.	Firmware download has been requested. USB enumeration has been completed. Now TriCoder is requesting the user to start PC TriCoder Firmware Downloader.	Start the Windows program, TriCoder Firmware Downloader. Available on TriCoder Utilities CD ROM, or on www.barcodehq.com .
TABLE DOWNLOAD? KEY [YES/NO]?_	A table has been defined in the memory partitions - you can now download a table into the TriCoder.	Press YES to continue with table download. Press NO to return to Mode Menu.
TABLE FORMAT ERR PRESS ANY KEY_	The table header is in an invalid format or EOF Ctrl Z (ASCII 26) is missing.	Check table file for format errors. Try again.
TABLE NOT AVAILABLE HIT ANY KEY_	The host program has told the TriCoder it has no table to download.	Try again later.
TABLE NOT DEFINED HIT ANY KEY_	You are trying to download a table to a table number that is not defined in the Partitions.	Go to Setup and define the table in the Partitions parameter.
TABLE NOT FOUND HIT ANY KEY_	A table referenced in a data collection program does not exist.	Download table or correct program to reference correct table.
TABLE NUMBER KEY [1-3]?_	You have requested to download a table. Now choose which table number you want to download to.	Choose a defined table number to download to.

TABLE DOWNLOAD? KEY [YES/NO]?_	A table is defined and ready for download. Do you want to download?	Press YES to proceed with download process. Press NO to return to Mode Menu.
TABLE TOO BIG PRESS ANY KEY_	Not enough memory was allocated to accept the table you are downloading.	Re-allocate memory or change table size.
TRANSMIT PROGRAM KEY Programs [1-3]----->1-3 Clone TriCoder?----->0	You have answered YES to Transmit Program? prompt. Choose program to transmit or clone entire TriCoder.	Press 1,2, or 3 to transmit that program or Press 0 to clone entire TriCoder.
TRICODER x9nnn HIT ANY KEY_	TriCoder opening screen. Displays firmware version.	HIT ANY KEY.
UPLOADING DATA PLEASE WAIT_	Collected data is being uploaded to host.	Wait for upload to finish.
USB Enumeration Please wait.....	At power on or when a cable is plugged in, TriCoder must enumerate as a USB device. Also happen when changing modes.	Just wait a few seconds. There is nothing to do. Advisory only.
USB not Connected Connect Cable, Then Press a Key Or F1 to Exit	Computer Interface is set to USB. A mode has been selected to transfer data. The USB cable is not plugged in.	Connect USB cable and press a key or F1 to Exit to Mode Menu.
USB not Connected Connect, Hit any Key or F1 – Exit or F2 – Display Only	You have answered YES to Non Portable Mode when the TriCoder is configured for USB interface and NOT connected to the USB port on the computer.	If you want to see the data on the computer, connect to the USB port, then press any key. Press F1 to exit Non Portable Mode or press F2 to simply display the data on the TriCoder screen without transmitting to the computer.
USB not Connected Connect, Hit any Key or F1 – Exit or F2 – Delete File	You have answered YES to Data Upload Mode when the TriCoder is configured for USB Interface and is NOT connected to the USB port on the computer.	If you want to upload via the USB port, connect the TriCoder to the USB port and press any key. Press F1 to exit Data Upload Mode or press F2 to delete the data file from the TriCoder without transmitting it to the computer
VOICE OPERATIONS KEY Record/Playback----->1 Assign Errors----->2	Voice Operations Menu accessed through Programming Mode.	Press 1 to record or playback voice messages. Press 2 to assign error messages.
Waiting on Host Program Or F1 to Exit	USB cable is plugged in. Upload has been started. TriCoder is waiting on <i>Tri Utilities</i> to be started.	Start the <i>TriCoder Utilities</i> .
WAITING ON PMPT_	TriCoder is in Non-Portable Mode, operating with HOST RESPONSE ACCEPTED and is waiting from a prompt from the host.	Wait for prompt from Host or press F1 to bypass.
WARNING 2K LEFT HIT STATUS KEY_	You are running out of memory. Finish what you are doing and upload your data.	Press STATUS key to see exact amount of memory left. Finish what you are doing and go upload your data
WRONG INPUT DEVICE HIT ANY KEY_	The input device you are using is not what is specified in your program.	Use the correct input device or change the specification in your program.
XMISSION INCOMPLETE Key Pressed in Error Restart Transmission Hit any Key_	A key was pressed on a transmitting TriCoder during the program transmission. The transmission has been aborted and the receiving TriCoder had invalid program information.	Hit any Key. Restart program transmission.

General Troubleshooting

If you want to what the settings in the TriCoder are, you can scan **Start Setup**, scan the **Parameter(s)** in which you are interested, and then read the display settings referring to the **TriCoder Setup Menu** for explanation of the letter codes.

You can return the TriCoder to the default shipped settings by scanning:

- **Start Setup**
- **Reset**
- **End Setup**

then reconfigure the TriCoder for your system using the bar coded **TriCoder Setup Menu** or by using the keypad in PROGRAMMING MODE.

Use the following information to troubleshoot any problems you may have:

USB won't upload

- Be sure you are not trying to use USB with Windows 95 or NT. There is not support for USB devices in these operating systems.
- When you first plug your TriCoder into a USB port, Windows will sense new hardware and attempt to install driver(s) for the TriCoder. If you fail to complete the driver(s) installation, the TriCoder will not upload or transfer programs, etc. See **Appendix G, USB Driver Installation Recovery** for how to recover from a failed driver installation.

Serial or Keyboard Wedge won't upload

- If everything else is working well, it has been uploading just fine, and now it has suddenly quit uploading, open the TriCoder up and push the Keyboard/Serial jumper block down fully. After dropping, the jumper block can sometimes become slightly unseated, destroying the upload. See **Appendix F: Jumpers, Switches, and Adjustments**.

Strange Behavior

- Low batteries that are not detected can exhibit some bizarre TriCoder symptoms, including laser beams that shut off, continuous beeping, shutting off when you scan, etc. Try the power supply. Try new batteries. Be sure if you are using NiCad or NiMH rechargeable batteries, you have the *Speaker/Batteries* set to **3** and not **2**.

The TriCoder won't read your bar codes...

- Recheck all hardware connections using **Chapter 5; TriCoder Connection** as a guide. Try reading a bar code you know is valid and readable – try the Test Label in **Chapter 3; Non Portable Mode**.

- If you are reading Code 39 bar codes with leading spaces (see the Barpad in *Appendix H; Code 39, Accumulate Mode*) **and** you have enabled **Accumulate Mode** in the setup, the reader will beep twice upon reading a bar code and will not transmit data to the computer until it reads a bar code *without* a leading space.
- Recheck the TriCoder setup and make sure you have *enabled* the bar code type you are trying to read.
- If you are having problems reading *Interleaved 2 of 5* codes, make sure the data length of the bar code is the same as the **2 of 5 Length** set on the TriCoder.
- Make sure you have not enabled **check digits** for Code 39 or Interleaved 2 of 5 if your bar codes do not have check digits.
- Make sure the scanner is plugged into the SCANNER port and *not* the COMPUTER port.

The TriCoder transmits extra characters at the start or end of bar code data...

- Clear the **preamble** and **postamble**.
- Check to make sure you have not setup the TriCoder to transmit *start/stop characters, check digits, NSC characters or terminator characters* that you don't want transmitted.
- For **UPC-E**, select *Compressed* transmission if you don't want your data padded out with extra zeroes.

Poor read rates...

- Try reading the bar code below as an example of a known “good” bar code. This bar code is a Code 39 bar code and is readable by the TriCoder set to its default settings.



- Make sure *your* bar codes have clearly defined dark bars and clean white spaces. If the bars are so light that they are gray instead of black or are so dark that they “bleed” into the white spaces, the printing of the bar codes is the problem. Whoever is printing the bar codes needs to make the necessary corrections.

- The bar code should also have a “quiet zone” of at least ¼” to the left of the first bar and to the right of the last bar. Make sure to start your scanning to the left of the bar code in the “quiet zone”, moving the scanner quickly and smoothly as if drawing a line through the bar code. If using a laser scanner or CCD scanner, make sure the beam covers the bar code completely.
- Make sure you are using the correct type of scanner for the type of bar code you are reading. If you are using an *infrared* scanner, your bar code must be printed using infrared-quality ink.
- If using a wand scanner, **clean the tip**. You would be *amazed* at how many wands we see where the only problem is that it needs to be cleaned. You would also be amazed at what we have found inside the tips of some of these wands. We cannot stress this enough – CLEAN YOUR WAND. In fact, make it a habit to clean your wand on a regular basis. Use only warm soapy water and a soft cloth; alcohol and other solvents can fog the lens of the tip – do not use them. If using a laser or CCD, clean the window of the scanner with a soft cloth.

Sometimes I get long beeps and sometimes short beeps...

- When the TriCoder is in NON PORTABLE MODE or using the power adapter, it uses a longer beep that can vary in tone – see **Chapter 6; TriCoder Setup** for details on changing the beep tone. If the TriCoder is in a “portable” mode (i.e. Data Collection), it uses a shorter beep to conserve power.

USB troubleshooting (for Windows® Users)

The bulk of USB problems are due to driver(s) installations not being completed and the data transfer(s) won't work. Whether you have selected USB HIGH Speed Data Upload or USB Keyboard Data Upload, you will be required to install a driver for Human Interface Device (HID) keyboard emulation as well as the Worth Data drivers for High Speed data transfers.

If the driver (s) are not completely installed, when you plug the TriCoder into a USB port, two things can happen:

1. Windows will recognize the device but flag it in the Windows Device Manager with a "!" icon (if you cannot find a HID entry for the TriCoder - double click on Human Interface Devices - or an entry for the TriCoder after double clicking on the Universal Serial Bus Controllers, the device has been disabled). Assuming you find the device with the “!”, right click on the device, look at properties, and then click on the Update Driver button – only this time being sure Windows finds the driver files it needs. For the HID driver, you will probably have to insert the original Windows CD and point the installer to the CD ROM drive; for the High Speed driver, you will have to insert the TriCoder Utilities CD and point the installer to the CD ROM drive.

2. The device will not show up in the Windows Device manager and the hardware will not be recognized when it is plugged in, because Windows has marked the device as "Disabled". To fix this, you will have to go into the **Control Panel**, go to "**Add Hardware**" and search for new devices, (with the TriCoder plugged into a USB port). When the TriCoder device is found, you need to uncheck the "Disabled" box and then proceed to click on "Update Driver", this time furnishing the original Windows CD (for HID) or the Worth Data Utilities CD (for the High speed driver).

See *Appendix G, USB Driver Installation Recovery* for additional details.

Once the all the drivers are installed correctly, there should not be any further problems.

Keyboard Wedge mode troubleshooting

The following problems are specific to a TriCoder used in keyboard wedge model T64/LT64 or T54/LT54 units jumpered for keyboard (Appendix F).

You get a "keyboard error" or a "301 keyboard error" when you power up your system...

- Check the cables to make sure all connections are secure and the TriCoder is ON.
- Make sure the keyboard splitter cable is plugged into the keyboard port and **not** the mouse port.
- Remove any keyboard extension cables or adapters. Plug directly into the port using the TriCoders keyboard splitter cable to eliminate the possibility that the extensions or adapters may be causing the problem.

The TriCoder transmits incorrect or no data to the PC's screen...

- If the TriCoder is transmitting punctuation characters (!@#%\$%^&*) when reading numeric bar codes, or transmitting letters in the wrong case (upper vs. lower), you could have a **Num Lock, Caps Lock, Shift or timing delay** problem. Check your keyboard to see if your Num Lock or Caps Lock is on. Try typing numbers (the upper row of keys on your keyboard) and see if you get the correct output on your screen. If you don't, make sure to reboot your PC before changing any delays on the TriCoder. See *Chapter 6; TriCoder Setup* for details on the *Intercharacter Delay* setting.
- If you scan a bar code and correct data shows up on your PC screen but some is missing, you need to change the *Intercharacter Delay*. See *Chapter 6; TriCoder Setup* for details on how to change this setting. Test your keyboard after every change made to the TriCoder

setup. If the keyboard does not work correctly, you will have to reboot before you make another change to the reader.

- Make sure you have configured the TriCoder to use the correct **Computer Interface**.

The TriCoder reads one bar code and stops reading after that...

- Double-check the **Computer Interface** setting. Selecting *Macintosh* as the interface when you are not physically connected to a Mac will hang up the TriCoder.

Serial mode troubleshooting

The following problems pertain mostly to TriCoders setup in serial mode – T54.

Using the 5 volt power adapter, the TriCoder does not beep when turned on...

- Plug something else into the wall outlet to make sure the outlet is working or plug the TriCoder's power adapter into an outlet that is working with something else. If the outlet is good, either the power adapter or the TriCoder is not working correctly. If you have more than one TriCoder, try the other TriCoder with the suspect power adapter. If you find a problem with either the TriCoder or the power adapter, call for repair or replacement.

The TriCoder beeps, but nothing appears on your computer screen...

- Recheck the installation instructions – *Chapter 5; TriCoder Connection* – to make sure all cables are properly connected. If you are connecting directly to a serial port on a PC, use the following checklist:
 1. **What kind of computer and port are you plugging into?**
 - A 25 pin female port is a parallel port.
 - PC – Male 9 pin port. A 9 pin female port is a video port.
 - Laptop COM ports are almost *always* 9 pin male.
 2. **What cable are you using?**
 - F34 – 25 pin null-modem cable
 - F36 – 9 pin female cable
 - If you have a 9-pin COM port and have the F34 cable, use a 9 to 25 null modem adapter or get the right cable (F36).
 3. **What *Computer Interface* is the TriCoder set for?**
 - “3” is the correct setting for RS-232

4. What *Baud Rate, Parity and Start and Stop bits* are you using?

- Make sure the settings on the TriCoder match what the host program is expecting. When all else fails, try the default settings.

The TriCoder reads one bar code and stops reading after that...

- Double-check the **Computer Interface** setting. Selecting *Mac ADB* as the interface when you are not physically connected to a Mac will hang up the TriCoder.
- If you selected *polling* protocol, the TriCoder needs to be polled by your computer before it will read another bar code. If you selected **Polling with ACK/NAK**, you also need to send an ACK or NAK back to the TriCoder after each read (unless you specify a finite time-out) as well as the poll, before it will read another code.

The TriCoder transmits data to your screen or serial port but some characters are garbled or missing...

- Check your serial parameters. Do the baud rate, parity, start and stop bits match on both the TriCoder and the serial port?
- Make sure you have selected the correct **Data Format**. *RS-232 ASCII* is the most commonly used.
- If you are using your own software to read the serial port, consider that not all software can keep up with the serial port at the highest baud rate. Try setting the TriCoder and serial port to a lower *Baud Rate*. If you have cables over 100 feet long, try lowering the baud rate.

I can't communicate with my RS-232 port on the host...

- This is one of the most common problems we hear. Check your cables first. Get rid of all cables and connectors except the Worth Data cable. If that works, your cables are suspect.

The TriCoder transmits a few messages then hangs...

- If you are using a terminal/ host configuration and are using XON/XOFF protocol on the terminal, **disable** XON/XOFF on the TriCoder – it may be missing the XON after intercepting a XOFF.

Program troubleshooting

The following examples have to do with programming the TriCoder.

When editing a program, all I can see are the upload prefixes and suffixes...

- If there is a data file currently in the TriCoder, you cannot edit any part of the programs except for the **Upload Prefix** or **Upload**

Suffix. This is to protect the integrity of the data that is currently still in the TriCoder. You will know if you still have a data file in the TriCoder if you see the

**DATA FILE EXISTS
PRESS ANY KEY_**

message when you enter PROGRAMMING MODE and enter the password. To edit or create a program, upload and delete the data from the TriCoder.

I can't delete a programming statement while editing a program in the TriCoder...

- You cannot actually “remove” a statement from a program when editing a program in the TriCoder. You can clear all of the program prompts for the statement but the statement number will remain “occupied” by a blank programming statement. The best thing to do is simply not “go to” that statement in your program. If that bothers you, the alternative is to delete the entire program and re-enter it without the offending statement. See *Chapter 8; Creating custom programs* for details.

My uploaded data has the old data followed by my new data...

- If you upload your data and fail to delete it from the TriCoder, when you enter DATA COLLECTION mode again, the TriCoder assumes you want to collect more data and append it to the end of the data file that already exists. To avoid this, be sure to press YES when the TriCoder asks if you want to delete the data file. When it asks ARE YOU SURE?, press YES.

I want to read more than one length I 2of 5 bar code...

- To scan any length I 2of 5 bar code, use 00 when setting the **2 of 5 Length**. If you are going to do this, you must check the length in DATA COLLECTION to minimize the possibility of partial reads. I 2 of 5 is very susceptible to misreads so using 00 to read all lengths is risky and not recommended.

I need more than 15 characters for upload prefix and suffix to upload multiple operator entered fields that I want outputted with my main field...

- When using **Refer-backs**, use {2 instead of {02 to refer back to a particular statement. Substitute your statement numbers for the 2 in the example above. You can also use the “None Statement” for additional refer-backs. See *Chapter 8; Creating custom programs* for details on **Refer-backs**.

Error messages for special consideration

The error messages below relate to problems that can either be solved by resetting the TriCoder or may require repair:

CHECK LITHIUM BATTERY

This message indicates a minor memory problem that has occurred in a Flag Byte area monitored by the TriCoder each time the TriCoder is powered up. Further memory loss could have occurred but the TriCoder was not able to detect a bad statement number, invalid entry type etc... The TriCoder corrected the Flag Bytes and is letting you know that the error has occurred. If you get this message you should:

1. Check the STATUS on the lithium battery to be sure it has at least 20% life remaining.
2. Check the existing programs, data and tables to be sure some undetected memory loss has not occurred.
3. This message can occur if both batteries (AA and Lithium) have been removed or if both have been depleted.

If the Lithium battery is OK and other problems appear with your programs, data or tables, call your dealer or Worth Data for an RMA number.

CHANGE LITHIUM BATTERY

Your TriCoder's memory was detected as having been altered. The unit was reset to its original factory default settings. Voice messages are still there but their number assignments have been returned to the factory default assignments.

Unless you have removed both types of batteries (or both are dead), call Worth Data for an RMA number to return and fix your unit. If you have removed both batteries, follow the re-initialization procedure (**Fail-safe Reinitialization Procedure**) outlined at the end of this section.

INCOMPLETE PGM

This may not necessarily be bad news. This error can occur by not completing the writing of a program - maybe you were interrupted while writing a program and the TriCoder went into sleep mode after 5 minutes of inactivity. If this happens, the program should be checked by pressing the F1 key while in the program itself. This causes the TriCoder to check the program for valid statement numbers and their references. If you are referencing a statement number that does not exist or is incomplete, trying to power up the TriCoder will result in the INCOMPLETE PGM message. You can check programs quickly by:

1. Going into PROGRAMMING MODE and choosing to edit the program.
2. Once in the program, scroll through the statements to see if the

program makes sense and still looks reasonable.

3. Press the F1 key to have the TriCoder validate and check the program.
4. Follow the instructions for correcting the program in *Chapter 8*; **Creating custom programs**.

If the program looks scrambled or not even close to what you expected, you need to reinitialize the TriCoder to its original factory shipped settings as described on the next page.

Fail-safe Re-initialization Procedure

Here is a fail-safe way to re-initialize the TriCoder and set it back to the factory defaults: (also useful for deleting a data file and programs no longer needed).

1. After turning on the TriCoder, answer **NO** to all prompts until you see

**NON PORTABLE MODE?
KEY [YES/NO]?_**

At the **NON PORTABLE MODE** prompt, press the **F1** key.

2. Press the **SHIFT** key.
3. Press the **D** key. After pressing the **D** key, you should see the prompt:

**PLEASE ENTER
DIAG. COMMAND_**

4. Press the **SHIFT** key.
5. Now press **one** of the following keys depending on what you want to happen:

- ◆ Press the **6** key to delete only the current data file.

Or

- ◆ Press the **8** key to load default programs, set program voice messages to 00, and leave error voice messages unassigned.

Or

- ◆ Press the **9** key to load default programs, sets program voice and error messages to defaults.

Or

- ◆ Press the **0** key to load default programs but clear all voice to unassigned and all program voice messages to 00.

6. Press the **F1** key to go back to the opening screen.

Planning for success...

Before you set out on your first big inventory or other data collection event, there are a few things you can do to better your chances for success. Planning and testing before the big day can help you avoid headaches as well as numerous calls to tech support. The whole point of using the TriCoder is to reduce data entry errors and speed up the data collection process. Here is a list of things you can do to make sure both of these things actually happen:

1. **Establish communication in non-portable mode first.**
Don't collect data and try to upload it without having thoroughly tested your computer interface settings. Keyboard wedge interface users can set their computer interface and test using *Non-Portable Mode* in any text editor such as Notepad or WordPad. Serial interface users will need to use the Windows programs provided on the *TriCoder Utilities* diskette.
2. **Use the Default Program #0 or Sample Program #1 if you can.**
These programs require no special programming and can greatly cut down on the amount of time you will spend getting your application to work correctly.
3. **If you create a custom program, collect and upload a small amount of data before you go for the whole thing.**
If you have problems with a small amount of data, think of the disaster you would have uploading your entire inventory without proper testing first.
4. **Stop data entry errors at the source by using the TriCoders data integrity features.**
Using data identifiers, data type checking, minimum and maximum data lengths and table validation and maintenance can greatly reduce operator error. See the section on Programming for details on each of these features.
5. **Use Voice Messages to speed up data entry.**
With proper planning, voice prompts and error messages can reduce the amount of time the operator has to look at the display, making data collection faster and more efficient.
6. **Use outside help when you need it.**
You don't have to be a programmer to write programs for the TriCoder, but if you are a computer novice and are stuck, save time by asking for help. Borrowing a little of a knowledgeable colleagues time or buying a few hours worth of help from a consultant will save you time and money in the long run. If you have technical problems with the TriCoder itself and cannot remedy the problem using the troubleshooting guide in the manual, call your Dealer or Worth Data.

If you have a problem...

- **Save the shipping box.** If you ever need to send the TriCoder or any of its' parts back for repair, you will need the original shipping box.
- If you have a problem with your TriCoder, **consult the troubleshooting section of this manual FIRST.** If you cannot find the answer here, call your Dealer or Worth Data for help.
- Before you call your dealer or Worth Data for technical support, have your TriCoder and related equipment in front of you and **be prepared to explain your problem in detail to the Technical Support Engineer.**
- The Engineer may ask you to go through some troubleshooting procedures while on the telephone. This will help them determine what is wrong and what the course of action should be. **Many problems can be resolved over the telephone and will not require that you return the equipment to us.** If you *do* need to return the TriCoder to Worth Data, the Engineer will issue an RMA number.
- If you do need to return the TriCoder for ANY reason, **you MUST have an RMA number** first. Write the RMA number on the outside of the original shipping box and make sure to insure the shipment. All RMAs should be shipped back to the following address unless directed otherwise:

RMA #XXXXXX
Worth Data Inc.
623 Swift St.
Santa Cruz, CA 95060
831-458-9938

Powering the TriCoder

The TriCoder can be powered by batteries or by the 5-volt power adapter included with the unit. The TriCoder also has a programmable automatic shutoff intended to conserve power. The following information explains how to turn the TriCoder ON and OFF, the differences between battery power and wall power, the two different batteries the TriCoder uses and how to change them. The final section of this appendix provides details on both short and long term storage of the TriCoder.

Turning the TriCoder ON and OFF

The ON/OFF key on the TriCoder keypad powers the TriCoder ON and OFF whether the TriCoder is using battery power or accessing wall power with the 5-volt power adapter.

To use the 5-volt power adapter, plug the power adapter into the wall outlet, then into the TriCoder (the power jack is on the bottom of the TriCoder). Turn the TriCoder on by pressing the ON/OFF key. Whether using batteries or wall power, upon power up the TriCoder displays the following message:

```
DMA TRICODER Xxxxx Y  
HIT ANY KEY_
```

Where: **X** is **W** for a TriCoder jumpered for Keyboard Interface or
 R for a TriCoder jumpered for Serial Interface or
 K for USB Keyboard upload or
 H for USB High Speed upload

xxxx is the firmware version (i.e. 2002) and

Y is the board version (i.e. E)

Pressing a key on the TriCoder keypad takes you to the *Mode Menu*. If you were in **NON-PORTABLE** mode when you turned OFF the TriCoder, it will bring you back into **NON-PORTABLE** mode upon pressing a key. Exit **NON-PORTABLE** mode by pressing the F1 key on the TriCoder keypad. This will bring you to the beginning of the *Mode Menu*, displaying the following prompt:

```
DATA COLLECTION?  
KEY [YES/NO]?
```

Battery Power and Wall Power

For portable use, the TriCoder is usually operated using battery power. Non-portable applications where the TriCoder is stationary typically use the 5-volt power adapter to utilize wall power and conserve batteries.

Wall Power

The ON/OFF key powers up the TriCoder once the 5-volt power adapter is plugged in. If accessing wall power with the power adapter, it is critical that you use **ONLY** the 5-volt power adapter that comes with the TriCoder. **DO NOT** plug in any other power adapter you may have even if the voltage matches – other specifications may not. Plugging in an adapter other than the correct one can cause SEVERE damage to your TriCoder costing hundreds of dollars to repair or replace.

Battery Power

For portable use, there are two levels of batteries used by the TriCoder. Three AA batteries provide the main power for the scanner, display and electrical circuitry. Either alkaline (including Alkaline rechargeables), Nickel Metal Hydride rechargeable batteries or NiCad rechargeables may be used. Nickel Metal Hydride (NiMH) is preferred over NiCad. Alkaline batteries (including Alkaline rechargeables) should provide approximately 20 hours of continuous scanning (without accessing voice messages), as well as retain the data in memory and provide for real-time clock operation for several months before tapping the backup battery source. NiMH or NiCad rechargeable batteries will give approximately 40% less operational time than alkalines.

If you are using rechargeable batteries, there is recharging circuitry built in to the TriCoder. To use the recharging circuitry, you must change a jumper inside the TriCoder itself and then plug in our 5v Power Adapter. For best results, use only **NiMH** rechargeable batteries.

By default, the TriCoder is set up to use regular alkaline batteries with the recharging circuitry OFF. Recharging alkaline batteries may cause the batteries to explode and leak battery acid throughout the TriCoder. With JP3 jumper installed, only use rechargeable batteries. The jumper inside the TriCoder is located above left of the POWER jack and is labeled JP3. The jumper must cover BOTH pins in order for the recharging to work. See *Appendix F: Jumpers, Switches, and Adjustments* for an internal diagram of the TriCoder. Recharging takes approximately 8 hours for a full charge if batteries are fully discharged first.

If you are using alkaline batteries (either *regular* or *rechargeables*) and have selected the **NiCad/Rechargeables** setting in the *Speaker/Battery* setup parameter (See *Chapter 6; TriCoder Setup*), the TriCoder generates the following error message:

**Warning Alkaline
Batteries Detected
Nicads Are Specified
Do Not Recharge**

The TriCoder can detect the battery type (when batteries are new) and compare it to the *Speaker/Battery* setting. If it detects Alkalines when NiCads are specified, you should NOT use the recharging feature. Make

sure the JP3 jumper is **not** installed and change the Speaker/Battery setting to ALKALINE. Recharging regular alkaline batteries can cause **severe** damage to the TriCoder.

If using rechargeable NiCad or NiMH batteries, be sure to reset *Speaker/Batteries* from 02 to 03; otherwise, the TriCoder will not know when to tell you to change batteries and it will fail in very strange ways. See **Chapter 6: TriCoder Setup - Speaker Battery** settings.

The second battery is a lithium battery, used for backup of the data in memory and updating of the real-time clock. The battery model is CR2032 3v and is available wherever you can buy watch or camera batteries. This battery should last for approximately 6 months, even if the AA batteries are removed. Even though the lithium backup battery can last for at least 6 months, we recommend not keeping valuable data in the TriCoder any longer than necessary. Upload your data to the computer – do not risk losing data if you don't have to. Once you have uploaded, back up your data file on a diskette or tape if the information is extremely critical.

The TriCoder can detect low AA batteries as well as a low lithium battery. If the TriCoder detects low AA batteries, it displays the following message for 20 seconds, then turns itself off to protect any data that may be in memory:

**CHANGE BATTERIES
UNIT SHUT DOWN_**

The TriCoder also has a battery life indicator that can be accessed in NON PORTABLE mode or during Data Collection. To display the remaining battery life of both the AA and the lithium battery (as well as the date, time and remaining memory) press the **STATUS** key:

mm/dd/yy hh:mm
nnnk BYTES FREE
AAxBAT99%
LI - BAT■■■■■■■■ - - - -50%

x=a Alkaline batteries specified in TriCoder Setup
x=n NiMH or NiCad batteries specified in TriCoder Setup
Press the **STATUS** key again resume processing.

To change the AA batteries:

1. Turn **OFF** the TriCoder and unplug the 5-volt power adapter.
2. Remove the battery holder door on the back of the TriCoder by pressing down on the grooved portion of the door and pushing outward.
3. Remove the old batteries and insert the new ones, making sure to orient the batteries according to the diagram inside the battery holder. The positive (+) end of the battery should be facing down toward the bottom of the TriCoder.
4. If using rechargeable batteries and the TriCoder's built-in recharging circuitry, make sure the jumper labeled **JP3** is configured correctly.

See *Appendix F: Jumpers, Switches, and Adjustments* for the location of **JP3**. The jumper should be ON for rechargeable, and OFF for *regular* ALKALINE. Also make sure you have the TriCoder Setup Speaker Batteries set to 3 for NiCad or NiMH so that the TriCoder will be able to tell you when to change batteries; if you don't do this, the TriCoder will exhibit very strange behavior when the batteries get too low.

5. Replace the battery door and turn the reader on using the ON/OFF switch.

Changing the Lithium Battery:

1. The model of the lithium battery is **CR2032 3v**. You can find them at most stores that carry watch or camera batteries.
2. Turn **OFF** the TriCoder and unplug the 5-volt power adapter.
3. Open up the TriCoder by removing the 4 screws holding the two halves together. The TriCoder opens like a book, with a ribbon cable connecting the two halves. The lithium battery is located in the lower right hand corner of the left half. See *Appendix F: Jumpers, Switches, and Adjustments* for the location of the lithium battery.
4. Remove the old battery and quickly insert the new one.
5. Close the TriCoder and replace the 4 screws that hold the TriCoder together. Turn the reader on using the ON/OFF switch.

Storing the TriCoder

Daily storage of the TriCoder does not require any special care. If the TriCoder is used on a daily basis, the AA batteries should remain in the unit and changed when low.

If you are going to store the TriCoder for several months, replace your current AA batteries with brand new AA Alkaline batteries. Storing the TriCoder with AA batteries that have low or no charge will result in the lithium battery being drained after the AA's are depleted. The SRAM needs small amounts of power to maintain its status, relying first on the AA's, then on the lithium battery. If both batteries (AA and lithium) are dead, it is likely that programs and data in the TriCoder will be lost.

For long-term storage (6 months or more) we recommend that you upload any stored data and programs, then remove both sets of batteries - the AA *and* the lithium - to prevent any possible damage to the TriCoder due to battery leakage. After removing the batteries, the SRAM will be reset to its original factory settings.

If you have removed both batteries and are using the TriCoder for the first time after long-term storage, you will get some LITHIUM BATTERY messages upon power up.

CHECK LITHIUM BATTERY means that data is probably not lost, but, flag bytes that the TriCoder monitors for change have indicated some kind of modification.

CHANGE LITHIUM BATTERY means that both programs and data have been lost and the unit has been set back to factory default settings. You will probably see this message if both sets of batteries have been removed.

Firmware and Model Upgrades

Firmware Updates

Occasionally it will be necessary for some users to update the TriCoder's firmware to fix a bug or take advantage of new capabilities added to the TriCoder. Previously, you had to actually replace the EEPROM chip inside the TriCoder. With the DMA TriCoder models T54/LT54 and T64/LT64, the TriCoder uses a Flash EEPROM and can be updated by downloading a file. The latest firmware file can always be found on our website at:

www.barcodehq.com/downloads.html or call us and we can send you the file by email.

How to Update

Once you have the new firmware file, be aware that you should first upload all data files and clone the TriCoder to a computer file before starting a firmware download. Data files and tables can be lost in firmware updates. Sometimes the *Setup* and the *Programs* in the TriCoder can also be lost, depending on the scope of the firmware change.

To initiate a firmware download to the TriCoder, run the **TriCoder EPROM Loader** program (also available for download on our website at www.barcodehq.com/downloads.html or on the *TriCoder Utilities* CD that came with your TriCoder. Use the following instructions to prepare the TriCoder for the firmware download:

- 1) Turn on the TriCoder.
- 2) Press and release the **F2** Key.
- 3) Press the release the **F1** Key.

Once you have started the firmware download, you should not interrupt the process until it is complete. Depending upon at what point in the process the download is interrupted, you could have trouble with the **F2 F1** sequence (see above). If you do, you will have to resort to the **failsafe procedure** described next.

Failsafe Firmware Update

If your TriCoder firmware update is interrupted, you may end up with a TriCoder that will not function properly. If you have a version 2.3 or higher TriCoder, you can perform the failsafe update by either USB or serial port. If you do not have version 2.3 or higher, you will have to perform the failsafe update via the serial interface. If your firmware update fails, you must use the following failsafe firmware update procedure:

USB Interface, version 2.3 or higher

1. Turn the TriCoder On, then immediately press and release the **L** key

Successful timing of this sequence produces nothing but a cursor in the

upper left hand corner of the TriCoder screen.

2. **Now press and release F2 followed by pressing and releasing F1.**

The TriCoder will then display the following message:

**No Firmware Detected
0 - Power Off Tricoder
1 - Download Firmware
Press 0 or 1 (V2.3)**

If you have TriCoder version 2.3 or higher, set for USB interface, you can now plug in your USB cable and press the 1 key. You will then see the following message:

**Start Host USB
Firmware Download
Program First and
then Hit any Key**

You should then start the download in the TriCoder Eprom Loader software, then press any key on your TriCoder. You should then see:

**Downloading Firmware
Please wait ...**

RS-232 Serial Interface

If your TriCoder is a serial interface, or if it is below version 2.3, you will be updating the firmware via the RS-232 serial port. Make sure the TriCoder is jumpered for serial interface and then procede:

1. **Turn the TriCoder On, then immediately press and release the L key**

Successful timing of this sequence produces nothing but a cursor in the upper left hand corner of the TriCoder screen.

2. **Now press and release F2 followed by pressing and releasing F1.**

The TriCoder will then display the following message:

**No Firmware Detected
0 - Power Off Tricoder
1 - Download Firmware
Press 0 or 1 (V2.3)**

If you press the 1 key, you will get the message:

**Downloading Firmware
via RS-232 Serial
Please wait ...**

Make sure you are connected to the serial port, then start the TriCoder Eprom Loader software and procede with the serial download.

Model Changes – from Serial to Wedge & back

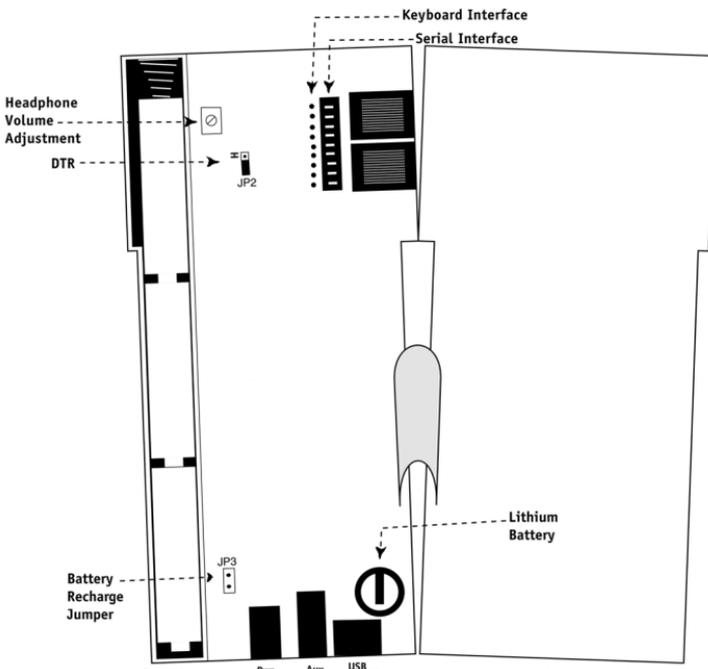
All that is required to change a serial model TriCoder to a Wedge model TriCoder (or wedge to serial) is to simply move a block of jumpers inside the TriCoder and change the cable. Although this sounds like an easy change to make, it is not necessarily a convenient one. It is especially advantageous for user who needs to utilize the TriCoder as a keyboard wedge on older computers without USB Ports.

The serial interface is much faster for uploading large files. If you find yourself changing back and forth from serial to wedge quite often, you may want to consider investing in another reader or using Portkey with a serial reader to get keyboard wedge-like operation. As with the Firmware Upgrade, use these precautionary measures when changing the interface:

- **Upload all data and programs from the TriCoder.**
- **Turn the TriCoder off and unplug the AC power adapter.**

Follow these steps to change the interface:

1. Open the TriCoder and lay the two halves flat as shown below.



2. Referring to TriCoder diagram above, locate the **Keyboard/Serial** jumper positioned next to the two RJ45 scanner and computer ports. The jumper block is 9 positions long and has 3 rows of pins.

3. Before you move the jumper block, note whether the jumper block is positioned on the Keyboard side or the Serial side. Use a small flathead screwdriver to loosen the jumper block and move it to the correct side. ***Be sure to press firmly on the jumper to make sure it is all the way down.***
4. Once you have changed the jumper, all that is left is to change the cable. The PC Keyboard interface requires an F30-1 PC Splitter Y-Cable. The Serial interface requires one of several cables, depending on what type of computer you are using. A PC requires either a F34 25 pin serial cable or the F36 9 pin serial cable. Check your serial port for its pin configuration. See ***Appendix D: Cable Pin-outs*** for more information on cables and pin-outs.

How to scan a bar code

The TriCoder can be used with a variety of scanners – lasers, CCDs, and slot scanners. Which one you choose is dependent upon your application and the quality and density of your bar codes. This section will include information on different scanners as well as how to use each one.

Practice Scanning

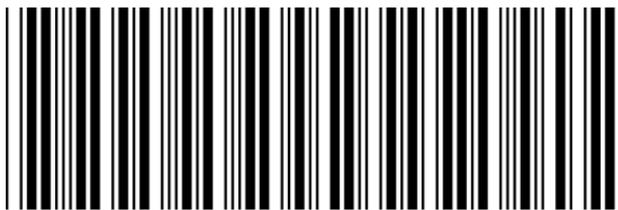
To practice scanning, turn on the TriCoder and press any key to get to the Mode Menu. If the screen reads **NON-PORTABLE MODE**, you are ready to start. If you see the “data collection” prompt:

**DATA COLLECTION?
KEY [YES/NO]?_**

Press NO until you see the “NON-PORTABLE” mode prompt.

**NON PORTABLE MODE?
KEY [YES/NO]?_**

Press YES. Use the Test Label and the technique diagram, to practice scanning with your laser or ccd scanner. You should hear an audible beep and see TEST LABEL displayed on the TriCoder screen after every scan. If you do not see TEST LABEL, check your technique, especially the angle and speed of the scan.



TEST LABEL

Laser Scanners

The laser scanner is typically the easiest scanner to use, requiring less operator training. A particularly desirable feature of the laser scanner is that upon triggering the beam, the laser scans the bar code multiple times (36 scans per second) until it has a good read. This practically eliminates having to scan a bar code a second time because you didn't get a read the first time. The laser scanner also scans from a distance, allowing for less wear on the bar code as well as letting you scan bar codes you might not be able to get to with other types of scanners.

Different laser scanners have different scanning specifications. **Table L-1** describes the laser scanners available from Worth Data and the scanning requirements for each one.

Model	Bar Code Density	Range
LZ300	6 mil	0" – 6"
	10 mil	0" – 10"
	40 mil	2" – 41"
	100 mil	36" – 48"*
LZ400	6 mil	.5" – 9"
	10 mil	0" – 17"
	40 mil	3" – 44"
	100 mil	24" – 84"*
LT54 TriCoders (integrated laser models)	6 mil	1" - 7"
	10 mil	1" - 13"
	40 mil	4" - 29"
	100 mil	24" - 84"*
PSC Long Range Scanner	6 mil	7" – 11"
	10 mil	7" – 31"
	40 mil	11" – 9 feet
	100 mil	Up to 17 feet*

Table L-1. Laser Comparison Chart

6 mil = high density

10 mil = medium density

40 mil = low density

* absolutely requires special retro-reflective label stock



To scan a bar code using your laser scanner (whether it be a handheld or an integrated laser) point the laser scanner at the bar code, making sure you are within the distance range specified above. Pull the trigger (or push the button on an integrated model) and line up the beam on the bar code. See the diagram above for proper beam positioning. Use the Test Label on the previous page to practice scanning with the laser scanner.

CCD Scanners

CCD Scanners are not considered a wand scanner but neither are they a laser scanner. Some CCD scanners are “touch” scanners that require that the scanner actually touch the bar code. Later CCD scanners could read 1-3” distance from the bar code.

The Worth Data LI50 Long Range CCD Scanner joins a new category of CCD scanners that are so radically improved, the scanning industry has

renamed them “Linear Imager Scanners”. This CCD or Linear Imager is so advanced that it approaches the performance of some laser scanners. It can read up to a 4.5” width medium density bar code, just like a laser scanner. The most desirable characteristic of laser scanners is distance scanning. The CCD has significantly closed the gap in distance scanning that lasers have traditionally enjoyed. Look at the distance chart below:

Model	Bar Code Density	Range
LI50 CCD Scanner	6 mil	1” – 4”
	10 mil	0.5” – 7”
	40 mil	1” – 12”

LI50 Distance Chart

Considering that older style CCD scanners could not even come close to the above distances, devices like the LI50 are true advancements in scanning technology. Laser scanners still produce a light beam that is easier to position correctly on the bar code, because the laser light is more focused to a sharper, finer, easier-to-see beam. Laser scanners can read longer bar codes than the CCD scanners although the vast majority of bar codes are significantly smaller in length than the limit for the CCD reading. Laser engines are also smaller in size than most of the CCD engines.

The LI50 is point-and-shoot. If you don’t get a read right away, move closer in or farther out until you get a read.



To practice scanning with an LI50 CCD scanner, position the CCD about 3 inches away from the bar code, pull the trigger and make sure that the block of light emitted by the CCD covers the bar code completely from end to end. If the bar code is not covered completely, pull the CCD back even further, up to about 7” away (for a medium density 10 mil bar code). Use the diagram above for reference.

Special Laser and CCD Settings

There are several hidden settings on the TriCoder Setup Menu designed specifically for laser and CCD performance:

Feature	Menu Setting	Description
Single Decode	Code 39 -F	Any decode is transmitted.
Double Decode	Code 39 -E	Takes 2 decodes for transmission.
CCD Trigger Required	Computer Interface.-C	triggered reading only
CCD Trigger Off	Computer Interface.-B	continuous reading – no trigger required -- use with stand
Quiet Zones	Computer Interface.-E	Default is normal size
	Computer Interface.-F	small quiet zones
Short Decode	2 of 5 Code-E	2.5 Second laser beam
Long Decode	2 of 5 Code-F	5 second laser beam
Difficult Code	2of5 Code-C or D	for difficult codes
Normal Code	2of5 Code-B	normal code reading

For laser scanning through automobile windshields, use **Difficult Code** set to C or D (go to D if C doesn't work) and turn OFF **Double Decode**.

Another laser feature which is only configurable by the keyboard is **Aiming Dot Duration**. A DMA TriCoder with firmware version DMA2018 or higher supports an aiming dot prelude with the internal lasers as well as external LZ200-D scanners. The aiming dot duration is configurable to 1/10th of a second up to 9.9 seconds (keying a value of 99). To enable the aiming dot:

1. Go to *Programming Mode*,
2. Enter the Password (**WDTRI**)
3. Go to *Change Setup* (Press **5**)
4. Go to *Other*
5. Press **Enter** until you get to *Aiming Dot Duration*.
6. Enter the number of seconds in 1/10th you want,(i.e. **20** for 2 seconds)

An aiming dot can be useful for trying to read a bar code on a page of bar codes, for reading in direct sunlight, and for distance reading.

Cable Pin-outs

Below are the pin-outs for our RS-232 and RS-422 cables. All cables showing a Worth Data part number (*Fxx* or *Txx*) are available for purchase. Unless you have experience making your own cables, we recommend buying your cables from us.

For all RJ45 cables, number pins from left to right, with the metal pin side of the connector facing you and the cable down.

F34 DB25 Null Modem Cable Pin-outs

These are the pin-outs for Cable F34, a DB25 Female to 8 pin modular RJ45 with pins 2 and 3 crossed, used for connection directly to a 25 pin male host serial port.

Mod 8 RJ45	Function	DB25 Female
1	Frame Ground	1
2	Transmit Data	3
3	Receive Data	2
4	Signal Ground	7

Table I-1. F34 Null Modem Cable

**Pins 5-8 are connected but not used by the TriCoder.*

This cable is *not* for Modem use. If you are using the TriCoder with a modem, see Table I- and Table I- for the correct cable.

F36 DB9 Straight Cable Pin-outs

These are the pin-outs for Cable F36, a DB9 Female to 8 pin modular RJ45. This is a straight-through cable used for direct connection of the TriCoder to a 9 pin Male host serial port.

Mod 8 RJ45	Function	DB 9 Female
1	Shell (chassis ground)	Shell
2	Transmit Data	2
3	Receive Data	3
4	Signal Ground	5

Table I-2. F36 9 pin cable

**Pins 5-8 are connected, but are not used by the TriCoder.*

F32B 25 Pin Modem Cable

This cable is for use in Modem communications. It is a DB25 male to 8 pin modular cable.

Mod 8 RJ45	Function	DB25 Male
1	Frame Ground	1
2	Transmit Data	2
3	Receive Data	3
4	Signal Ground	7
5		
6		
7		20
8		4 } 4 }

Table I-3. F34A Modem Cable

Pins 5 and 6 are not connected at the DB25 end. Pins 20 and 4 are tied together.

F46B 9 Pin Modem Cable

This cable is for use in Modem communications. It is a DB9 male to 8 pin modular cable.

Mod 8 RJ45	Function	DB 9 Male
1	Shell (chassis ground)	Shell
2	Transmit Data	3
3	Receive Data	2
4	Signal Ground	5
5		
6		
7		4 } 7 }
8		

Table I-4. F46B 9 Pin Modem Cable

Pins 5 and 6 are not connected at the DB9 end. Pins 4 and 7 are tied together.

422 Cable pin-outs

RS-422 allows multiple numbers of TriCoders to be "multi-dropped" off a single 422 serial port. Maximum distance for RS-422 is 4000 feet. Using the following pin-outs, you can make your own 422 "multi-drop" cables by:

1. Tying **T+** on the TriCoder end to the **R+** on the continuous 422 line.
2. Tying **T-** on the TriCoder end to the **R-** on the continuous 422 line.

Function	Mod 8
Transmit Data + (T+)	2
Transmit Data - (T-)	3
Ground	4
Receive Data + (R+)	5
Receive Data - (R-)	6

Table I-7. RS-422 Multi-drop cable

You must have **T+/T-** in one twisted pair and **R+/R-** in the other.

We suggest using our F44 422 "Y" Cable instead. One end of this cable goes into the TriCoder, the other 2 ends have female modular 8 pin connectors. The only cables you provide are cables with male modular 8 pin connectors on each end to connect between TriCoders and a cable coming from the 422 serial port with a male modular 8 pin connector to connect to the first TriCoder. At the end of the string of TriCoders, tie pins 2&3 and 5&6 together with 120 ohm resistors or order our 422 terminator plug. We recommend using Belden 1227AI (or Category 5 cable if you don't want to buy new wire) for all of the 422 cabling above.

Beside the standard cable pin-outs provided above, there are several other cable pin-outs which may prove useful to users.

F38 Data Cloning Cable

The pin-outs for the F38 TriCoder Data cloning cable (Male RJ45 on both ends) are:

Wedge/RS-232		RS-422	
RJ45 male	RJ45 male	RJ45 male	RJ45 male
1	1	2	5
2	3	3	6
3	2	4	4
4	4	5	2
6	6	6	3

Table I-9. F38 Data Cloning Cable

Laser and CCD

The laser and CCD TTL pin-outs are:

Pin	Function
1	5 volts
2	Data
3	Phase
4	LED
5	Trigger
6	Enable
7	Shield(drain)
8	Ground

Table I-11. Laser and CCD Pin-outs

Remember:

If you make your own cables, you are on your own. We accept **NO RESPONSIBILITY** for damages resulting from incorrect wiring.

Optional Features

The following are the features available for the TriCoder:

Item #	Description
F10	5V/110V Power Supply
F11	5V/220V Europe and South American Power Supply
F14	5V/220V UK Power Supply
F13	5V/240V Australian/New Zealand Power Supply
F30-1	PC 5 pin/6 pin Keyboard Splitter Cable
C21	USB Cable
F32A	25 Pin Hayes Compatible Modem Cable
F46A	9 Pin Hayes Compatible Modem Cable
F34	RS-232 Null Modem 8 Pin Modular to 25Pin Female
F36	RS-232 Straight 8 Pin Modular to 9 Pin Female
F38	TriCoder Cloning Cable
T15	Voice Cloning Cable
T12	Headphone
	Microphone
B12	Rubber Boot for TriCoder
F41	TriCoder Carrying Case (including rubber boot)
T46	Holster for TriCoder using Rubber Boot (B12)
T49	Integrated Laser TriCoder Belt Holster
F88	Belt Holster for tethered Laser Scanner Gun
H10	Laser Holder Clip
F59	Bar Code Slot Badge Scanner (non-portable mode only)
LZ300	Laser Scanner
LZ400	Laser Scanner
PSCLR	PSC Long Range Laser Scanner
LI50	Long Range CCD Scanner

Bar Code Slot Scanner

Depending on your non-portable application, you may wish to use a slot scanner as your bar code scanning device instead of a CCD or laser. The slot scanner is especially useful for reading bar codes printed on badges or ID cards. Worth Data sells a bar code slot scanner that plugs into the TriCoder's SCANNER port for scanning in *Non Portable* mode. We recommend using the 5-volt power adapter as the slot scanner drains the batteries very quickly. To use the slot scanner, the Decode Light switch must be set to L (see page M-3).

To read a card or badge with the bar code slot scanner, orient the card so its bar code faces the lighted side of the scanner. Slide the card in a continuous swipe motion through the slot. For optimum use with the slot scanner, bar codes should be printed or applied so that the center of the bar code is 1/2 inch from the edge of the card. The Slot Scanner can be permanently mounted to a desk or wall.

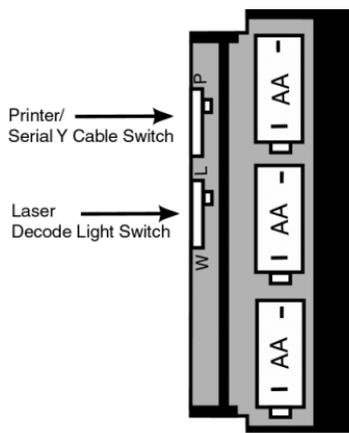
Laser Scanners

The TriCoder is available with an integrated laser scanner for one-handed scanning. This laser uses the Symbol 950 Scan Engine with a lifetime warranty on the scan element. The model that have the laser scanner built into the top of the TriCoder is the LT54. We also offer cabled laser scanners (the **LZ300**, **LZ400** and **PSC LR**) as an add-on, plugging directly into the SCANNER port of the T54 TriCoder.

Decode Light on External Scanners

Decode lights on tethered laser scanners and most CCD scanners allow the user to see that a scan was successful by a green light turning on until you release the trigger. This can be especially useful in noisy environments or where you are scanning blind, (not looking at the display for instructions).

The TriCoder is shipped with the decode light on external laser/CCD scanners deactivated so that the TriCoder can operate interchangeably with a wand or laser. If you want to restrict the TriCoder's operation to a laser scanner only with the decode light *activated*, simply move the switch which is accessible from the battery compartment. Refer to the figure below for assistance in locating the switch.



Battery Compartment with door removed

The Laser decode light switch is located on the TriCoder board which is visible and accessible from the battery compartment with the battery door removed. Move the switch to **L**.

LZ300 Laser Scanner

This laser scanner uses the Symbol 1200WA Scan Engine with a lifetime warranty on the scan element. The 10 ft. cable is durability rated for 1,000,000 bends. It reads all densities of bar codes down to a 3 mil narrow bar and reads a typical UPC code at about 10". It also supports "stand mode" (hands-free scanning) with an external power supply and the TriCoder in Non-Portable mode. The warranty on the LZ300 is 2 years.

LZ400 Laser Scanner

This laser scanner is the equivalent of the lasers used in the integrated models of the TriCoder. The LZ400 uses the Symbol 1200 Scan Engine with a lifetime warranty on the scan element. It can read a 10 mil bar code at 15", a 40 mil bar code at 4.5 ft., and a reflective 100 mil bar code at 14 ft. It can read high density codes down to a 3 mil narrow bar width. The LZ400 also supports the aiming dot mode of operation on the TriCoder.

Durability features include a cable tested to withstand 1,000,000 bends of operation, as well as a scan engine tested to withstand 2000 G's of force. It is an extremely rugged product, made to withstand harsh treatment including repeated drops.

PSC Long Range Laser Scanner

This laser is a long-range laser (it reads a 100 mil reflective bar code from up to 17 ft.), but it also reads normal codes. It has a two position trigger; the first position stop is an aiming spot, the second position stop triggers the beam. Warranty is 2 years.

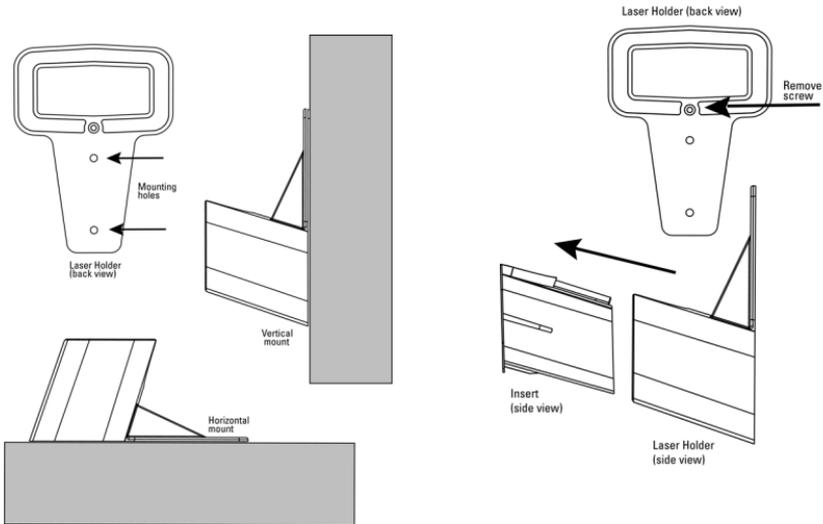
Laser Accessories

H11 Laser Holder

The H11 Laser Holder is for the LZ300 and LZ400 laser scanners.

The H11 Laser Holder can be mounted vertically (wall) or horizontally (table top).

You can use wood or metal screws (not provided) to mount the holder.



CCD Scanners

LI50 Worth Data Long Range CCD Scanner

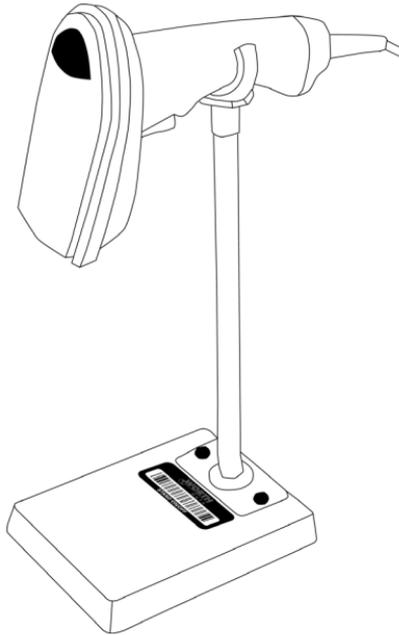
This CCD Scanner reads typical UPC codes from a .5" to 7" distance. It acts just like a laser scanner, except the beam is fuzzier than the lasers sharp line across the bar code. The cable is rated for 1,000,000 bends and is very durable. The warranty is 2 years.

S10/S20 and S11/S21 Hands Free CCD/Laser Stands

There is a stand available for use with the LZ300 and LZ400 laser scanners (S11/S21) as well as a stand for the LI50 CCD Scanner (S10/S20). The stands are available as a mountable "goose neck" (S10 or S11) or in a free-standing version with a weighted base (S20 or S21). Either stand allows for hands free scanning of bar codes but is only for use in *Non-Portable Mode* and requires the TriCoder's use of the 5 volt power adapter. To use the stand, simply scan the "Stand on/off" bar code on the base to turn on the automatic reading mode, then place the scanner in the stand. When a bar

code is placed under the narrow search beam of the scanner, it activates the full beam and scans the bar code. When you want to use the laser or CCD as a hand held again, simply scan the bar code on the base again to turn off automatic scanning. To use the LI50 CCD Scanner with the stand, set the CCD to "Trigger-less Reading" as described in the settings table defined below. You must present the bar code within 3-4 inches from the scanner and use the 5 volt power adapter. Under no circumstances will the stand work properly while the TriCoder is using battery power.

The drawing below shows an LZ300 Laser Scanner mounted into the S21 weighted-base stand.



TriCoder Cases and Holsters

The TriCoder has a variety of carrying cases and holsters available for use, depending upon the configuration and function of your TriCoder. Choosing the correct carrying case or holster can increase productivity by making the TriCoder more accessible and portable.

The TriCoder can use the following carrying cases and holsters:

F41 Leather Carrying Case for Booted TriCoder



The F41 Leather Carrying Case features either a shoulder strap or belt loop attachment, a convenient holster-style wand holder, and a vinyl cover over the keys. The TriCoder is worn upside down to make it easier for the operator to simply lift the TriCoder up and view the display and keypad in the correct orientation. The case has openings for all cable and scanner attachments, making it unnecessary to remove the case for uploading. This case has open access to the TriCoder keypad but is also available with a clear plastic keypad window to protect the TriCoder keypad from the elements.



B12 Rubber Boot for TriCoder

The B12 Rubber Boot is for use only with all models of the TriCoder. The B12 is a rugged, protective rubber boot intended to protect the TriCoder in the most hostile environments. The B12 is included with at no cost with all TriCoder orders.

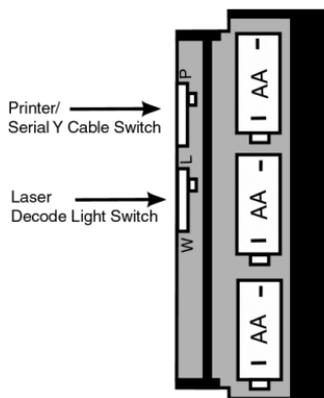
T46 Holster for LT model TriCoder with B12 Rubber Boot

The T46 holster was designed with ample room in order to accommodate the LT TriCoder while encased in the B12 Rubber Boot. The holster is worn on the belt and gives the operator a convenient place to store and carry their TriCoder during use.



Jumpers, Switches, and Adjustments

There are two switches inside the battery compartment of the TriCoder. One is the Laser Decode Light Switch and the other is the Printer/Serial Y Cable Switch. To get to these switches, you must open the battery compartment and look for the switches on the visible board edge. Refer to the below diagram:



Battery Compartment with door removed

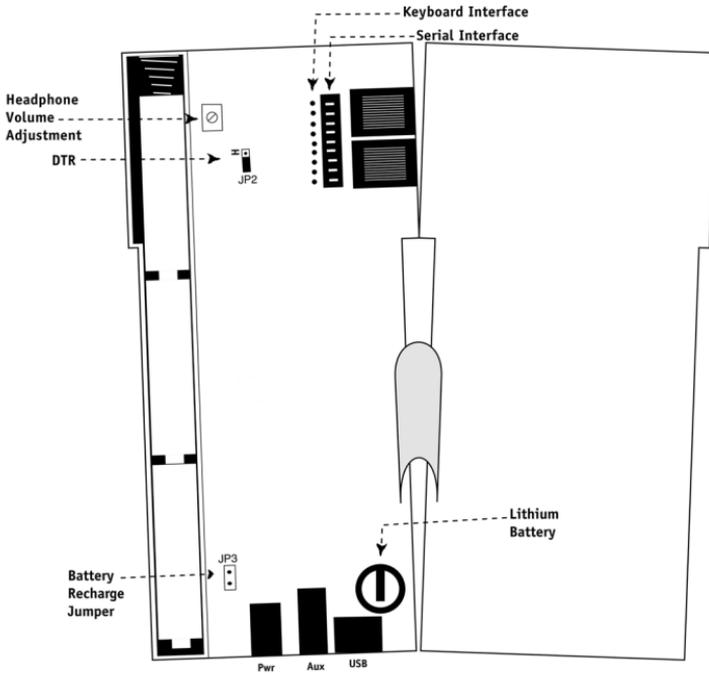
For the Laser Decode Light Switch, the switch must be on the **W** setting for the older "switch wands" to work. The **W** setting also allows lasers and CCDs to work, but the decode light (green light turning on for 3 seconds to signify a "good read") will not come on unless the switch is moved to **L**. It is set to **L** by default.

The Printer/Serial Y cable switch allows you to use a portable printer or a serial Y cable (*not* common) with the TriCoder. By default, the switch is set for printer **P**. If you must use a serial Y cable, you must move the switch towards the **L**.

To do any of the following operations:

1. To change the lithium battery,
2. adjust the headphone volume,
3. set the TriCoder to recharge batteries with the 5v power supply plugged in,
4. force DTR to high,
5. to change from Serial to Keyboard Wedge, or
6. to change Keyboard Wedge to Serial,

you must remove the four screws from the back of the TriCoder using a Phillips head screw driver. Open the case and lay it out as shown on the following page:



The Battery Recharge Jumper is shipped disabled. If you want to use rechargeable batteries and charge them in the TriCoder using the 5V power adapter shipped with the TriCoder, you need to place the jumper so that it covers both pins (**JP3**). When you use rechargeable batteries, you need to change the *Speaker/Batteries* setting (See Setup) to 3; if you use rechargeables with the *Speaker/Batteries* setting at 2, you will experience difficulties as the batteries run down because the TriCoder firmware will assume the longer life of alkalines.

USB Driver Installation Recovery

The USB TriCoder uses two separate USB “drivers”: The HID driver provided with Windows and the TRICODERUSB High Speed transfer driver provided with the TriCoder. Which driver is active depends on the operating mode of the TriCoder.

Driver installation is initiated when the TriCoder device (HID or High Speed) attempts to attach to the host and the driver is not present (or incorrectly installed) on the host PC.

Incorrect driver installation is unlikely to happen; however:

High Speed driver installation can be cancelled by the user and the High Speed USB upload in the TriCoder will not function. The High Speed driver installation is re-initiated next time the TriCoder is attached either before or after a Windows restart (depending on the version of Windows). Recovery from an error in installing the High Speed driver is at worst rebooting the PC and re-attaching the TriCoder to redo the driver installation.

HID driver installation is usually automatic: windows pop up indicating the new device and then disappear on their own and you’re done. In some situations, the required files for the HID driver are not all found on the computer and the user is prompted for their Windows CD. If the user **cancels** the HID driver installation at this point, the HID mode TriCoder will not function properly and Windows **does not** automatically initiate a re-install as it does with the High Speed driver. Control panel utilities (varies with operating system) are required to re-install the HID driver.

Resolving incomplete, aborted, or incorrect HIGH SPEED driver installation

This driver is provided with the TriCoder (included on the Utilities CD). Restarting Windows and re-attaching TriCoder will often re-initiate driver installation; if so, just follow the instructions and this time point the installer to the TriCoder Utilities CD, (or if you have downloaded the drivers, to the folder where you saved the download).

Assuming the drivers was partially installed, you will have to update the driver manually following the below procedures:

Manually Updating Tricoder High Speed USB Driver on Windows® XP & Vista

1. Plug the Tricoder into the computer's USB port and turn it on. Make sure it is in High Speed mode, (go to the Data Collection? Y/N prompt).
2. In Windows, go to: *Start | Control Panel*.
3. If you are set for "*Classic*" view, double-click the "*System*" icon. If

set for "Category" view, click "Performance and Maintenance" then click "System".

4. Click the *Device Manager* option in the *Hardware* tab.
5. Now select the View "Devices By Type" option in the *View* menu.
6. Click the "+" sign next to "Universal Serial Bus Controllers".
7. Right-Click on the *TriCoderUSB* (a future version will be *TriCoderHCUSB*) icon and select "Properties".
8. Click the *Update Driver* button in the *Driver* tab.
9. In *DriverWizard*: Select "Install from a List or Specific Location" and click on the *Next* button.
10. Select "Don't Search. I will choose the driver to install." option by clicking on the appropriate radio button.
11. Click the *Next* button.
12. Check the "Have Disk" button.
13. In the "Install from Disk" dialog, click the *browse* button and select the **Worth Data Utilities** CD ROM or the directory where you unpacked the files downloaded from www.barcodehq.com.
14. Choose the one "trcdr.inf" (a future version will be "trcdrhc.inf") file and click "Open"
15. When you get back to the "Install from Disk" dialog, click "OK".
16. Click the *Next* button.
17. Click the *Finish* button.
18. Reboot.

Manually Updating Tricoder High Speed USB Driver on Windows 2000

1. Plug the Tricoder into the computer's USB port and turn it on. Make sure it is in High Speed mode, (go to the Data Collection? Y/N prompt).
2. In Windows, go to: *Start | Settings | Control Panel | System*.
3. Click the *Device Manager* option in the *Hardware* tab.
4. Now select the *View Devices By Type* option in the *View* menu (should be the default).
5. Click the "+" sign next to "Universal Serial Bus Controllers"
6. Right-click on "TriCoder" and select "Properties"
7. Select the "Driver" tab and click "Update Driver"

8. Click the "*Next*" button in the Device Driver Wizard
9. Select "*Search for a suitable driver for my device (recommended).*" and click "*Next*"
10. Select "*Specify a location*" and click "*Next*"
11. Browse to the **Worth Data Utilities** CD ROM of the folder where you unpacked files downloaded from www.barcodehq.com and click "OK"
12. Choose "*Install one of the other drivers*" at the bottom of the dialog and click "*Next*"
13. In the next dialog, choose "*TriCoderUSB*", (NOT "*TRICODERUSB*" which is the old driver), (future will be *TriCoderHCUSB*) and click "*Next*"
14. When it asks you to insert disk, click "*OK*"
15. Browse to the directory where you unpacked the files and click "*OK*"
16. Click "*Finish*"

Manually Updating Tricoder USB Driver on Windows 98/Me

1. Plug the Tricoder into the computer's USB port and turn it on. Make sure it is in High Speed mode, (go to the Data Collection? Y/N prompt).
2. In Windows, go to: *Start | Settings | Control Panel | System.*
3. Now select the *View Devices By Connection* option.
4. For USB devices, navigate to *Standard PC | PCI bus | PCI To USB Universal Host Controller | USB Root Hub | TricoderUSB*, (future will be *TriCoderHCUSB*).
5. Select *Properties*.
6. Click the *Update Driver* button in the *Driver* tab.
7. Click the *Next* button.
8. Check the *Only Specify A Location* check-box.
9. Click the *Next* button.
10. In the input box that is displayed, enter the path to the **Worth Data Utilities** CD or the folder where the downloaded driver files have been extracted.
11. Click the *OK* button.
12. Click the *Next* button.
13. Click the *Finish* button.
14. Reboot.

Resolving incomplete, aborted or incorrect HID driver installation

This driver is provided with Windows. Most recent versions of Windows include necessary files in the installed Windows folder so driver installation is easy if not automatic. It is possible for the user to cancel the HID driver installation before it is completed and this results in a problem.

Restarting Windows and re-attaching the TriCoder does NOT initiate a re-installation. The TriCoder may hang with the message:

**USB enumeration
Please Wait...**

when attempting to re-attach, or it may appear to attach correctly but not operate in keyboard mode.

In either case, the user must physically attach the TriCoder, turn it on and press a key on the TriCoder to get past the startup prompt. If the TriCoder was initially configured as "High Speed USB" then set it for "Non-Portable mode" to force HID keyboard enumeration. The user must then go into the device management utility in Windows. Location and operation of the device management utility is different depending on the version of Windows:

Windows® XP & Vista:

1. Go to the *Start* menu.
2. Select *Control Panel*.
3. Switch to "*Classic View*" if in "*Category View*"
4. Select "*System*".
5. Select "*Hardware*" tab.
6. Select "*Device Manager*"
7. Double Click on the "*Human Interface Devices*"
8. Locate the USB Human Interface Device with a "!" in the icon.
9. Click on *Update Driver*
10. Follow instructions. If XP fails to find the driver on the computer's hard disk, you may have to insert and point to the original Windows XP CD to complete the installation.
11. Click "*Finish*"

Win98/ME:

1. Go to the "*Start*" menu.
2. Go to "*Settings*".
3. Select "*Control Panel*".
4. Go to "*System*".
5. Click on the "*Device Manager*" tab.
6. Double Click on the "*USB Human Interface Devices*" (it may be titled *TriCoder HID Keyboard* instead).
7. Now click on the "*Reinstall Driver*" button.
8. Follow directions. If the installer cannot find the right driver file on your hard disk, you may have to insert the original Windows 98

- CD and point to it to complete the installation.
9. Click "*Finish*".

Win2000:

1. Log on as *Administrator* and open the "*Administrative Tools*" folder in your *Control Panel*.
2. Run the "*Computer Management*" utility.
3. Select the "*Tree*" tab on the left panel
4. Find the "*Device Manager*" entry under "*System Tools*" and click on it. The right panel will display current devices.
5. Problem devices will be identified with an "!" icon. Find either the "*HID Keyboard Device*" under *Keyboards* or the "*USB Human Interface Device*" under *Human Interface Devices* and double-click on one of those entries.
6. Now select the "*Driver*" tab at the top of the window and click on the "*Update Driver*" button. Follow the prompts to re-install the HID driver.

Specifications for Code 39

Code 39 (or Code 3 of 9) is the de facto standard of non-retail American industry. It is widely used in the automotive industry (AIAG specifications) as well as in government and military applications (LOGMARS specifications). Code 39 is flexible, features a large character set, variable data length and density, and bi-directional readability. Code 39 is extremely accurate; substitution errors are almost nonexistent. Its character set consists of numbers 0 through 9, upper case A-Z, and characters *Space*, \$, %, / + and -.



The name "Code 39" comes from both the fact that its character set originally contained 39 characters (it now has 43) and from its structure. Each character is formed of three wide and six narrow elements, made up of five bars and four spaces. Code 39's density can vary from a low of .75 characters per inch (cpi) to a high of 9.4 cpi. There should be a ¼" "*quiet zone*" (white space) to the left and right of the bar code.

Code 39 uses an asterisk (*) as a start and stop character. This character must precede and follow the data in the bar code. The TriCoder gives you the option of transmitting or not transmitting these characters when the bar code is read.

Exact specifications for Code 39 and other bar code symbologies can be obtained from ANSI at the address below:

American National Standards Institute
Customer Service
11 West 42nd St.
New York, NY 10036
<http://web.ansi.org>
document ANSI/AIM BC1-1995

Code 39 has several advanced features and functions that are discussed further in this appendix.

Code 39 Advanced Features and Functions

Mod 43 Check Character

Standard Code 39 can be printed with a "Mod 43 Check Character". This Mod 43 check character *cannot* be used with **Full ASCII Code 39**. The check character is derived by assigning a value to each character in the data to be bar coded from the table as follows:

Char	value	Char	value	Char	value	Char	value
0	0	B	11	M	22	X	33
1	1	C	12	N	23	Y	34
2	2	D	13	O	24	Z	35
3	3	E	14	P	25	-	36
4	4	F	15	Q	26	.	37
5	5	G	16	R	27	space	38
6	6	H	17	S	28	\$	39
7	7	I	18	T	29	/	40
8	8	J	19	U	30	+	41
9	9	K	20	V	31	%	42
A	10	L	21	W	32		

Table A-1. Mod 43 Check character calculation for Code 39

Here is an example to illustrate how the check character is calculated for bar code data of **123XYZ**:

1. Take the sum of the values assigned to each character:

$$\mathbf{1 + 2 + 3 + 33 + 34 + 35 = 108}$$

I 2 3 X Y Z

2. Divide the sum by **43**: (thus the name modulus 43)

$$\mathbf{108/43 = 2 \text{ with a Remainder of } 22}$$

3. Find the character corresponding with the remainder.

M (value 22) is the CHECK CHARACTER

The data becomes **123XYZM**, with **M** added as the Mod-43 check character.

Full ASCII Extension to Code 39

"Full-ASCII Code 39" expands the Code 39 character set to include all 128 ASCII characters. Symbols 0-9, A-Z and punctuation characters . and - are identical to their Code 39 representations. Lower-case letters, additional punctuation characters and control characters are represented by sequences of *two Code 39* characters.

This table depicts the Full ASCII character set as a function of Code 39 characters:

ASCII	Code 39	ASCII	Code 39	ASCII	Code 39	ASCII	Code 39
NUL	%U	SP	Space	@	%V	`	%W
SOH	\$A	!	/A	A	A	a	+A
STX	\$B	"	/B	B	B	b	+B
ETX	\$C	#	/C	C	C	c	+C
EOT	\$D	\$	/D	D	D	d	+D
ENQ	\$E	%	/E	E	E	e	+E
ACK	\$F	&	/F	F	F	f	+F
BEL	\$G	'	/G	G	G	g	+G
BS	\$H	(	/H	H	H	h	+H
HT	\$I	)	/I	I	I	i	+I
LF	\$J	*	/J	J	J	j	+J
VT	\$K	+	/K	K	K	k	+K
FF	\$L	,	/L	L	L	l	+L
CR*	\$M	-	- or /M	M	M	m	+M
SO	\$N	.	. or /N	N	N	n	+N
SI	\$O	/	/O	O	O	o	+O
DLE	\$P	0	0 or /P	P	P	p	+P
DC1	\$Q	1	1 or /Q	Q	Q	q	+Q
DC2	\$R	2	2 or /R	R	R	r	+R
DC3	\$S	3	3 or /S	S	S	s	+S
DC4	\$T	4	4 or /T	T	T	t	+T
NAK	\$U	5	5 or /U	U	U	u	+U
SYN	\$V	6	6 or /V	V	V	v	+V
ETB	\$W	7	7 or /W	W	W	w	+W
CAN	\$X	8	8 or /X	X	X	x	+X
EM	\$Y	9	9 or /Y	Y	Y	y	+Y
SUB	\$Z	:	/Z	Z	Z	z	+Z
ESC	%A	;	%F	[	%K	{	%P
FS	%B	<	%G	\	%L	|	%Q
GS	%C	=	%H	]	%M	}	%R
RS	%D	>	%I	^	%N	~	%S
US	%E	?	%J	_	%O	DEL	%T, %X

Table A-2. Full ASCII Table

Function/Control Key Support in Wedge Mode

The TriCoder, when in keyboard wedge mode or serial PC Terminal mode, can transmit **Function, Control, Alt** and **Shift Keys** for use with software programs that use these keys for menus or commands. For example, when the TriCoder reads a bar code containing the Code 39 characters for SOH (Control-A), it will transmit the corresponding function key, F1 to your computer.

These "keys" are created by combining two Code 39 characters. In order to read them and have them interpreted as the correct keystroke, the bar code reader must have "**Full ASCII Code 39**" reading enabled. The following chart shows the encoding scheme for both IBM and Macintosh computers.

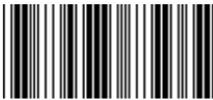
Full ASCII Code	Code 39	IBM PC key transmitted	Mac key transmitted
SOH	\$A	F1	F1
STX	\$B	F2	F2
ETX	\$C	F3	F3
EOT	\$D	F4	F4
ENQ	\$E	F5	F5
ACK	\$F	F6	F6
BEL	\$G	F7	F7
SO	\$N	F8	F8
LF	\$J	Num Pad 5*	Enter
CR	\$M	Enter	Return
SI	\$O	F9	F9
DLE	\$P	F10	Command On
DC1	\$Q	Del	Del
DC2	\$R	Insert	Command Off
DC3	\$S	Left Arrow*	Left Arrow
DC4	\$T	Right Arrow*	Right Arrow
NAK	\$U	Down Arrow*	Down Arrow
SYN	\$V	Up Arrow*	Up Arrow
VT	\$K	Page Up*	Page Up
FF	\$L	Page Down*	Page Down
ETB	\$W	Home*	Home
CAN	\$X	End*	End
EM	\$Y	Shift On	Shift On
SUB	\$Z	Shift Off	Shift Off
FS	%B	Control On	Control On
GS	%C	Control Off	Control Off
RS	%D	Alt On	Option On
US	%E	Alt Off	Option Off

*Refers to the keys on the Number Pad on the far right side of a PC keyboard

Table A-3. C39 Keyboard Support for IBM and Mac

Code 39	IBM Key Sequence	Mac Key Sequence	Code 39	IBM Key Sequence	Mac Key Sequence
%U0	Insert	Ins	%U6	Right Arrow	right arrow
%U.	Delete	del	%U7	Home	home
%U1	End	end	%U8	Up Arrow	Up arrow
%U2	Down Arrow	down arrow	%U9	Page Up	page up
%U3	Page Down	page down	%UC	Windows ON	control ON
%U4	Left Arrow	left arrow	%UD	Windows OFF	control OFF
%U5	Line Feed	Line Feed	%UE	ENTER (num)	ENTER (num)

This chart corresponds to the small center section of keys between the main letter keys and the numeric keypad on the right of the keyboard. If you are using **MAC AND USB**, in order to emulate the arrow keys, you **MUST USE THE COMMANDS AS SHOWN ABOVE**. You can scan them from the FULL ASCII MENU, for example, to emulate the "Left Arrow" key on the Mac (USB) scan the "NUL" (which represents "\$U") bar code and then the "4" bar code from the menu.



Ctrl C

The SHIFT, CTRL, & ALT (Command and Option for MAC) keys must use ON (key pressed) and OFF (key released) bar codes to properly emulate keyboard functions. For example, to encode a bar code sequence for Ctrl-C, you would create a bar code of Ctrl ON, C, and Ctrl OFF.



ASCII 250

You can also enter any value from ASCII 000 to 255. For example, to enter ASCII 250, encode **Alt On, Down Arrow** (number 2 on number pad), **LF** (for the unmarked 5 on number pad), **Insert** (number pad for 0) & **Alt OFF**.



F11

F11 and **F12** are created by encoding *NULLF1* and *NULLF2* as bar codes. Using the table on the previous page, the coding sequence for F11 would be %U\$A and F12 would be %U\$B

Special key sequences for USB

If you are using the TriCoder attached to a **USB** port, you can emulate the "Windows" key on a PC or the "Command" key on a Mac by encoding ON (key pressed) and OFF (key released) sequences. %UC is *ON*, %UD is *OFF*.

Older TriCoders (pre-06/99) can emulate the same key sequences by programming "make" and "break" hex scan codes in the *Preamble* or *Postamble* (NON PORTABLE mode only).

``E01F`N`E0F01F``

where E01F is the "make" code for "Windows key" ON or "Command key" ON, N is any keystroke, and E0F01F is the "break" code for "Windows key" OFF or "Command key" OFF. You must use the **right `** and **left `** apostrophes exactly as shown in the code above.

Function/Control Key Support with PortKey

The TriCoder in RS-232 ASCII mode using PortKey can emulate the special keys on the PC keyboard. PortKey expects the "extended key code" convention outlined in the BASIC manuals and most compiler manuals. For example, to transmit a F1 key from a serial TriCoder to the keyboard, a *null* (ASCII 0) followed by a *semicolon* (ASCII 59) would be required. You can use Full ASCII Code 39 or Code 128 to transmit the required sequences. The following is a list of the most common keys, the required codes and the equivalent Code 39 characters:

PC Key	ASCII Character	Code 39
Ctrl @	0,3	%U\$C
Ctrl A	2 (SOH)	\$A
Ctrl B	3 (STX)	\$B
Ctrl C	4 (ETX)	\$C
Ctrl D	5 (EOT)	\$D
Ctrl E – Ctrl Y	6 (ENQ) – 25 (EM)	\$E - \$Y
Ctrl Z	26 (SUB)	\$Z
Ctrl [	27 (ESC)	%A
Ctrl \	28 (FS)	%B
Ctrl]	29 (GS)	%C
Ctrl ^	30 (RS)	%D
Ctrl _	31 (US)	%E
F1	0,59 (Null ;)	%U%F
F2	0,60 (Null <)	%U%G
F3	0,61 (Null =)	%U%H
F4 – F9	0,62 (Null >) – 0,67 (Null C)	%U%I - %UC
F10	0,68 (Null D)	%UD (or %U /D)
Home	0,71 (Null G)	%UG (or %U /G)
Up Arrow	0,72 (Null H)	%UH
Pg Up	0,73 (Null I)	%UI
Left Arrow	0,75 (Null K)	%UK
Right Arrow	0,77 (Null M)	%UM
End key	0,79 (Null O)	%UO
Down Arrow	0,80 (Null P)	%UP
Pg Dn	0,81 (Null Q)	%UQ
Ins	0,82 (Null R)	%UR
Del	0,83 (Null S)	%US
Shift F1	0,84 (Null T)	%UT
Shift F2 – Shift F9	0,85 (Null U) – 0,92 (Null \)	%UU – %U%L
Shift F10	0,93 (Null])	%U%M
Ctrl F1	0,94 (Null ^)	%U%N
Ctrl F2 – Ctrl F9	0,95 (Null _) – 0,102 (Null f)	%U%O – %U+F
Ctrl F10	0,103 (Null g)	%U +G
Alt F1	0,104 (Null h)	%U +H
Alt F2 – Alt F9	0,105 (Null i) – 0,112 (Null p)	%U+i - %U+p
Alt F10	0,113 (Null q)	%U +q

Table A-4. Function and Control Key Support with Portkey

Accumulate Mode

Accumulate Mode is an option allowing the TriCoder to accumulate multiple bar codes in its buffer, then transmit them to the computer as if they had been a single bar code. This is useful for entering quantities and other variable data.

Accumulate Mode works with Code 39, Code 93 and Code 128 only and can't be used with a check digit. When the TriCoder reads a bar code with a **space as the first character**, it beeps and buffers the data without transmission. It continues to read and buffer bar codes (up to 40 characters) until it reads a bar code **without a leading space**. Once it reads this last bar code, the entire buffer (including that last code) is transmitted as one long bar code. A "double-minus" sign (--) bar code clears the buffer. Scanning a "backspace" code (\$H in Code 39) backspaces in Full ASCII mode. The **ENTER** code on this Barpad is a Code 39 *Start/Stop Character* only and assumes you have a *Terminator Character* specified. If you do not have a *Terminator Character* programmed in your TriCoder, substitute the bar code for **CR** from the **FULL ASCII MENU**.

Accumulate Mode must be turned on using the bar coded Setup Menu or by using the keypad and going into "Change Setup" while in **PROGRAMMING MODE**. *Accumulate Mode* is located in the Code 39 parameters. Choose **4** to *Enable* or **5** to *Disable* this feature.

This numeric Code 39 "Barpad" illustrates **ACCUMULATE Mode**. Scan **5**, **3**, **8**, and **Enter**. The TriCoder transmits a single message of "538".



0



1



2



3



4



5



6



7



8



9



Clear



Backspace



Enter

Code 128 Specifications

Code 128 is a very powerful bar code, combining an extensive character set and variable length with compactness and error checking. The character set contains all 128 ASCII characters with each character made up of three bars and three spaces. (No double characters are required to make up lower case and special characters). Each element (bar or space) varies from one to four units in width, totaling 11 units of width per character. Code 128 contains two levels of error checking:

- Each character is checked for internal parity, **and**
- The last character is a checksum.



12345

Code 128 has three subsets, A, B and C. Subset A contains alphanumeric characters and unprintable control characters, subset B contains alphanumeric characters plus printable control characters and subset C contains only numeric characters and uses a 2-character encoding scheme to create a more compact bar code. Code 128 uses an internal Mod 103 check character that is not displayed by the bar code reader. Code 128 bar codes can be made up of only one subset or may be a combination of several.

The Code 39 features of **Accumulate Mode**, **Caps Lock ON** and **Caps lock OFF** also apply to Code 128.

UCC-128/ EAN-128

UCC-128/EAN-128 Code is a subset of Code 128 adopted by the UCC and EAN council's product, container, and shipping label symbology. UCC/EAN-128 bar codes always start with a Function Code 1 character. In addition, all variable length fields are terminated by a Function Code 1 character unless they are the last field in the bar code.

The TriCoder outputs the following for the special function codes and start sequences:

JC1 Start C/Function Code 1

^] (GS) Function Code 1 as a variable string terminator

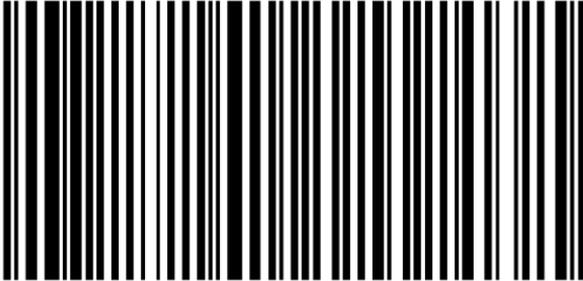
If **UCC/EAN 128** is *enabled*, the reader looks for the Function Code 1 as the leading character, and treats all such codes as UCC/EAN 128 bar codes.

A subset of UCC/EAN-128 is the **UCC or EAN Serial Shipping Container Code**; its specification calls for a 19 digit UCC/EAN 128 code with an additional Mod 10 Check digit (20 digits in all). The Mod 10 Check digit is calculated the same as the *Interleaved 2 of 5* example in **Appendix J**. It is the 20 digit data length (including the MOD 10 check digit) and the MOD 10 check calculation that distinguishes the *UCC Serial Shipping*

Container Code from other UCC /EAN 128 bar codes.

UCC/EAN 128 is enabled by scanning the appropriate bar codes on the *TriCoder Setup Menu*. If UCC/EAN 128 is **enabled**, you will be able to read standard Code 128 bar codes, any UCC/EAN 128 bar code, as well as the 19 digit UCC/EAN 128 bar codes with the *Function 1* character and the Mod 10 check character. (Any 19 digit UCC/EAN 128 code will not be read unless the 20th digit computes as a valid Mod 10 check digit.

(00) 1 0028028 300055004 6



UCC 128 Shipping Container Code

The UCC 128 specification is used extensively by the retail industry. If you have a requirement for a **UCC 128 Serial Shipping Container** bar code, be sure to follow the specification as closely as possible as many vendors will impose fines for non-conformance. For more information on UCC 128, contact the Uniform Code Council at:

Uniform Code Council, Inc.
7887 Washington Village Drive, Suite 300
Dayton, OH 45459
937-435-3870
937-435-7317
info@uc-council.org
8:00 a.m. to 6 p.m. EST

Many of the specifications are available online at:

<http://www.uc-council.org>

Interleaved 2 of 5 Code

Interleaved 2 of 5 Code is a numeric-only, even-number-of-digits bar code. It is widely used in warehouse and industrial applications. A combination of five elements, two wide and three narrow represent each character. Odd-number position digits are encoded in the bars, even-number positions in the spaces.



123456

Interleaved 2 of 5 Code is so susceptible to partial scans being interpreted as valid reads that we recommend only one length of I 2 of 5 to be read. Using one length of data allows the TriCoder to ignore any valid partial reads. As shipped, the TriCoder is set to look for a 6 digit I 2 of 5 code, but you can set the length to something different using the TriCoder Setup Menu. Setting the length to **00** digits allows variable length bar codes scanning. If you must use the **00** setting, you must use the “*Minimum/Maximum*” data length field when creating a program in the TriCoder to check each field for the proper length; otherwise, expect partial (bad data!) reads (misreads!).

A Mod 10 Check Digit is optionally available for use with I 2 of 5. The exact check digit calculation is illustrated below.

Interleaved 2 of 5 Mod 10 check digit calculation

1. Assume that the bar code data is **1987**.
2. Starting with the least significant digit (in this case, a 7), label the digits alternatively even and odd.

7 - even

8 - odd

9 - even

1 - odd

3. Take the sum of the odd digits: **$8 + 1 = 9$**
4. Multiply the sum of the even digits by 3: **$(7 + 9) \times 3 = 48$**
5. Add the results of steps 3 and 4: **$9 + 48 = 57$**
6. Subtract the result of step 5 from the next highest multiple of 10:
 $60 - 57 = 3$
7. The checksum becomes the low-order digit: **19873**
8. Because the data now has an odd length, a leading zero is added, for the final result of : **019873**

UPC Specifications



UPC symbols are found on almost all grocery products and many other retail items. The UPC code most people are familiar with (UPC-A) is a fixed-length (12 digits) numeric only code, with the first digit controlled by UPC coding assignments and the last digit a checksum. UPC-E and UPC-E1 are variations of the standard UPC-A code. Each digit is constructed of two bars and two spaces. UPC has very precise standards of code size, structure, and numbers to be used.



EAN is an international superset of UPC. EAN-13 has 13 digits, with the first two digits representing a country code. The final digit is, as with UPC, a check digit. EAN-8 is a shorter version on the EAN-13 code containing seven data digits and ending again with a checksum.

The exact UPC/EAN symbol specifications are available from:

GS1 US
7887 Washington Village Drive, Suite 300
Dayton, OH 45459
937-435-3870
937-435-7317
info@gs1us.org
8:00 a.m. to 6 p.m. EST

Specifications are also available via the internet at:

<http://www.gs1us.org>

Keep the following guidelines in mind when printing UPC bar codes:

- If you plan to use a "supermarket-type" in-counter scanner to read the codes, specify a bar code height of at least .9" for an optimal first read rate.
- Make it an early practice to observe the numbering conventions of the GS1 UPC Council. Do not label unmarked merchandise with a bar code whose numbers may conflict with those already assigned. If products with these numbers are not in your store now, they are likely to be in the future, causing conflicts in your inventory system.
- The leading **Number System Character**, (the first number of the 11 digits to be entered) should conform to these UPC assignments:

- 0,6,7,8** Regular UPC 12 digit codes with numbers assigned by the UPC Council. (Do not use **0** as the leading number for in-store marking).
- 2** Store-marked random weight items of meat and produce.
- 3** Reserved for National Drug Code and Health Related Items.
- 4** Use this leading digit for in-store marking of non-food items.
- 5** Reserved for coupons. Do not use this today, or you will not be able to process coupons through your system tomorrow.

UPC 2 and 5-character supplemental codes



The UPC standards include the addition of a 2 or 5-character supplemental code used with magazines and paperback books. To read the supplements, you must first enable them using the TriCoder Setup Menu.

NOTE: *Enabling the supplements disallows the reading of UPC codes from right to left to assure*

that the supplement does not get missed.

UCC/EAN Extended Coupon Code

Enabling supplements also allows reading of the Extended Coupon Codes, providing that the UPC's NSC is a 5 or the EAN's country code is 99. The supplement is a Code 128 bar code in an Extended Coupon Code.

ISBN Specifications

ISBN (International Standard Book Numbering) bar codes are essentially EAN-13 with a 5 digit supplement, where the first 3 digits are the Bookland country codes of **978** for books and **977** for periodicals. Although the bar code contains 18 characters, the ISBN format uses only 9 of them, along with a newly calculated Mod-11 check digit. For example, a bar code containing the numbers 978055337062153495 would transmit as 0553370626 in the ISBN format. The TriCoder has the option of transmitting in the ISBN format.



ISBN specifications are available from:

**American National Standards Institute
Customer Service
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The UPC/EAN checksum character

The last character in a UPC-A, UPC-E, UPC-E1, EAN-13 or EAN-8 bar code is the checksum. For reference, these are the methods of calculation:

Checksum calculation for UPC-A, EAN-13 and EAN-8

Use Worth Data's phone number (it's not a real UPC-A code) as sample data:

18314589938

Assign even and odd positions, starting at the right and moving left:

8	3	9	9	8	5	4	1	3	8	1
odd	even	odd								

1. Starting with the leading digit, 8, take the sum of all the characters in the odd positions.

$$8 + 9 + 8 + 4 + 3 + 1 = 33$$

2. Multiply the result of step 1 by 3.

$$33 \times 3 = 99$$

3. Now take the sum of all the even-position characters.

$$3 + 9 + 5 + 1 + 8 = 26$$

4. Add the result in Step 2 to the result in Step 3.

$$99 + 26 = 125$$

5. Subtract the result from the next higher multiple of 10.

$$\text{Next higher multiple of 10 over 125} = 130$$

$$130 - 125 = 5$$

5 is the *Modulo-10* check character. The data to be printed becomes:

183145899385

This same formula is used for EAN-13 (using the 1-12 digits) and EAN-8 (using the 1-7 digits).

UPC-E Checksum Calculation

Use the sample data of 123456 to demonstrate the UPC-E checksum calculation:

1. The 6 digit UPC-E code is converted to a 10-digit code, using an expansion scheme based on the sixth digit:

If the code ends in:	UPC-E Data	Insertion Digits	Insertion Position	10 digit code
0	abcde 0	0000	3	ab 0000 cde
1	abcde 1	1000	3	ab 1000 cde
2	abcde 2	2000	3	ab 2000 cde
3	abcde 3	0000	4	abc 0000 de
4	abcde 4	0000	5	abcd 0000 e
5	abcde 5	0000	6	abcde 0000 5
6	abcde 6	0000	6	abcde 0000 6
7	abcde 7	0000	6	abcde 0000 7
8	abcde 8	0000	6	abcde 0000 8
9	abcde 9	0000	6	abcde 0000 9

Because the sample UPC-E code ends in a **6**, the insertion digits **0000** are inserted at the **sixth digit** (insertion position 6):

1234500006

2. Add the **Number System Character** of 0 to the sample data:

01234500006

3. Use the UPC-A check digit calculation described in the previous section to produce a check digit as if it were a UPC-A code. The check digit for the sample data is:

5

4. The complete 8 digit code consists of the *Number System Character*, the *original 6 digit code* and the *check digit*:

01234565

Codabar Specifications

Codabar is widely used in libraries, blood banks, the cotton industry and transportation industries. Its character set consists of numbers **0** through **9**, and punctuation characters **+**, **.**, **-**, **/**, **:** and **\$**. Symbols **a**, **b**, **c**, **d**, **t**, **n**, ***** and **e** are used as start and stop characters. Characters are constructed of four bars and three spaces.



a12345b

Codabar is a numeric-only code, but different combinations of start and stop characters can be used to identify different types of labels. Codabar's variable data length and extremely low error rate make for a versatile bar code.

Codabar start/stop transmission

The Codabar section on the TriCoder Setup Menu lets you determine whether Codabar start/stop characters are transmitted or not. If you are varying start/stop characters with different types of labels, you'll want to "**Enable Stop/Start character Transmission**". Start/stop character transmission can also be helpful if you want your program to differentiate between data coming from the TriCoder and data coming from the keyboard. If neither of these situations apply, you'll probably want to disable it.

MSI/Plessey Specifications

Plessey is a variable length numeric only bar code. **MSI Bar Code** is a variable length, numeric-only code with an automatically appended Modulus 10 check digit. MSI is sometimes called *Modified Plessey Code*. If the user specifies an additional check digit, the MSI code can be 14 digits long, otherwise it has a maximum length of 13 characters. This is how the MSI check digit(s) are calculated:

The MSI Mod 10 check digit is calculated as follows:

The example bar code data is:

82345

1. Form a number from the odd positions, starting in the units position.

835

2. Multiply the new number by 2

(835) x 2 = 1670

3. Add the digits of product

1 + 6 + 7 + 0 = 14

4. Add the even digits of the original number to the result in 3

2 + 4 + 14 = 20

5. Subtract the result from the next highest multiple of 10

20 - 20 = 0

6. New Check Digit

0

7. Data with check digit is:

823450

The MSI Mod 11 check digit is calculated as follows:

The example bar code data is:

943457842

Assign a checking factor to each number, starting with the units position of the number (in this example, the **2**) up to the highest order position (the **9**). Use checking factors of:

2,3,4,5,6,7,2,3,4,5,6,7...

Multiply the checking factor with its assigned number and add the products:

$$4 + 12 + 32 + 35 + 30 + 28 + 6 + 12 + 36 = 195$$

Divide the sum by 11

$$195/11 = 17 \text{ remainder } 8$$

Subtract remainder from 11

$$11 - 8 = 3$$

New Check Digit

3

(If the remainder is 10, no check digit is added.)

Data with check digit is:

943457823

Code 93 Specifications

Code 93 is variable length, continuous, bi-directional, compact code. Code 93 is an alphanumeric bar code which consists of *43 data characters (0-9,A-Z,\$/+%. - and Space)*, *4 control characters*, and a *unique start/stop character*. The entire set of 128 ASCII characters is represented in Code 93 using combinations of *control characters* and *data characters*.

The control characters are $\text{\textcircled{\$}}$, $\text{\textcircled{\%}}$, $\text{\textcircled{/}}$, and $\text{\textcircled{+}}$. Full ASCII 93 is created by pairing these control characters with normal data characters. It is almost identical to the pairings for Code 39; Code 39 uses \$M to produce a Carriage

Return (ASCII 13) character -- Code 93 uses $\text{\textcircled{\$}}$ M to produce the Carriage Return.

Code 93's two built-in check digits greatly minimize the possibility of reader substitution errors. These check digits are never transmitted by the bar code reader. Code 93's Start and Stop characters are also never transmitted.

The Code 39 features of **Accumulate Mode**, **Caps Lock ON** and **Caps lock OFF** also apply to Code 128.

If you have not decided which bar code type to use for your application and are considering using Code 93, while we agree that Code 93 is an excellent code, we believe that Code 128 is generally preferable because less space is required. Two space disadvantages of Code 93 are:

1. Code 93 **does not** have the numeric compression capability that 128 does, (compression results in 128's significantly less space for equivalent codes), and
2. Code 93 requires pairings to make all Full ASCII characters while 128 does not, (more space is required for lower case and upper case than Code 128).

ASCII Code Equivalent Table

The 128 ASCII codes and their 3 digit decimal equivalents are detailed in the below table. The RS232 Models use the ASCII; the keyboard wedge models have some of the unprintable ASCII characters reassigned to specific keys, (i.e. SOH is f1).

char	hex	3 digit ASCII									
NUL	00	000	SP	20	032	@	40	064	'	60	096
SOH	01	001	!	21	033	A	41	065	a	61	097
STX	02	002	"	22	034	B	42	066	b	62	098
ETX	03	003	#	23	035	C	43	067	c	63	099
EOT	04	004	\$	24	036	D	44	068	d	64	100
ENQ	05	005	%	25	037	E	45	069	e	65	101
ACK	06	006	&	26	038	F	46	070	f	66	102
BEL	07	007	'	27	039	G	47	071	g	67	103
BS	08	008	(	28	040	H	48	072	h	68	104
HT	09	009	)	29	041	I	49	073	i	69	105
LF	0A	010	*	2A	042	J	4A	074	j	6A	106
VT	0B	011	+	2B	043	K	4B	075	k	6B	107
FF	0C	012	,	2C	044	L	4C	076	l	6C	108
CR	0D	013	-	2D	045	M	4D	077	m	6D	109
SO	0E	014	.	2E	046	N	4E	078	n	6E	110
SI	0F	015	/	2F	047	O	4F	079	o	6F	111
DLE	10	016	0	30	048	P	50	080	p	70	112
DC1	11	017	1	31	049	Q	51	081	q	71	113
DC2	12	018	2	32	050	R	52	082	r	72	114
DC3	13	019	3	33	051	S	53	083	s	73	115
DC4	14	020	4	34	052	T	54	084	t	74	116
NAK	15	021	5	35	053	U	55	085	u	75	117
SYN	16	022	6	36	054	V	56	086	v	76	118
ETB	17	023	7	37	055	W	57	087	w	77	119
CAN	18	024	8	38	056	X	58	088	x	78	120
EM	19	025	9	39	057	Y	59	089	y	79	121
SUB	1A	026	:	3A	058	Z	5A	090	z	7A	122
ESC	1B	027	;	3B	059	[	5B	091	}	7B	123
FS	1C	028	<	3C	060	\	5C	092	|	7C	124
GS	1D	029	=	3D	061	]	5D	093	{	7D	125
RS	1E	030	>	3E	062	^	5E	094	~	7E	126
US	1F	031	?	3F	063	_	5F	095	DEL	7F	127

Table H-1. Full ASCII Equivalent Table

RS-422

Using the TriCoder with an RS-422 board instead of a standard RS-232 serial port allows multiple TriCoders to be multi-dropped off of a single RS-422 port at a distance up to 4000 feet. Multiple TriCoders can then be polled periodically while they are collecting data. To be used with a RS-422 board, the TriCoder must have the 422 option factory installed.

RS-422 boards are available from a variety of sources. The specifications vary for different RS-422 boards, so make sure you have proper documentation for your board.

The biggest problem we see with RS-422 multi-dropping has to do with cabling. Follow the specifications for the cabling exactly as they are shown. Use only the wire specified (don't use whatever is lying around) and be sure to test your communications thoroughly before going on-line with a large installation.

You can use the following pin-outs to create your own RS-422 multi-drop cables:

1. Tying **T+** on the TriCoder end to the **R+** on the continuous 422 line.
2. Tying **T-** on the TriCoder end to the **R-** on the continuous 422 line.

Function	Mod 8
Transmit Data + (T+)	2
Transmit Data - (T-)	3
Ground	4
Receive Data + (R+)	5
Receive Data - (R-)	6

Table N-1. RS-422 Multi-drop cable

*You must have **T+/T-** in one twisted pair and **R+/R-** in the other.*

At the end of the string of TriCoders, tie pins 2&3 and 5&6 together with 120 ohm resistors or order our 422 terminator plug. Use **Belden 1227AI** or Cat 5 wire for all of the 422 cabling above.

Polling and how it works

Polling is the operation where a TriCoder records data (either scanned or entered on the keypad) and buffers it until the host computer asks the TriCoder to transmit the data. The request for the data from the host is called a "poll". The TriCoder then transmits its data (along with its ID character to identify which TriCoder the data came from) to the host and goes on to record another piece of information and wait for its next poll. Polling is not considered a "portable" operation and requires that you use the 5 volt power adapter with the TriCoder. Polling works only with serial interface readers.

Polling with the TriCoder

Here is what polling looks like on the TriCoder:

The TriCoder reads a code, beeps once, and displays the data on the 1st line and **WAITING ON POLL** on the 2nd line. The TriCoder stores the data in its buffer, waiting for the host to ask for it. For the purposes of this explanation, let's suppose that the person using a TriCoder with the ID character "a" just read the bar code **123456** and the person using TriCoder "b" is on a lunch break. The software running on the host computer transmits each of your TriCoders' ID characters one by one over the serial port. As each TriCoder's ID character is transmitted, the TriCoder with the matching ID character responds with one of the following:

1. If the TriCoder has *no* data in its buffer to transmit, it sends back its **ID CHARACTER** *only*.
2. If the TriCoder has data to transmit, it sends back its **ID CHARACTER followed by the data**.

When the host program transmits an "a", the TriCoder with the ID character of "a" responds with "a**123456**". The TriCoder screen goes blank and is ready for more data. When the host computer sends out a "b" polling character, TriCoder "b" responds with a "b" only (its operator is at lunch and has recorded no data). TriCoder "b" then clears its screen and is ready for data. The host software reads the transmitted data from the serial port and processes it according to your needs.

The software can tell which TriCoder transmitted which piece of data by the ID character preceding the data. If you don't care what belongs to what, the ID can be discarded. The computer and TriCoders poll and respond very quickly. People using the TriCoders are seldom conscious of any delay due to polling. The TriCoder Utilities diskette contains a basic program that polls and differentiates between data from three TriCoders that have been assigned ID characters of "a", "b", and "c".

Polling with "Host Response Accepted"

Host Response Accepted is one of the protocols used with Polling. *Host Response Accepted* allows the TriCoder to act on data received from the

host computer. The host can send data to the TriCoder to control the beeper, display data on the TriCoder screen or broadcast a voice message. If you are using the *Host Response Accepted* Protocol setup option, observe the following rules:

1. To prevent conflict between ID characters and data characters, the displayable **data characters** must be limited to **ASCII 32-95**. In other words, **no lower case letters** are permissible.
2. **ID characters** must be ASCII 96-127.
3. A displayable prompt must be terminated by a **CR** *unless* you are sending TriCoder beeper control characters **BEL**, **DC2**, or **nnDC4** (where *nn* is the voice message number). The beeper control characters are the termination for the prompt instead of a **CR**. A displayable prompt can also be a single character of **CR**, **BEL**, **DC2**, or **nnDC4**.
4. In order to prevent the loss of a message from the host, the TriCoder *locks out* scanning or keyboard data entry until it receives a valid prompt from the host. The Tricoder displays the following message until it receives the prompt:

WAITING ON PMPT

If you want to change *anything* (including scanning the Setup Menu) *without* receiving the expected prompt from the host, you must first press the **CLEAR** key on the TriCoder keypad.

Polling with ACK/NAK

The **Polled with ACK/NAK** option allows for greater data accuracy by using ACK/NAK protocol while polling. The TriCoder appends two checksum characters upon transmission of its data. The host computer receives this data, calculates the checksum then compares it to the checksums transmitted by the TriCoder. If they are the same, the host sends an ACK (ASCII 6). If they are different, the host sends a NAK (ASCII 21). If the TriCoder receives 10 NAK's in a row, it suspends operation.

Sometimes it is desirable to know whether the TriCoder is "**waiting on a poll**" or "**waiting on an ACK/NAK**". A setup parameter is available that displays either the message **WAITING ON POLL** or **WAIT ON ACK/NAK**, depending on which condition is present. This feature is activated through the bar coded *TriCoder Setup Menu* by scanning **Terminator Character**, then **A**. To get rid of the extra messages, scan **B**.

For more information on *Polling with ACK/NAK* and a sample program (BASIC), see the *TriCoder Utilities* disk.

Modem Uploads

Data collected in the TriCoder can be uploaded to a host via a Hayes-compatible modem. Either the host *or* the TriCoder can initiate the upload by dialing and establishing the connection.

Modem communication is simple on the TriCoder side – it is the host application that can be difficult. Only someone experienced with modem communications in general and has a good understanding of their host application should attempt this type of uploading.

Successful modem communications

Cabling can be the deciding factor in your success or failure to upload via modem. Getting your cables from us can help to eliminate the possibility that your cabling is causing a problem. The F32A and F46B are specially wired for modems; DSR is cut and RTS is jumpered to CTS to defeat the "RTS/CTS enabled" feature on some modems.

Portable modems often require the DTR line to be forced high. The top jumper on the TriCoder circuit board can be set from its default setting of **NC** to **H**. Separate the halves of the TriCoder (by removing the four recessed screws on the back of the Tricoder) and locate the top jumper above the EPROM (labeled with a COPYRIGHT MESSAGE) on the left edge of the board. Move the top jumper from **NC** setting to the **H** side to force DTR to *always* be high. See the diagram in **Appendix B, Firmware and Model Upgrades** for a picture of the TriCoder circuit board.

Dial-up by TriCoder to Host

Dial-up to a host by the TriCoder is fairly simple as long as you make sure that the TriCoder is configured properly. **XMODEM** is the protocol of choice but **Polled with ACK/NAK** can be used also. Using XMODEM with common applications such as Procomm and Windows' Hyperterminal is a popular choice for modem uploads.

Configuring the TriCoder...

To get to the host through an external modem, the TriCoder needs to dial the receiving computer. Use the **Dialing String** parameter (which is limited to use with only the "Polling with ACK/NAK" or XMODEM protocols) on the **Setup Menu**. The **Dialing String** parameter is specified by scanning the following bar codes on the Setup Menu:

1. **Start Setup**
2. **Dialing String**
3. **Up to 24 Characters scanned from the Full ASCII Menu, the last character must NOT be a CR**
4. **SET**
5. **End Setup**

- The dialing string is typically **ATDTnnnnnnnn**, where *n* is any other modem commands and the phone number you are dialing. One command you may find useful is a “pause” in the dialing string. A ½ second pause can be inserted by putting a “~” in the dialing string. Any Hayes-compatible commands can be programmed, but the length of the entire string must be limited to 24 characters.
- Automatically, the TriCoder resets the modem before the first dialing attempt and between dialing attempts. You can vary the length of the delay between dialing attempts (*Retry Delay*) from the standard default of 30 seconds to anything from 01-99 seconds. You cannot make this change by scanning the bar coded TriCoder setup menu; **it can only be made through the keyboard setup** on the TriCoder.

Dialing the host...

After setting the TriCoder to the correct protocol (**Polled with ACK/NAK or XMODEM**), and specifying the *Dialing String*, return to the **Mode Menu** and answer **NO** to the prompts until you see:

**DATA UPLOAD?
KEY [Y/N]?**

- Press the TriCoders “**F2**” key (*not* the “Yes” key) to start the transmission of the *Dialing String* to the Modem.
- The TriCoder first transmits the dialing string, then waits for the modem to answer. If the modem answers, it responds by transmitting a **CONNECT** message which the TriCoder displays on its screen. Because the **CONNECT** message comes so fast, some of the characters in the word **CONNECT** may be missing on the TriCoder display.
- If the TriCoder is unable to make a connection on the first try, it attempts to connect by redialing two more times. The TriCoder uses the *Retry Delay* setup in the TriCoder to determine how long to wait before it tries to dial again. If you do not want the TriCoder to redial, simply turn the TriCoder **OFF**. If the TriCoder is still unable to connect after three attempts, it displays the following message :

**FAILED TO CONNECT
HIT ANY KEY**

XMODEM Upload

XMODEM is by far the modem protocol of choice. It is available in most communications software packages, many of which do not require extensive programming by the user. You can also use **XMODEM** to upload by cable without a modem attached, simply by **not** specifying a **dialing string** in the setup. The TriCoder does not try to dial; it just waits to be

polled by the host computer.

The following information describes what happens during an XMODEM upload:

- After the TriCoder has received the **CONNECT** message from the modem, the TriCoder sends out the following message to the host computer :

**PREPARE TO RECEIVE TRICODER DATA
BY XMODEM**

- Once the host begins the file transfer, the TriCoder transmits its data in accordance with XMODEM protocol.
- At the end of the data transmission, the TriCoder waits 2 seconds then sends out its **EOF String** (if you have one programmed), signaling to the host that the TriCoder is ready to continue. XMODEM does not use the TriCoder's EOF String as an actual *End-Of-File marker*; instead, XMODEM uses the **Hex 1A** character at the end of the file.
- The TriCoder now waits 10 seconds to receive either an **ACK** (hex 06) or an **EOT** (hex 04). An ACK (hex 06) tells the TriCoder to retain the data file just transmitted, an EOT (hex 04) tells it to delete the data file. If the TriCoder receives either character within the 10 seconds, the TriCoder displays the appropriate message:

ACK, FILE SAVED (*If ACK is received*)

Or

EOT, FILE ERASED (*If EOT is received*)

After displaying either message, the TriCoder hangs up the line by sending **+++ATH0**.

- If neither an **ACK** nor an **EOT** is received by the end of the 10 seconds, the TriCoder disconnects the line and displays the following prompt, waiting for action by the operator:

**DELETE DATA FILE?
KEY [YES/NO]?**

Xmodem Procomm Script File

The following Procomm script file is an example of an automated Xmodem file upload from the TriCoder to the host.

```
TRANSMIT "+++ATSO=1^M"
```

```
WAITFOR "CONNECT" 86400
```

```
PAUSE 15
```

```
GETFILE XMODEM "FLE0.DAT"
```

```
PAUSE 3
```

```
TRANSMIT "CHR$(04)" *insert ASCII character 04 to delete the file from the TriCoder
```

```
PAUSE 3
```

```
HANGUP
```

```
PAUSE 3
```

```
EXIT
```

Unattended Dial-up by Host to TriCoder

The TriCoder can also upload its data by waiting for a host computer to initiate the upload. Dialing up a TriCoder from a remote host computer requires the following procedures:

- Use the 5 volt power supply to conserve batteries.
- Set the modem to "Auto-Answer".
- Set the TriCoder to use "Polled with ACK/NAK" or "XMODEM" Protocol. **XMODEM** is the most commonly used and easiest to set up.
- If desired, you can initialize the modem by scanning a bar code "ATSO=1" while in **Non-Portable** mode.
- Start the TriCoder's upload by responding with **YES** to the **DATA UPLOAD?** prompt. The TriCoder then waits to be polled.

See the previous sections on **XMODEM Upload** for details on what happens after the connection is made.

Buffered Terminal Mode

Buffered Terminal Mode is a serial on-line mode, not a portable mode. Using the data prompts in Program #1, the TriCoder prompts the operator for input, writes the data to the TriCoder RAM, and transmits the data upon request from the Host computer using a *Polled with ACK/NAK* protocol. **Buffered Terminal Mode** is designed for the user who has several multi-dropped 422 T53 TriCoders and wants to collect data all day with periodic requests from the host to transmit the data. This mode uses Program #1, Data File #1, and Table #1 only.

Configuring the TriCoder for Buffered Terminal Mode...

Before setting the TriCoder in **Buffered Terminal Mode**, you must complete the following:

1. Upload any data file currently in the TriCoder.
2. Select **RS-422** as the *Computer Interface* on the TriCoder setup.
3. Specify *ID Characters* for each TriCoder in the string. ID characters must be ASCII 96-127.
4. Set the *Baud Rate, Parity, Data Bits, Stop Bits, and EOF String* to match what the host computer program expects.
5. Enter the program you intend to use as prompts in Program #1.
6. The 5Vpower supply **must** be plugged into the TriCoder.

Getting into Buffered Terminal Mode...

Once you have met all of the requirements, put the TriCoder in *Buffered Terminal Mode* by scanning *Operation Mode*, then **6** on the *TriCoder Setup Menu*. This automatically sets the TriCoder to prompt the operator using Program #1 and use a variation of the *Polling with ACK/NAK* communication protocol. Upon entering *Buffered Terminal Mode*, if Program #1 does not exist, or if there is a data file still in the TriCoder, the TriCoder displays an error message then resets itself. It will display the opening screen as though it was turned off then back on.

Operating in Buffered Terminal Mode

These are the steps the TriCoder goes through when operating in Buffered Terminal Mode:

- The TriCoder begins prompting the user according to the prompts stored in Program #1. When the host polls the TriCoder with its ID Character, the TriCoder suspends prompting the operator and transmits the first stored data field in the format of:

ID+ Prefix + Data + CheckSumHigh + CheckSumLow + Suffix + Terminator

- After transmission of each field of data, the TriCoder waits for its **ID character** followed by an **ACK** or **NAK** from the host. If the TriCoder receives a **NAK** from the Host, it re-transmits the data. If the TriCoder receives an **ACK** from the host, it goes ahead and sends the next data field without waiting for another poll; the poll is only necessary to begin the entire transmission. As long as the TriCoder continues to receive **ACKs** from the host, it continues to transmit data until all of the data fields are sent to the host.
- After all of the fields are transmitted, the TriCoder sends the **EOF String** then waits for an **ACK** or **NAK**. If the TriCoder receives an **ACK**, it deletes the data file and returns to prompting the operator using the data prompts in Program #1.
- If the TriCoder receives a poll and its data file is empty, the TriCoder sends back the following string of data:

ID Character + ETX (03) + Terminator

The TriCoder does not expect an ACK or NAK from the host after transmission of this string.

- If the TriCoder times out waiting for an ACK, (maybe it missed it while doing something else), it will transmit the following:

ID Character + EOT (04) + Terminator

This is a signal to the host to discard all of the data just received from that TriCoder. The TriCoder will include all of the same data in the next transmission. The TriCoder does not delete the data when it misses an ACK, it simply goes back to collecting data from the operator. After the program is finished getting rid of that TriCoder's last transmitted data, it should then poll the TriCoder again to re-initiate the data transfer.

*See the **TriCoder Utilities** disk for a program called **BUFFPOLL** for an example of a program to use with **Buffered Terminal Mode**. A **BASIC** program as well as an executable program is included.*

Using the TriCoder as a Time Clock

Time clock applications are a popular use for the TriCoder. The most common ways to use the TriCoder as a time clock utilize either *Buffered Terminal Mode* or *Data Collection Mode*.

In either case, you will want to display the time on the screen of the TriCoder. This is done while creating a program by specifying "**DIS**" (for **DIS**play date and time) in the *DATA ID* field of a:

- **T** (Time Stamp)
- **Y** (Date Stamp)
- **S** (Date and Time Stamp) or
- **D** (Data)

programming "*Statement Entry Type*". The time and/or date is displayed above the next *Data* prompt.

If you have a power failure...

If you are plugged into wall power and there is a power failure, the TriCoder batteries do not take over until you press the ON/OFF key. If you are running in *Buffered Terminal Mode* and this happens, once you go to battery power the TriCoder will display the opening message and go right back to where it was when the power was interrupted.

Setting the time on the TriCoders

To use the time clock function efficiently, you will want the host to be able to set the time on the attached TriCoders. Setting all of the TriCoders from the host ensures that they are all set the same. The TriCoder uses the following protocol to set the time:

1. The host sends **ID+SOH**
2. The TriCoder responds with **ID+<CR>**
3. The host sends **ID+mmddyymmss + 2 chksum bytes + <CR>**
4. If the TriCoder computed checksums match the received checksums, then the TriCoder responds with **ID+ACK**. If the checksums don't match, then the TriCoder responds with **ID+NAK**
5. If the host gets a **NAK**, then start the whole sequence over again by going back to step 1.

See the *TriCoder Utilities* diskette for a program called *TIMESSET* for an example of a program written to set the time on multiple TriCoders. A *BASIC* program as well as an executable program is included.

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