Getting the Most
From Your
Cassette System

by Mickey Schmitt

This book is our gift to
the TI community.

*Copying is permitted
and encouraged.*

Mickey Schmitt
Mike Wright

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1. Introduction

by Mike Wright

When Texas Instruments pulled out of the Home Computer market in 1983 it was assumed that the TI-99/4A would survive for a while and then end up in the obsolescence junkyard. But even TI failed to gauge the near-fanatic loyalty of Home Computer owners. As a result, the TI-99/4A still survives and new hardware and software are still being developed for it.

As power users add hard drives and 80-column video displays, they often sell off less-used equipment. There are also TI owners who sell their equipment at bargain prices in an effort to "trade up" to a state-of-the-art system. (Incidentally, they are often disappointed.) Because of this flux, there are still new TI-99/4A users coming forward having only a minimum system.

Unfortunately, they are often less than adequately cared for. They can get little or no help from TI. Most of the primer TI books have long since disappeared from the bookstores. And even user groups may be reluctant to "lower" themselves to explaining what can be classified as elementary material at a meeting.

Nevertheless, there is a need for such material, and Mickey Schmitt has taken up the cudgels to fill this gap. The first episode of *Getting the Most from Your Cassette System* was published in the newsletter of the West Penn User Group in May 1986. TI neophytes embraced it, and demanded more. Mickey kept on producing until February 1988, by which time the series had grown to 18 articles and was being reproduced in TI newsletters all over the world.

Mickey and I met at a TI show in Harrisburg. I told her that I had access to sophisticated typesetting equipment and that I thought it would be a good idea to preserve her material in collected form for future TI'ers. She sent me a disk with her TI-Writer D/V80 files. These were converted to DOS files using PC-Transfer. The DOS disk was loaded into a PC and the files transferred by Ethernet to the Unix-based Xyvision system where they were tagged and coded for printing. During this process the original material has been updated, corrected and improved. Our hope is that this publication will help the beginning TI-99/4A user derive the maximum benefit from this excellent home computer.

Boston,
February 1990.

1.1. Introduction update

This compilation is a slightly modified version of the original. It was generated by importing and converting the original Xyvision files into WordPerfect 8.0. From WordPerfect, it was then output in Adobe Portable Document Format.

The original Xyvision full-page output was amended manually (cut and paste) by Mickey to include the sections on Cassette Datafile Program, CS1*FINDEX, and the McGovern loader. These were scanned using Omnimark 8.0 and then imported and placed into the WordPerfect 8.0 document using the same heading numbering as the original.

This version includes an addendum, that was not part of the original. The articles in the addendum were written by Mickey, clearly some time after the original version was published.

Notes:

1.   It is unlikely that any of the addresses or prices quoted in the original are still valid.

2.   Mickey Schmitt married and became Mickey Cendrowski.

3.   Clyde Colledge's High-Speed Cassette Loader was withdrawn from distribution by the author, who retained the copyright. Mickey and Clyde were seeing each other (there is a hint of a relationship in her text). Mickey later told me that when they broke up, that was also the end of the cassette loader. However, in her opinion, the McGovern loader did all that the Colledge loader did, and then some.

<div align="right">

Mike Wright
Salem, NH
April 1998

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2. Getting Started

2.1. Equipment

Before you try to do anything with a cassette system, you need to start with the right equipment. There are many different models of standard cassette recorders available which will work with your TI computer (besides the official TI Program Recorder). However, for best operation and a lot less mental aggravation, you should use a cassette recorder with the following features:

1.   **Volume Control**
      For best results this control should be set between the mid-range and maximum settings.

2.   **Tone Control**
      For best results this control should also be set between the mid-range and maximum settings.

3.   **Microphone Jack**
      This jack is needed in order to receive information from your computer.

4.   **Earphone or External Speaker Jack**
      This jack is needed in order to send information to your computer.

5.   **Remote Jack**
      This jack makes it possible for your computer to control your cassette recorder's drive motor — thus your tape recorder will operate by pressing the **ENTER** key on your computer console.

6.   **Digital Tape Counter**
      This is a very important feature, as it will save you a lot of unnecessary aggravation. This feature enables you to easily locate the correct tape position of your program or data file. This is especially useful when you want to store more than one program on the same side of the cassette tape.

Next, you will need to have the TI cassette interface cable which is used to connect your recorder to your computer. Although this cable comes with the official TI Program Recorder, it must be purchased separately if you are using another type of cassette recorder. If you are having trouble finding this cable, you should be able to purchase one from:

Triton Products Company   Tex-Comp
P.O. Box 8123   or   P.O. Box 33084
San Francisco, CA 94128   Granada Hills, CA 91344
Phone: 1-800-227-6900   Phone: 1-818-366-6631

2.2. Connecting Your Cassette Recorder

1.   Locate the nine-pin plug at one end of the cassette recorder's interface cable. Insert this plug firmly into the jack on the right rear of the computer.
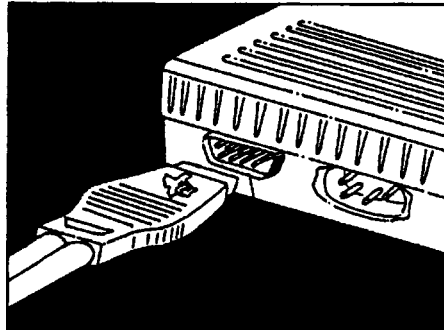
2.   Locate the set of three plugs at the other end of the cable. The wires that lead to these plugs are color-coded: red - white - black.

Black wire to
remote Jack

Connects to 9-pin
outlet on back of
console

White wire to
earphone Jack

Red wire to
microphone Jack
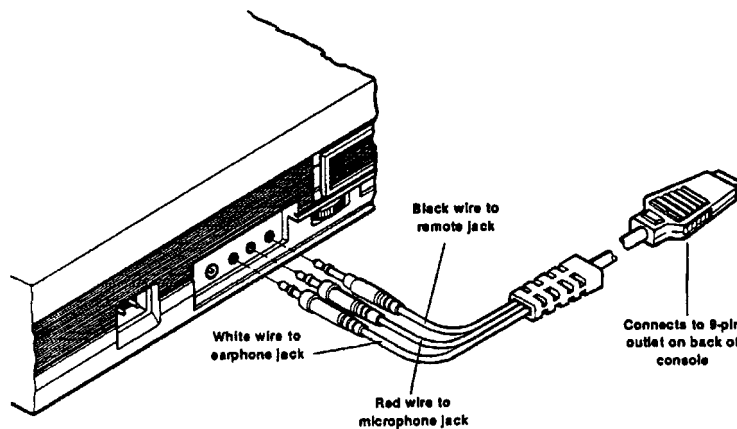
3.   Locate the jacks labeled: MIC-EAR (or external speaker) and REM on your cassette recorder.

4.   Insert the plug with the red wire into the recorder's microphone jack (labeled MIC).

5.   Insert the plug with the white wire into the recorder's earphone (or external speaker) jack (labeled EAR).

6.   Insert the plug with the black wire into the recorder's remote jack (labeled REM).

That's all there is to it! Your cassette system is now ready to go.

3. Loading and Saving Programs

While loading and saving programs with the use of a cassette recorder is not a difficult process in itself — reading and understanding the instructions for the very first time can be quite confusing. With that thought in mind, I have tried to keep these instructions as simple as possible.

3.1. Instructions for Loading Programs

1.   Type: `OLD CS1`

2.   Then: Press **ENTER**

3.   Follow the directions as they appear on your monitor or TV screen:

4.   `* REWIND CASSETTE TAPE CS1`
          `THEN PRESS ENTER`

5.   `* PRESS CASSETTE PLAY CS1`
          `THEN PRESS ENTER`

6.   Computer displays message:

          `* READING`

7.   Computer displays message:

          `* DATA OK`

8.   `* PRESS CASSETTE STOP CS1`
          `THEN PRESS ENTER`

9.   Wait for the flashing cursor to appear in the lower left-hand corner of your monitor or TV screen.

10.   Type: `RUN`

11.   Then: Press **ENTER**

3.2. Instructions for Saving Programs

1.   Type: `SAVE CS1`

2.   Then: Press **ENTER**

3.   Follow the directions as they appear on your monitor or TV screen:

4.   `* REWIND CASSETTE TAPE CS1`
        `  THEN PRESS ENTER`

5.   `* PRESS CASSETTE RECORD CS1`
        `  THEN PRESS ENTER`

6.   Computer displays message:

        `* RECORDING`

7.   `* PRESS CASSETTE STOP CS1`
        `  THEN PRESS ENTER`

8.   Your program is now saved — but you should get into the habit of checking all your programs to be sure that they were saved without error.

3.3. Instructions for Checking Your Saved Programs

1.   Continue to follow the directions as they appear on your monitor or TV screen:

2.   Computer displays message:

        `* CHECK TAPE (Y OR N)?`

3.   Type: `Y`

4.   Follow the directions as they appear on your monitor or TV screen:

5.   `* REWIND CASSETTE TAPE CS1`
        `  THEN PRESS ENTER`

6.   `* PRESS CASSETTE PLAY CS1`
        `  THEN PRESS ENTER`

7.   Computer displays message:

        `* CHECKING`

8.   Computer displays message:

        `* DATA OK`

9.   `* PRESS CASSETTE STOP CS1`
        `  THEN PRESS ENTER`

10.   Your program is now saved — safely and without error.

4. Understanding Cassette Error Codes and Messages

Understanding cassette error codes and messages is not quite as difficult as it may seem. Unfortunately, trying to find a list of error codes and messages that deal specifically with the cassette recorder proved to be more difficult than I had expected.

Basically, cassette error codes and messages can occur during one of two different types of commands. More specifically, I am referring to the loading (`OLD CS1`) procedure and the saving (`SAVE CS1`) procedure.

4.1. Error Codes and Messages that can Occur During the Loading (OLD CS1) Procedure

When the computer finishes loading your data, it will tell you whether or not it read the data properly. If the data were read correctly, you would see the following message appear on your monitor or TV screen:

```
* DATA OK
* PRESS CASSETTE STOP CS1
  THEN PRESS ENTER
```

If, however, the computer did not successfully read your program into memory, an error occurs and the computer prints one of the following error messages:

```
* ERROR - NO DATA FOUND
  PRESS R TO READ CS1
  PRESS C TO CHECK
  PRESS E TO EXIT
```

or:

```
* ERROR DETECTED IN DATA
  PRESS R TO READ CS1
  PRESS C TO CHECK
  PRESS E TO EXIT
```

When this occurs, you will have to choose one of the following three options: R to Read, C to Check, or E to Exit. (Please note, however, that these single-letter responses must be in upper-case letters only.)

1.   Press R to repeat the reading procedure. However, before repeating this procedure, check to make sure that you have put the cassette tape in correctly, that it is the correct cassette tape and that it has been placed in the cassette recorder with the correct side facing up. Then follow the directions as they appear on your monitor or TV screen.

2.   Press C to check the data you have read into memory. At this point you may wish to adjust your cassette recorder's volume control and tone setting. Then follow the directions as they appear on your monitor or TV screen.

3.   Press E to exit from the loading procedure. At this time another error message is displayed, indicating that the computer did not properly read your program into memory:

```
* WARNING:
  CHECK PROGRAM IN MEMORY
* I/O ERROR 56
```

If I/O ERROR 56 appears, something definitely went wrong. But don't panic! Generally speaking, when the error message:

```
* ERROR - NO DATA FOUND
```

occurs, the computer did not recognize the cassette recorder at all during the OLD CS1 routine. On the other hand, when the error message:

```
* ERROR DETECTED IN DATA
```

occurs, the computer recognized only part of the data that the cassette recorder was sending to the computer.

When this happens, recheck your cassette recorder's volume control and tone setting. Then recheck your cassette cable. Make sure that both ends of the cable are firmly attached to the computer and to the cassette recorder. While you are at it, make sure that the color-coded wires leading to the cassette recorder are connected correctly. The cassette recorder will not operate properly if the color-coded wires are reversed!

4.2. Error Codes and Messages that can Occur During the Saving SAVE CS1 Procedure

When the cassette recorder finishes saving your program, the computer will tell you whether or not the program was recorded successfully. If the program was recorded successfully, you would see the following message appear on your monitor or TV screen after you completed the necessary steps in the checking procedure:

```
* DATA OK
* PRESS CASSETTE STOP CS1
  THEN PRESS ENTER
```

If, however, the cassette recorder did not successfully record your program onto the cassette tape, an error occurs and the computer prints one of the following messages:

```
* ERROR - NO DATA FOUND
  PRESS R TO RECORD
  PRESS C TO CHECK
  PRESS E TO EXIT
```

or:

```
* ERROR DETECTED IN DATA
  PRESS R TO RECORD
  PRESS C TO CHECK
  PRESS E TO EXIT
```

When this occurs, you will have to choose one of the following three options: R to Record, C to Check, or E to Exit. (Please note, however, that these single-letter responses must be in upper-case letters only.)

1.   Press R to repeat the recording procedure. However, before repeating this procedure, check to make sure that you have put the cassette tape in correctly, and that there is enough blank tape left on the cassette tape on which to record the program. Then follow the directions as they appear on your monitor or TV screen.

2.   Press C to check the data you have read into memory. At this point you may wish to adjust your cassette recorder's volume control and tone setting. Then follow the directions as they appear on your monitor or TV screen.

3.   Press E to exit from the saving procedure. At this time another error message is displayed, indicating that the cassette recorder did not properly save your program onto the cassette tape:

```
* WARNING:
  CHECK PROGRAM IN MEMORY
* I/O ERROR 66
```

If `I/O ERROR 66` appears, something definitely went wrong. But don't panic! Generally speaking, when the error message:

```
    * ERROR - NO DATA FOUND
```

occurs, the computer did not recognize the cassette recorder at all during the `SAVE CS1` routine. On the other hand, when the error message:

```
    * ERROR DETECTED IN DATA
```

occurs, the computer recognized only part of the data that the cassette recorder was sending to the computer. When this happens, recheck your cassette recorder's volume control and tone setting. Then recheck your cassette cable. Make sure that both ends of the cable are firmly attached to the computer and to the cassette recorder. While you are at it, make sure that the color-coded wires leading to the cassette recorder are connected correctly. The cassette recorder will not operate properly if the color-coded wires are reversed!

4.3. General Areas to Check when Cassette Error Codes and Messages Occur

1.   Make sure that your cassette recorder is connected to your computer console correctly. The cassette recorder interface cable must be connected to the 9-pin plug at the rear of your computer console. Don't confuse this plug with the 9-pin joystick port on the side of your console. They are not interchangeable! While you are at it, make sure that the color-coded wires which plug into the cassette recorder are attached correctly, as well. The cassette recorder will not operate properly if the color-coded wires are reversed! They must be:

red   to the recorder's microphone jack
white   to the recorder's earphone jack, and
black   to the recorder's remote jack.

2.   If you are using DC current, instead of AC current, make sure that your batteries are fresh! Weak batteries will cause your data to be distorted!

3.   Make sure that your cassette recorder's volume control and tone settings are adjusted properly. Generally speaking, a volume control of 8 and a tone setting of 9 are recommended.

4.   Make sure that your cassette tape head is clean. If you can't remember the last time that you cleaned it, then it's been too long!

5.   Make sure that you are using a "high-quality" cassette tape. A poor-quality cassette tape yields poor performance, headaches and total frustration!

6.   Make sure that your cassette tape is not any longer than a C-60 cassette (which is 30 minutes per side). Longer tapes are thinner and provide less fidelity.

7.   Make sure that your cassette tape is in good condition, that the tape has not been damaged or accidently erased. If in doubt, try another tape!

8.   Make sure that you have put the cassette tape in correctly, that it is the correct cassette tape and that it has been placed in the cassette recorder with the correct side facing up. Also, make sure that the cassette tape has been positioned at the beginning of the desired program.

9.   Make sure that your cassette tape was recorded with your cassette recorder or an identical model. If the cassette tape was originally recorded using a different type of cassette recorder, it is possible that your program will not load properly. When this occurs, you have no choice but to either obtain another copy of the program, using your own cassette recorder on which to save the program, or load the program in again, using the same cassette recorder that had originally saved the program.

5. Cassette Tips, Tricks and Tidbits

This month's topic may sound a little strange to you, but I hope that it proves to be well worth reading as I pass along what I've learned about computers the hard way, and what I've learned from my fellow TI friends.

Looking back on my very "first computer days" it's hard to believe that I was once such a "rookie". I knew absolutely nothing about computers back then (as you will soon find out!)

I will always remember the very first thing that I ever learned about the computer. To this day I am still impressed with the fact! The computer uses the same type of cassette recorder and cassette tape to store a "program" on as you would use to record your favorite music on. With this thought in mind, I soon learned that it wasn't necessary to purchase "special data cassette tapes" for the computer. The "standard" C-60 cassettes will work just fine with your computer and they are so much more economical than those "special" computer cassettes.

Over the years I have decided on using Maxell C-60 cassette tapes for my own personal computer use. But I will be the first to admit that there are a lot of other brands of cassette tapes that would work with your computer just as well. I would, however, caution you against using any type of Radio Shack cassette tape (computer or standard) and any type of Certron tape, as these particular brands of cassette tapes have been known to give people trouble in the past.

Believe me, there is nothing more frustrating than finding out that a program which you just saved onto one of these types of cassettes will not load back properly from the same cassette at a later time! The reason for this particular problem occurring is that the program is being played back at a slightly different tape speed than which it was recorded at, thus creating a slight distortion in the sound of the tape. As a word of warning: using either of these two brands of cassettes may be hazardous to your present state of mind!

For those of you who can identify with the struggles of other cassette users, (and who might also enjoy a good laugh at my own expense), just wait till you hear what I used to do! Would you believe that I used to load programs into my computer, run them, and then save them back onto their original cassettes in the very same location as they were recorded on the tape in the first place (without ever even editing any of the programs!)

Don't ask me where I ever got the idea that once you loaded a program off of a cassette tape that it was physically removed from the cassette tape. But that is the impression that I was under at the time back then. Of course, I plead that at that time in my computer learning I was not a member of any computer club, nor did I know anyone who even owned a computer — so I was left to struggle on my own and make a lot of mistakes along the way in the process.

I did learn this the hard way, but I bet that I'll never forget it either: "If you are only running a program and you are not making any changes in the program whatsoever, it is not necessary to save the program back onto its original cassette in its original tape location because it never really left the tape in the first place!" It is always there (unless you record over it!)

You may laugh if you wish, but it's all a part of learning, and we all had to start somewhere!

In keeping with the spirit of learning from one's own mistakes, I would highly recommend using the following guidelines when you are working with your cassette system.

When saving your programs onto a cassette you should get into the habit of recording them onto a counter reading which ends in a zero. This may sound like an unnecessary procedure to follow at first, but let me assure you that it is a very good habit to get into as it actually serves two useful purposes.

First, it will make it much easier to locate a program on your cassette tape as you are watching the counter reading speed by.

Second (and far more important), it will allow you some additional blank space between your programs. That way you can make changes to a program and then save it back onto your cassette at the same tape location as the original was located — without accidentally writing over the first part of the following program or the ending of the preceding program!

Believe me, I learned this the hard way. If you don't give yourself a little extra room to work with, you run a very high risk of overwriting your programs when you try to save them back over your originals!

If you have a cassette tape that you wish to keep permanently but are afraid that you may accidentally record over it, you can break out the left rear tab of the side of the cassette that you want to save, or you can break out both tabs if you wish to save both sides of the cassette.

Following this procedure will prevent you from accidently recording over your programs. If, however, you decide at a later time that you would like to record over a cassette that has had its tabs broken out, all is not lost. A piece of cellophane tape placed over the tab opening will allow you to once again record programs onto the cassette.

One of the most important things that I have learned about cassette tapes is that if you don't keep up with them, you start to collect a lot of junk. This "junk" that I am referring to is the many bits and pieces and parts of programs that were saved when you were creating or using a program. Once your final program is completed, get rid of all your "junk" saves! If you don't do it right away you'll forget about it and the next thing you know you'll start saving new programs onto a cassette that is full of "junk". You will end up having to waste a lot of valuable time checking an entire cassette just to find out what's what!

Once a "junk" tape has served its purpose, record over it with a volume setting of zero. That way the "junk" will be erased, and you won't have to wonder if that particular program — or tape — was important any more!

6. Keeping your Cassette Tapes and Programs Organized

How many times have you wanted to find a specific program that you had but . . .

1.   You can't remember which cassette you put it on.

2.   Or . . . you can remember which cassette you put in on . . . but now you can't remember whether you put it on side A or B.

3.   Or . . . you can remember whether you put it on side A or B . . . but now you can't remember what the counter reading was for the beginning of the program.

4.   Or . . . you can remember what the counter reading was for the beginning of the program . . . but now you can't remember if the program was written in Basic or Extended Basic . . . or maybe it was that you needed TE2 . . . or was it Mini-Memory?

If all of this sounds way too familiar to you, don't panic. You are not alone! The same situations have happened to all of us who use a cassette recorder — at least at one point of time or another.

The solution? Get Organized! Stop wasting all of your valuable computer time hunting for programs!

Now that you see the need for some "organization" — let me be one of the first to tell you that there are a lot of different ways in which to go about organizing your programs. Keep in mind that while one method may seem to work the best for you — it may not be the best method for someone else. Only you know what method will best meet your own needs!

If you are not using any system right now, I would suggest organizing your programs with the use of 3" x 5" index cards using the following information as a guideline:

1.   Cassette title and/or cassette number

2.   Cassette side

3.   Program name

4.   Counter reading

5.   Language used

6.   Peripherals needed

7.   Program description

That should be enough to get you started and keep you quite busy for a while. I know that it all sounds like a lot of work, but it will be appreciated in the long run when you need to find a specific program and you don't have all day to hunt for it!

The information generated by using the 3" x 5" index cards is the foundation for the following program.

Although this program will work as written, you are encouraged to make any changes that you may want in order to meet your own personal needs. Don't be afraid to do a little experimenting. It can't hurt and you just may learn a thing or two in the process.

This particular program was created with the intent of giving you the following two options:

1.   You may type in the following program as listed, filling in the blanks as they appear, or

2.   You could just type in the information that would appear in the blank area and forget about typing in all of the "formal titles".

Personally, I like the latter choice myself, as it saves a lot of unnecessary repetitive typing, and it keeps my screen information down to a bare minimum when I run the program.

7. Cassette Tape Cataloger — Program Listing

```
100 REM *******************
110 REM *                 *
120 REM *   CASSETTE TAPE  *
130 REM *                 *
140 REM *     CATALOGER    *
150 REM *                 *
160 REM *******************
170 REM *                 *
180 REM *  EXTENDED BASIC  *
190 REM *                 *
200 REM *******************
210 REM *                 *
220 REM *  JANUARY 1 1990  *
230 REM *                 *
240 REM *******************
250 REM *                 *
260 REM *  MICKEY SCHMITT  *
270 REM * 196 BROADWAY AVE *
280 REM *  LOWER BURRELL   *
290 REM *    PA 15068      *
300 REM *                 *
310 REM *******************
320 REM *                 *
330 REM *                 *
340 REM *  TO CUSTOMIZE    *
350 REM * THIS PROGRAM TO  *
360 REM *   WORK ON ANY    *
370 REM *  CASSETTE TAPE   *
380 REM *  USE THE SAME    *
390 REM *  FORMAT AS USED  *
400 REM *    IN LINES:     *
410 REM *  1190 THRU 1280  *
420 REM *  FOR THE FIRST   *
430 REM *  PROGRAM ON THE  *
440 REM *  TAPE AND LINES: *
450 REM *  1220 THRU 1280  *
460 REM *  FOR THE REST OF *
470 REM *   THE PROGRAMS   *
480 REM *   ON THE TAPE    *
490 REM *                 *
500 REM *                 *
510 REM *******************
520 REM *                 *
530 REM *                 *
540 REM *  CONTINUE USING  *
550 REM * THIS SAME FORMAT *
560 REM * TILL ALL OF YOUR *
570 REM *  PROGRAMS HAVE   *
580 REM *  BEEN CATALOGED  *
```

```
590 REM *                   *
600 REM *                   *
610 REM *******************
620 REM *                   *
630 REM *                   *
640 REM *  PROGRAM LINES:   *
650 REM *  1290 THRU 1350   *
660 REM *  ARE INCLUDED TO  *
670 REM *    SERVE AS AN    *
680 REM *   EXAMPLE AND     *
690 REM *  SHOULD BE USED   *
700 REM *  AS YOUR FIRST    *
710 REM * LISTING WHEN YOU  *
720 REM *  USE THE PROGRAM  *
730 REM *                   *
740 REM *                   *
750 REM *******************
760 REM *                   *
770 REM *                   *
780 REM *     CAUTION:      *
790 REM * AFTER YOUR FINAL  *
800 REM * ENTRY - REMEMBER  *
810 REM *  TO USE AN "END"  *
820 REM *  STATEMENT RIGHT  *
830 REM * AFTER YOUR FINAL  *
840 REM *   "CALL CLEAR"    *
850 REM *    STATEMENT!     *
860 REM *                   *
870 REM *                   *
880 REM *******************
890 REM *                   *
900 REM *                   *
910 REM *  FOLLOWING THIS   *
920 REM * FORMAT WILL HELP  *
930 REM * KEEP ALL OF YOUR  *
940 REM *   PROGRAMMING     *
950 REM *   INFORMATION     *
960 REM *   UNIFORM AND     *
970 REM * EASIER TO FOLLOW  *
980 REM *  ON YOUR MONITOR  *
990 REM *   OR TV SCREEN    *
993 REM *                   *
996 REM *                   *
999 REM *******************
1000 CALL CLEAR
1010 CALL SCREEN (5)
1020 FOR C=0 TO 14
1030 CALL COLOR(C,16,5)
1040 NEXT C
1050 CALL CHAR(91,"FFFFFFFFFFFFFFFF")
1060 CALL HCHAR(1,3,91,28)
```

```
1070 CALL HCHAR(24,3,91,28)
1080 CALL VCHAR(1,3,91,24)
1090 CALL VCHAR(1,30,91,24)
1100 DISPLAY AT(7,11)SIZE(8)BEEP:"CASSETTE"
1110 DISPLAY AT(9,8)SIZE(14):"TAPE CATALOGER"
1120 FOR DELAY=1 TO 1000
1130 NEXT DELAY
1140 DISPLAY AT(20,8)SIZE(14)BEEP:"MICKEY SCHMITT"
1150 DISPLAY AT(21,5)SIZE(20):"196 BROADWAY AVENUE"
1160 DISPLAY AT(22,3)SIZE(24):"LOWER BURRELL, PA. 15068"
1170 FOR DELAY=1 TO 1000
1180 NEXT DELAY
1190 CALL CLEAR
1200 PRINT "CASSETTE TITLE:   ": :
1210 PRINT "CASSETTE NUMBER:   ": :
1220 PRINT "CASSETTE SIDE:   ": :
1230 PRINT "COUNTER READING:   ": :
1240 PRINT "LANGUAGE USED:   ": :
1250 PRINT "PERIPHERALS NEEDED:   ": :
1260 PRINT "PROGRAM NAME:   ": :
1270 PRINT "PROGRAM DESCRIPTION:   ": :
1280 GOSUB 1380
1290 CALL CLEAR
1300 PRINT "COUNTER 000": :
1310 PRINT "EXTENDED BASIC": :
1320 PRINT "KEYBOARD": :
1330 PRINT "CASSETTE TAPE CATALOGER": :
1340 PRINT "PUBLIC DOMAIN PROGRAM BY      MICKEY SCHMITT": : :
1350 GOSUB 1380
1360 CALL CLEAR
1370 END
1380 DISPLAY AT(24,1)SIZE(27)BEEP:"PRESS:  ANY KEY TO CONTINUE"
1390 CALL KEY(0,K,S)
1400 IF S=0 THEN 1390
1410 RETURN
```

8. Cassette Box Labeler — Program Listing

```
100 REM *******************
110 REM *                 *
120 REM *   CASSETTE BOX   *
130 REM *                 *
140 REM *      LABELER     *
150 REM *                 *
160 REM *******************
170 REM *                 *
180 REM *  EXTENDED BASIC  *
190 REM *                 *
200 REM *******************
210 REM *                 *
220 REM *  JANUARY 1 1990  *
230 REM *                 *
240 REM *******************
250 REM *                 *
260 REM *  MICKEY SCHMITT  *
270 REM * 196 BROADWAY AVE *
280 REM *  LOWER BURRELL   *
290 REM *    PA 15068      *
300 REM *                 *
310 REM *******************
320 REM *                 *
330 REM *                 *
340 REM *   TO CUSTOMIZE   *
350 REM *  THIS PROGRAM TO *
360 REM *  PRINT OUT YOUR  *
370 REM * NAME AND ADDRESS *
380 REM *  ON THE CASSETTE *
390 REM *  LABELS CHANGE   *
400 REM *     LINES:       *
410 REM *  1240 THRU 1280  *
420 REM *                 *
430 REM *                 *
440 REM *******************
450 REM *                 *
460 REM *                 *
470 REM *  THIS PROGRAM IS *
480 REM *  DESIGNED TO BE  *
490 REM *   USED WITH MY   *
500 REM *  SERIAL PRINTER  *
510 REM *                 *
520 REM * IF YOU ARE USING *
530 REM *  ANOTHER TYPE OF *
540 REM * PRINTER YOU WILL *
550 REM *  NEED TO CHANGE  *
560 REM *     LINES:       *
570 REM *    860 AND 1230  *
```

```
580 REM * TO MEET YOUR OWN *
590 REM * PRINTER COMMANDS *
600 REM *                   *
610 REM *                   *
620 REM *******************
630 CALL CLEAR
640 DIM SIDE$(50)
650 DIM COUNTER$(50)
660 DIM LANGUAGE$(50)
670 DIM PROGRAM$(50)
680 CALL SCREEN(5)
690 FOR C=0 TO 14
700 CALL COLOR (C,16,5)
710 NEXT C
720 CALL CHAR (91,"FFFFFFFFFFFFFFFF")
730 CALL HCHAR(1,3,91,28)
740 CALL HCHAR(24,3,91,28)
750 CALL VCHAR(1,3,91,24)
760 CALL VCHAR(1,30,91,24)
770 DISPLAY AT(7,5)SIZE(20)BEEP:"CASSETTE BOX LABELER"
780 FOR DELAY=1 TO 1000
790 NEXT DELAY
800 DISPLAY AT(20,8)SIZE(14)BEEP:"MICKEY SCHMITT"
810 DISPLAY AT(21,5)SIZE(20):"196 BROADWAY AVENUE"
820 DISPLAY AT(22,3)SIZE(24):"LOWER BURRELL, PA. 15068"
830 FOR DELAY=1 TO 1000
840 NEXT DELAY
850 CALL CLEAR
860 CR$=CHR$(27)&CHR$(85)
870 FLAG=0
880 I=1
890 DISPLAY AT (22,1):"CASSETTE TITLE:
900 ACCEPT AT(24,1)SIZE(24)BEEP:TEMP$
910 TITLE$=TEMP$
920 CALL CLEAR
930 DISPLAY AT(22,1):"CASSETTE DESCRIPTION:"
940 ACCEPT AT(24,1)SIZE(24)BEEP:TEMP$
950 DESCRIPTION$=TEMP$
960 CALL CLEAR
970 DISPLAY AT(4,9):"INSTRUCTIONS:
980 DISPLAY AT(6,1):"PRESS ""E"" TO END THE PROGRAM"
990 DISPLAY AT(8,1):"PRESS ""R"" TO REPEAT THE PRO-"
1000 DISPLAY AT(10,11):"GRAM FOR CASSETTE"
1010 DISPLAY AT(12,11):"SIDE TWO OR SIDE B"
1020 DISPLAY AT (22,1):"CASSETTE SIDE:"
1030 ACCEPT AT(24,1)SIZE(1)BEEP:TEMP$
1040 SIDE$(I)=TEMP$
1050 IF SIDE$(I)="E" THEN 1230
1060 IF SIDE$(I)="R" THEN 1230
1070 CALL CLEAR
1080 DISPLAY AT(22, 1):"COUNTER READING:"
1090 ACCEPT AT(24,1)SIZE(3)BEEP:TEMP$
```

```
1100 COUNTER$(I)=TEMP$
1110 CALL CLEAR
1120 DISPLAY AT(22,1):"COMPUTER LANGUAGE:"
1130 ACCEPT AT(24,1)SIZE(2)BEEP:TEMP$
1140 LANGUAGE$(I)=TEMP$
1150 CALL CLEAR
1160 DISPLAY AT(22,1):"PROGRAM NAME:"
1170 ACCEPT AT(24,1)SIZE(16)BEEP:TEMP$
1180 PROGRAM$(I)=TEMP$
1190 CALL CLEAR
1200 I=I+l
1210 IF I=51 THEN 1230
1220 GOTO 960
1230 OPEN #1: "RS232/2.DA=8.BA=9600"
1240 NAME$="MICKEY SCHMITT"
1250 ADDRESS$="196 BROADWAY AVENUE"
1260 CITY$="LOWER BURRELL,
1270 STATE$=" PA. "
1280 ZIP$="15068"
1290 IF FLAG=1 THEN 1330
1300 PRINT #1:TAB(6);NAME$;CR$
1310 PRINT #1:TAB(3);ADDRESS$;CR$
1320 PRINT #1:CITY$;;STATE$;;ZIP$;CR$
1330 PRINT #1:CR$
1340 PRINT #1:TAB((24-LEN(TITLE$))/2);" ";TITLE$;CR$
1350 PRINT #1:TAB((24-LEN (DESCRIPTION$))/2); " ";DESCRIPTION$;CR$
1360 PRINT
1370 FOR J=1 TO I-1
1380 PRINT #1:SIDE$(J);COUNTER$(J);" ";LANGUAGE$(J);
     TAB(9);PROGRAM$(J);CR$
1390 NEXT J
1400 CALL CLEAR
1410 CLOSE # 1
1420 FLAG=1
1430 IF SIDE$(I)="R" THEN 880
1440 END
```

9. Understanding, Creating and Using Cassette Files

This subject has been an extremely hard subject for me to write for a number of reasons:

First, this is an area that I have not had very much experience with in the past. At least not enough experience with that I feel comfortable or confident enough to be writing this article with the hope and expectation of passing along some of my own computer knowledge, so that others may learn from my own experiences!

Second, this is an area that seldom pops up during any of the various discussions that take place at any of the club meetings. I assume that either the idea of data files must be a terribly boring subject or no one wants to admit that they really don't understand data files either!

Third, and possibly the funniest of all reasons — I have found out that many of the so-called "instruction manuals" that talk about data files, assume that you already know all there is to know about data files, from some other source of information. Personally, that makes about as much sense to me as looking a word up in the dictionary because you don't know how to spell it!

Fourth, and I must admit, the most truthful of all reasons — nothing scares me more about the TI than those two very haunting words: "file processing". For some reason I would rather have to listen to the sound of chalk squeaking on a blackboard for an entire day than to have to deal with the thoughts of having to write this particular article!

Nevertheless, I am going to try and face this fear of mine by giving this topic the attention it deserves! All I ask is that you be patient with me, as I will be learning a lot of this information just prior to passing it along to you.

As most fellow TI users will agree, with just the use of a monitor or a television screen, the TI Home Computer is one of the most impressive, powerful and versatile home computers ever to be built for your money. Not only has this particular fact been recognized by other computer manufacturers, but it continues to stand the test of time, even though Texas Instruments stopped marketing the TI-99/4A Home Computer back in 1983!

However, as I'm sure that most fellow TI users will also agree, the TI Home Computer can be greatly expanded in that power and versatility through the use of additional accessory devices, such as the cassette recorder.

Until now, we have only acknowledged the cassette recorder as an accessory device through which we have the ability to save and load programs. Although this may be the cassette recorder's primary purpose, we must not fail to acknowledge the cassette recorder's ability to save and load data files as well!

With this thought in mind, I have decided to examine and explain the differences between "programs" and "data files", so that we may all have a firm basis on which to build our knowledge of our computer system.

First, let us examine the computer definition of a "program":

>A "program" is a set of statements which tells the computer how to perform and complete a specific task. Each statement must begin with a line number and will be executed by the computer in a sequential order, beginning with the smallest line number and continuing until all the line numbers have been executed.

Now, let us examine the computer definition of a "data file":

>A "data file" is a collection of related data records which are processed or produced by the computer. A "data file" must be used in conjunction with a "program" that has been specifically designed to accept that particular "data file". A "data file" is useless by itself, as it will not load into the computer's memory.

In other words, a "program" can run without a "data file" — but a "data file" cannot run without a "program"!

Before I continue, I would like to mention that most of my material will be taken directly from the Texas Instruments *User's Reference Guide* (better known as the "green" manual).

Since this particular manual was included in the instruction packet which you received when you purchased your computer, you should have no trouble finding a copy of this manual floating around somewhere. Once you have located this manual, you should turn to the section dealing with "File Processing" — more specifically Pages ii-118 through ii-136. Please keep in mind that the *User's Reference Guide* discusses both disk files and cassette files at the same time, as it explains each part of the file processing procedure. It is very important that you follow the specific instructions that were designed for the cassette recorder and not the disk drive!

The first thing that we must learn is how to "open" a cassette file. Believe it or not, it is not as difficult a process as it first seems to be, although I must admit that trying to read and understand the process for the very first time can be quite confusing. With this thought in mind, I have tried to keep my explanation as simple as possible!

The OPEN statement prepares a Basic program to use data files which are stored on accessory devices, such as the cassette recorder. The OPEN statement does this by providing the necessary link between a "file-number" which you have used in your program and the particular accessory device, (in this case a cassette recorder), on which the file is located.

The OPEN statement describes a file's characteristics to the computer so that your program can process it or create it. With some accessory devices the computer will check that the file or device characteristics match the information specified in the OPEN statement for that file. If they don't match or the computer cannot find or create the file, the file will not be opened and an I/O (input/output) error message will be printed.

The "file-number" and "file-name" must be included in the OPEN statement. The other information can be included in any order or can be omitted, as well. However, if you leave out any specification, the computer will assume certain standard defaults and those defaults may not be the correct specification for your particular file.

All TI Basic statements, which refer to particular files, do so by means of a particular "file-number" (between 0 and 255 inclusive) in the OPEN statement. However, as a word of warning: since "file-number 0" refers to the screen and keyboard of your computer and is always accessible, you cannot OPEN or CLOSE "file-number 0" in your programming statements! You may however assign any of the other remaining "file-numbers" as you wish, just as long as each open file in your program has a different number than any other file that you are currently using in your program.

The "file-number" is entered into the OPEN statement as the number sign — # (**SHIFT 3**) — followed by any number between 1 and 255 inclusive.

A "file-name" refers to a device or to a file which is located on a device, depending on the capability of the accessory. Each accessory has a predefined name which the computer recognizes. For example, the valid file-names for the two computer cassette recorders are CS1 and CS2. By including this file-name in the OPEN statement, you are telling the computer to access a particular file or device, whenever the program references the associated file-number.

If all of this sounds way too confusing for you, fear not. I felt the same way myself! With that particular thought in mind, I have decided to create a reference chart in order to get a better understanding of all the new material that I have examined so far.

To open a cassette file follow these steps . . .			
Step	*Enter*	*Value*	*TI Basic*
1	Line number	1 to 32767	10
2	Space		
3	Open		OPEN
4	Space		
5	File-sign		#
6	File-number	1 to 255	1
7	Colon		:
8	Quote		"
9	Device name	CS1 or CS2	CS1

The "open mode" entry instructs the computer to process the cassette file either in the "input mode" where files may be read only, or the "output mode" where files may be written to only. Keep in mind that the new output file which is being created will have all the characteristics given it by the open statement specifications, including the standard default characteristics, as well. *Note*: if you are using two cassette recorders only `CS1` can be specified for an input file. Both `CS1` and `CS2` can be specified for an output file.

As a word of warning: the "open mode" specification is required. There is no default specification for this entry.

The "file organization" entry must be `SEQUENTIAL` for a cassette recorder. Records on a `SEQUENTIAL` file are read or written one after the other in sequence from beginning to end. You may, however, optionally specify the initial number of records on a file by following the word `SEQUENTIAL` with a numeric expression.

If you omit the "file organization" specification, no problem. The TI computer will automatically assume the default specification as `SEQUENTIAL` organization.

To open a cassette file follow these steps . . . (continued)			
Step	*Enter*	*Value*	*TI Basic*
10	Quote		`"`
11	Comma		`,`
12	Open mode	INPUT or OUTPUT	`choice`
13	Comma		`,`
14	File organization	Sequential	`SEQUENTIAL`

The "file-type" entry specification designates the format of how the data is going to be stored on the file. This will be either a `DISPLAY` format or an `INTERNAL` format. The `DISPLAY` format refers to printable ASCII characters and is usually used when the output will be read by people, rather than by the computer. The `INTERNAL` format refers to data which is recorded internally in machine language. You will find that data in this format is far more efficient for recording data on a cassette recorder as it requires less space. Thus a program will run much faster than when your files are recorded in `INTERNAL` format.

As a word of warning: if the "file-type" specification is omitted, the TI computer will assume a standard default of a `DISPLAY` format, which is not as efficient as the `INTERNAL` format.

The "record-type" entry specifies that the records on the file are all the same fixed length. The keyword FIXED may be followed by a numeric expression specifying the maximum length of a record. For cassette tape records, you may specify any length up to 192 positions. However, the cassette tape device uses records with lengths of 64, 128, or 192 positions and will pad the record that you specify to the appropriate length.

As a word of warning: if the "record length" is not specified, the TI computer will assume the standard default of 64 record positions for a cassette recorder.

The "file-life" entry informs the computer that the files that you are about to create are to be considered PERMANENT files and not TEMPORARY. You may omit this entry entirely since the TI computer already assumes all files to have a PERMANENT file-life.

To open a cassette file follow these steps . . . (continued)			
Step	*Enter*	*Value*	*TI Basic*
15	Comma		,
16	File type format	DISPLAY format = printable ASCII INTERNAL format = machine language	INTERNAL (preferred option)
17	Comma		,
18	Record type	Fixed length 1 to 192 positions	FIXED
19	Comma		,
20	File life	Permanent	PERMANENT

10. Quick Reference Chart for Cassette Files

To open a cassette file follow these steps . . .			
Step	Enter	Value	TI Basic
1	Line number	1 to 32767	10
2	Space		
3	Open		OPEN
4	Space		
5	File-sign		#
6	File-number	1 to 255	1
7	Colon		:
8	Quote		"
9	Device name	CS1 or CS2	CS1
10	Quote		"
11	Comma		,
12	Open mode	INPUT or OUTPUT	choice
13	Comma		,
14	File organization	Sequential	SEQUENTIAL
15	Comma		,
16	File type format	DISPLAY format = printable ASCII INTERNAL format = machine language	INTERNAL (preferred option)
17	Comma		,
18	Record type	Fixed length 1 to 192 positions	FIXED
19	Comma		,
20	File life	Permanent	PERMANENT
Defaults	SEQUENTIAL,DISPLAY,FIXED 64,PERMANENT		

11. Cassette Datafile Program
(to be used as an address book) — Program Listing

We are now ready to move on into an area of the cassette that I'm sure we've all been waiting for. Finally, you will be able to see first-hand just how a cassette file operates.

Although this program will work as written, you are encouraged to make any changes that you may want in order to meet your own specific personal needs. Don't be afraid to do a little experimenting. It can't hurt and you just may learn a thing or two in the process.

```
100 REM *******************
110 REM *                 *
120 REM *     CASSETTE     *
130 REM *                 *
140 REM * DATAFILE PROGRAM *
150 REM *                 *
160 REM *******************
170 REM *                 *
180 REM * TO BE USED AS AN *
190 REM *                 *
200 REM *  ADDRESS BOOK    *
210 REM *                 *
220 REM *******************
230 REM *                 *
240 REM *  EXTENDED BASIC  *
250 REM *                 *
260 REM *******************
270 REM *                 *
280 REM *  JANUARY 1 1990  *
290 REM *                 *
300 REM *******************
310 REM *                 *
320 REM *  MICKEY SCHMITT  *
330 REM * 196 BROADWAY AVE *
340 REM *  LOWER BURRELL   *
350 REM *    PA 15068      *
360 REM *                 *
370 REM *******************
380 REM *                 *
390 REM * PLEASE NOTE THAT *
400 REM * THE CURRENT FILE *
410 REM *    LIMIT IS 5    *
420 REM * ADDRESS RECORDS  *
430 REM *                 *
440 REM *******************
450 REM *                 *
460 REM *  IF YOU WANT TO  *
470 REM * CHANGE THE LIMIT *
480 REM * ---------------- *
490 REM * REPLACE THE "5"  *
```

```
500 REM *  IN LINES: 820,  *
510 REM *930,1000,1040, AND*
520 REM *1160, TO ANY LIMIT*
530 REM *    YOU DESIRE    *
540 REM *                  *
550 REM *******************
560 CALL CLEAR
570 CALL SCREEN(5)
580 FOR C=0 TO 14
590 CALL COLOR(C,16,5)
600 NEXT C
610 CALL CHAR(91, "FFFFFFFFFFFFFFFF")
620 CALL HCHAR(1,3,91,28)
630 CALL HCHAR(24,3,91,28)
640 CALL VCHAR(1,3,91,24)
650 CALL VCHAR(1,30,91,24)
660 DISPLAY AT(5,11)SIZE(8)BEEP:"CASSETTE"
670 DISPLAY AT(7,7)SIZE(16):"DATAFILE PROGRAM"
680 FOR DELAY=1 TO 1000
690 NEXT DELAY
700 DISPLAY AT(20,8)SIZE(14)BEEP:"MICKEY SCHMITT"
710 DISPLAY AT(21,5)SIZE(20):"196 BROADWAY AVENUE"
720 DISPLAY AT(22,3)SIZE(24):"LOWER BURRELL, PA. 15068"
730 FOR DELAY=1 TO 1000
740 NEXT DELAY
750 CALL CLEAR
760 DISPLAY AT(7,5)SIZE(19):"1 CREATE A DATAFILE"
770 DISPLAY AT(9,5)SIZE(17):"2 LOAD A DATAFILE"
780 DISPLAY AT(11,5)SIZE(18):"3 QUIT THE PROGRAM"
790 DISPLAY AT(23,8)SIZE(13):"YOUR CHOICE? "
800 ACCEPT AT (23,21)SIZE(-1)BEEP VALIDATE("123"):CHOICE
810 ON CHOICE GOTO 820,980,1190
820 FOR FILE=1 TO 5
830 CALL CLEAR
840 INPUT "NAME ":NAME$(FILE)
850 INPUT "ADDRESS ":ADDRESS$(FILE)
860 INPUT "CITY ":CITY$(FILE)
870 INPUT "STATE ":STATE$(FILE)
880 INPUT "ZIP ":ZIP$(FILE)
890 INPUT "PHONE ":PHONE$(FILE)
900 NEXT FILE
910 CALL CLEAR
920 OPEN #1:"CS1",INTERNAL,FIXED 192,OUTPUT
930 FOR FILE=1 TO 5
940 PRINT #1:NAME$(FILE),ADDRESS$(FILE),CITY$(FILE),
    STATE$(FILE),ZIP$(FILE),PHONE$(FILE)
950 NEXT FILE
960 CLOSE #1
970 GOTO 750
980 CALL CLEAR
990 OPEN #1:"CS1",INTERNAL,FIXED 192,INPUT
```

```
1000 FOR FILE=1 TO 5
1010 INPUT #1:NAME$(FILE),ADDRESS$(FILE),CITY$(FILE)
     STATE$(FILE),ZIP$(FILE),PHONE$(FILE)
1020 NEXT FILE
1030 CLOSE #1
1040 FOR FILE=1 TO 5
1050 CALL CLEAR
1060 PRINT NAME$(FILE)
1070 PRINT ADDRESS$(FILE)
1080 PRINT CITY$(FILE)
1090 PRINT STATE$(FILE)
1100 PRINT ZIP$(FILE)
1110 PRINT PHONE$(FILE)
1120 PRINT : : : : : : :
1130 PRINT " PRESS: ANY KEY TO CONTINUE"
1140 CALL KEY(0,K,S)
1150 IF S=0 THEN 1140
1160 IF FILE<5 THEN 1170 ELSE 1180
1170 NEXT FILE
1180 GOTO 750
1190 CALL CLEAR
1200 END
```

12. Joseph Bartle's CS1*FINDEX:
     ## An Automatic Cassette Tape Program Location System

Review by Charles Good (Lima, OH Users Group)

This one is for cassette tape users and for those interested in unusual programming techniques. Have you ever wondered if it was possible to mark with software the position of a specific program on a cassette tape full of many programs, and then have the computer search the tape from the beginning, until the specific desired program is found? TI did once develop such a system for its 99/8 and CC-40 computers, but the Hexbus Wafertape was never released. Coleco Adam computers successfully use such a system. No so for the TI-99/4A, according to many well respected commentators. I have read time and time again, in our exchange newsletters, expert comment to the effect that with the TI there is no way to automatically, under software control, advance a long cassette tape to the exact physical location where a program starts.

Well . . . way back as early as 1983, Joseph E. Bartle, of Parish, New York, wrote a TI Basic program that does this for the TI! I recently acquired a 1985 update of Joe's CS1*FINDEX program (still entirely in TI BAsic — with no assembly routines) and after removing a few bugs, I am quite impressed with the capability of this software.

CS1*FINDEX will do its stuff, even if you don't have a printed list of which programs are on a program tape, even if you are using a tape recorder that does not have a numerical tape counter, and even if you are using a tape recorder that is not automatically controlled by the TI-99/4A. CS1*FINDEX finds semi-automatically the exact location of a program on a long tape. The manual tape recorder operations required of the user are all prompted from the screen. If you are using a TI compatible recorder, CS1*FINDEX will advance the tape to your program's location after you press **FAST FORWARD**, and then automatically stop the tape. If you are using a tape recorder that the TI cannot automatically turn on and off, CS1*FINDEX will turn the screen from green to yellow, and finally to red to indicate when you should manually press cassette **STOP**, once the location of your program has been reached. Neat!

With CS1*FINDEX you can create a catalog of up to 10 programs you want to put on one side of a C-60 tape and put this catalog at the beginning of the tape. The catalog includes program name (up to 12 characters with spaces anywhere), and there is also provision for the catalog to display a 12-character comment for each of the 10 programs. You can then put your programs onto the tape, with CS1*FINDEX advancing the tape recorder to the correct tape location where you should SAVE CS1 each program. It is necessary to reload CS1*FINDEX for each of the programs you put on the tape. Thus, users with only a console/cassette system will appreciate the fact that CS1*FINDEX is designed to be small enough to load into the Mini-Memory module with SAVE MINIMEM. Then each time you need to load CS1*FINDEX, all you do is type OLD MINIMEM, and CS1*FINDEX boots in a few seconds. Otherwise, it takes about 90 seconds to load CS1*FINDEX from tape.

Later, when you want to use the tape, you load `CS1*FINDEX` into the computer and then load the tape's catalog from `CS1*FINDEX`. From the catalog display you select the number of the desired program on the tape. You are then instructed to rewind the tape to the beginning and press **FAST FORWARD**. `CS1*FINDEX` then advances the tape to the program's location, automatically stops the tape if you are using a TI compatible recorder, displays the name of your program on the screen, and informs you this program has been located. Then `CS1*FINDEX` BREAKs to command mode and allows you to load your program in the normal way by typing `OLD CS1` and following all the usual screen instructions, except that you do not again `REWIND CASSETTE TAPE`. `CS1*FINDEX` can easily be modified in Extended Basic to load the located tape program into the computer from within `CS1*FINDEX` rather than from command mode. Change line 2300 to read `RUN "CS1"`.

If you already have a printed list of each program on the tape and in which order the programs occur, you can bypass the catalog loading procedure. When you `RUN CS1*FINDEX` your first option is `LOCATION SEARCH (Y/N)`. From here you can use `CS1*FINDEX` to locate the first, second, third, up to the tenth, program on the tape without using time to boot the catalog.

What's the secret? How does `CS1*FINDEX`, using only TI Basic with no assembly routines, do what all the experts say can't be done? Have you ever noticed how the tape recorder behaves when you read or write serial files to tape, as opposed to programs. The recorder starts, reads in, or writes, what I presume to be a file header, then stops. Then the recorder starts again and reads, or writes, the first record and then stops. Then the recorder starts again and reads, or writes, the second record, and then stops, etc. The total number of start/stop cycles equals the number of records plus one. The computer controls the turning on and off of the tape recorder's motor and it doesn't matter to the computer if the recorder is set for **PLAY** or for **FAST FORWARD**.

When searching for a program, `CS1*FINDEX` writes a file fie to the tape, turning the tape recorder motor on and off several times as this file is written. The tape recorder is set for **FAST FORWARD** rather than for **RECORD** as this file is written, so the tape never receives any data. The computer cannot directly sense that the tape is not getting any data, so the computer continues to turn the recorder's motor on and off as it writes its fake file to the tape. When turned on, the tape advances very rapidly because the recorder is set for **FAST FORWARD**. A tape file, designed to write up to 10 records with a record length of 192, will go through up to 11 start/stop sequences on a C-60 tape before the tape is completely wound up on the take-up reel. This is how `CS1*FINDEX` locates physical blocks of tape space in which to insert programs, and can later find a specific program located at any one of these physical blocks of tape space. The first block (corresponding to the false file's header) is where the catalog is stored, and the next 10 blocks (each corresponding to a false file record) are where the programs are stored. Enough space is included in each of the program storage blocks to store the largest possible tape program.

12.1. Limitations

You can't use `CS1*FINDEX` with an already existing program-filled tape. The spacing of the programs on the tape won't be right. You need to load programs onto your program storage cassette tape using `CS1*FINDEX`.

Problems may occur if different type recorders are used to store and later play programs. If the **FAST FORWARD** speed of the two recorders differ very much, `CS1*FINDEX` will not correctly find the location of the desired program.

There is only room for a short program in the last (10th) program block before the tape runs out.

This program is released to the TI community as fairware. If you use this program, please send a donation to the author, Joseph E. Bartle.

13. CS1*FINDEX — Program Listing

```
100 REM ********************
110 REM *                  *
120 REM *    CS1*FINDEX     *
130 REM *                  *
140 REM ********************
150 REM *                  *
160 REM *     TI BASIC      *
170 REM *                  *
180 REM ********************
190 REM *                  *
200 REM *  COPYRIGHT 1983   *
210 REM *                  *
220 REM ********************
230 REM *                  *
240 REM *     FAIRWARE      *
250 REM *                  *
260 REM ********************
270 REM *                  *
280 REM *      PLEASE       *
290 REM *                  *
300 REM *SEND DONATIONS TO:*
310 REM *                  *
320 REM ********************
330 REM *                  *
340 REM * JOSEPH E. BARTLE *
350 REM * S & E TRAILER CT *
360 REM * PARISH, NEW YORK *
370 REM *       13131       *
380 REM *                  *
390 REM ********************
400 REM *                  *
410 REM * TO RUN USING THE *
420 REM *     MINIMEMORY    *
430 REM *                  *
440 REM *   DELETE LINES:   *
450 REM.*    100 TO 500    *
460 REM *   570,780,850,   *
470 REM *    1000,1090,     *
480 REM *     AND 2290      *
490 REM *                  *
500 REM ********************
510 CALL CLEAR
520 $="_____"
530 C$="CATALOG "
540 LC$="LOCATION SEARCH"
550 DEF LF=LEN(F$)
560 DIM PG$(19)
570 DISPLAY TAB(7);"CASSETTE FINDEX"::TAB(7);"JOSEPH E BARTLE''
    :::::::::::::::
580 GOSUB 2420
```

```
590 CALL CLEAR
600 INPUT LC$&" Y/N ":AN$
610 IF AN$="Y" THEN 2000
620 IF AN$="N" THEN 630 ELSE 590
630 DISPLAY
640 INPUT "DOES TAPE HAVE "&C$:AN$
650 IF AN$="Y" THEN 670
660 IF AN$="N" THEN 840 ELSE 590
670 GOSUB 1780
680 GOSUB 1110
690 CALL CLEAR
700 RESTORE 2450
710 MI=18
720 GOSUB 2360
730 CALL KEY(0,OP,S)
740 IF (OP<49)+(OP>53)THEN 730 ELSE 760
750 IF S=0 THEN 730
760 ON OP-48 GOTO 770,840,990,1050,1080
770 CALL CLEAR
780 DISPLAY TAB(7);LC$::::::::::::::
790 GOSUB 2420
800 GOSUB 1230
810 GOSUB 2320
820 IF C=0 THEN 690
830 GOSUB 2030
840 CALL CLEAR
850 DISPLAY TAB(9);"NEW "&C$::::::::::::::
860 FOR @=l TO 20
870 F$=F$&_$
880 NEXT @
890 FF$=F$
900 GOSUB 1110
910 GOSUB 2420
920 OP=50
930 GOSUB 1840
940 GOSUB 1230
950 GOSUB 1520
960 GOSUB 1170
970 GOSUB 1700
980 GOTO 690
990 CALL CLEAR
1000 DISPLAY TAB(8);"CHANGE "&C$::::::::::::::
1010 GOSUB 2420
1020 GOSUB 1230
1030 GOSUB 1520
1040 GOSUB 1840
1050 GOSUB 1170
1060 GOSUB 1700
1070 GOTO 690
1080 CALL CLEAR
1090 DISPLAY "@1983,@1984,@1985,@1990''
```

```
1100 STOP
1110 CALL CLEAR
1120 FOR I=0 TO 19
1130 PG$(I)=SEG$(F$,I*12+1,12)
1140 IF (SEG$(PG$(I),1,1)=" ")+(SEG$(PG$(I),1,1)="")THEN 1160
1150 NEXT I
1160 RETURN
1170 CALL CLEAR
1180 INPUT "PRINTOUT Y/N ":IO$
1190 IF IO$="Y" THEN 1210
1200 IF IO$<>"Y" THEN 970
1210 IO=1
1220 OPEN #IO:"RS232/2.DA=8.BA=9600"
1230 CALL CLEAR
1240 PRINT #IO:TAB(12);C$:TAB(5);"NUM ";TAB(12);"PROGRAMS"
1250 FOR I=0 TO 19
1260 IF I>09 THEN 1320
1270 IF I>08 THEN 1300
1280 PRINT #IO:TAB(5);I+1;"~ ";PG$(I)
1290 GOTO 1330
1300 PRINT #IO:TAB(4);I+1;"~ ";PG$(I):TAB(12);"REMARKS!"
1310 GOTO 1330
1320 PRINT #IO:TAB(4);I+I;"R ";PG$(I)
1330 NEXT I
1340 IF IO=0 THEN 1370
1350 CLOSE #IO
1360 IO=0
1370 RETURN
1380 CALL CLEAR
1390 DISPLAY :"TO END CATALOG PRESS <ENTER>"::
     "PROGRAM NAME ~LIMIT 12 CHAR~"
1400 DISPLAY :"PROGRAM/REM#";I+1;PG$(I)::
1410 IF I<8 THEN 1430
1420 IF I>8 THEN 1450
1430 INPUT "             ************                ":N$
1440 GOTO 1460
1450 INPUT  "             ************                 ":N$
1460 IF LEN(N$)>12 THEN 1470 ELSE 1500
1470 CALL CLEAR
1480 DISPLAY ">>INPUT ERROR--PLEASE REDO<<":::::
1490 GOTO 1390
1500 FS$=N$&SEG$(_$,1,12-LEN(N$))
1510 RETURN
1520 INPUT "      CHANGE Y/N ":CH$
1530 IF CH$<>"Y" THEN 1690
1540 OP=51
1550 CALL CLEAR
1560 INPUT "EDIT PROGRAM # (0/NONE) ":I
1570 IF (I>0)*(I<11)THEN 1620 ELSE 1580
1580 CALL CLEAR
1590 INPUT "EDIT REMARK # (0/NONE) ":I
1600 IF (I>10)*(I<21)THEN 1620
```

```
1610 IF I=0 THEN 1690 ELSE 1580
1620 I=I-1
1635 GOSUB 1380
1640 PG$(I)=FS$
1650 CALL CLEAR
1660 INPUT "EDIT ANOTHER LISTING Y/N ":CH$
1670 IF CH$="Y" THEN 1550
1680 GOSUB 1840
1690 RETURN
1700 CALL CLEAR
1710 INPUT "SAVE Y/N ":AN$
1720 IF AN$<>"Y" THEN 690
1730 OPEN #4:"CS1",INTERNAL,OUTPUT,FIXED 192
1740 PRINT #4:G$
1750 PRINT #4:H$
1760 CLOSE #4
1770 RETURN
1780 OPEN #3:"CS1",INTERNAL,INPUT FIXED 192
1790 INPUT #3:G$
1800 INPUT #3:H$
1810 F$=G$&H$
1820 CLOSE #3
1830 RETURN
1840 F$=""
1850 FOR I=0 TO 19
1860 IF OP<>50 THEN 1900
1870 GOSUB 1380
1880 PG$(I)=FS$
1890 IF SEG$(PG$(I),2,1)="_" THEN 1960
1900 F$=F$&PG$(I)
1910 IF (L$="N")+(OP=50)+(OP=51)THEN 1940
1920 I=I+l
1930 IF I>19 THEN 940
1940 IF (L$="Y")+(OP=52)THEN 1960
1950 NEXT I
1960 F$=F$&SEG$(FF$,LF+1,240-LF)
1970 G$=SEG$(F$,1,180)
1980 H$=SEG$(F$,181,180)
1990 RETURN
2000 PRINT
2010 INPUT "LOCATION 1-10 ":M
2020 M=M-1
2030 CALL CLEAR
Z040 FOR CC=2 TO 7
2050 CALL COLOR(CC,2,l)
2060 NEXT CC
2070 CALL SCREEN(2)
2080 RESTORE 2490
2090 MI=20
2100 GOSUB 2360
2110 CALL SCREEN(15)
```

```
2120 CALL KEY(0,KE,ST)
2130 IF ST=0 THEN 2120
2140 REM CALL HCHAR(18,1,31,192)
2150 CALL SCREEN(13)
2160 OPEN #2:"CSI",DISPLAY OUTPUT,FIXED 192
2170 FOR I=0 TO M
2180 IF I<>M THEN 2200
2190 CALL SCREEN(11)
2200 PRINT #2:I
2210 NEXT I
2220 CALL SCREEN(9)
2230 CLOSE #2
2240 CALL CLEAR
2250 FOR CC=2 TO 7
2260 CALL COLOR(CC,2,1)
2270 NEXT CC
2280 DISPLAY "PROGRAM LOCATED":::PG$(I-1):::"DO NOT RREWIND!":::
     "ENTER OLD OR SAVE CS1":::"CON TO CONTINUE"::::
2300 BREAK
2310 GOTO 690
2320 INPUT "NUM 1-10 OR ""0"" TO EXIT ":C
2330 IF (C<0)+(C>10)THEN 770
2340 M=C-1
2350 RETURN
2360 CALL CLEAR
2370 FOR R=1 TO MI
2380 READ A$
2390 DISPLAY TAB(3);A$
2400 NEXT R
2410 RETURN
2420 CALL SOUND(1000,111,30)
2430 CALL SOUND(1,111,30)
2440 RETURN
2450 DATA .."     OPTION LIST     ",,
2460 DATA "                        ","     1. SEARCH      ",
        "     2. NEW     "
2470 DATA "     3. CHANGE        ","     4. PRINT       ",
        "     5. DONE ",
2480 DATA "                        ","                        ",
        "  ENTER 1,2,3,4 OR 5   ",,,
2490 DATA ,,,,FIRST BEEP,REWIND TAPE,THEN PRESS ENTER
2500 DATA ===========================,,SECOND BEEP,PUSH FAST
     FORWARD,THEN PRESS ENTER
2510 DATA ===========================,,THIRD BEEP,PUSH STOP,
     THEN PRESS ENTER,
2520 DATA ,<PRESS: ANY KEY TO CONTINUE>
```

14. Clyde Colledge's High-Speed Cassette Loader

For those of you who are not familiar with this particular program, let me say that if you are still using a cassette system this program is a must! It is by far one of the most impressive cassette utilities available to date!

By way of introduction I would like to quote a brief paragraph out of the Texas Instruments Program Recorder manual:

> "NOTE: Used with TI Extended Basic, the Memory Expansion peripheral card adds 32K bytes of random access memory (RAM) to the built-in memory of the computer. However, even with the Memory Expansion available, the largest program that can be stored on a cassette is 12K bytes (approximately 12,000 characters) in size. Although the length of the actual program is limited by the amount of available memory in the console, utilizing the Memory Expansion unit provides other advantages. For example, with the unit installed in the Peripheral Expansion System, your program can be up to 12K bytes in length, while any data generated by the program can be stored in the memory expansion. Without the unit, the program must be shorter so that both it and the generated data can be stored in the computer's built-in memory."

Now that you know what the limits of the cassette recorder used to be according to Texas Instruments, let me introduce you to Clyde Colledge's High-Speed Cassette Loader.

The high-speed cassette loader utility was written for people who have added 32K memory expansions to their computer. It is hoped that this utility would make adding 32K memory expansion a more useful addition to basic computer systems.

The assembly language routines that do the saving and loading of programs are loaded very easily from cassette tape and reside in an area of memory not usually used by Extended Basic programs. The high-speed cassette utility will allow the saving and loading of programs up to 24K bytes in length.

In addition to increased program size, the same size program can be saved or loaded in approximately half the amount of time that the original routines required. The increase in speed is due to removing duplication of data sent to the cassette recorder. While this decreases reliability slightly, few errors have been encountered in use and error checking is still recommended. The size limitation was increased by writing directly to the memory expansion rather than to the console memory which the program was sent to by the original cassette routines.

While loading Clyde's program is not a difficult process in itself, understanding the procedure for the very first time can be a little confusing. With that thought in mind I have tried to keep the load instructions as simple as possible.

14.1. Instructions for loading Clyde's Loader

1.   Insert the Extended Basic module into the computer.

2.   Select option 2: `EXTENDED BASIC`

3.   Type: `OLD CS1`

4.   Then: press **ENTER**

5.   Follow the directions as they appear on your monitor or TV screen:

6.   `* REWIND CASSETTE TAPE CS1`
        `  THEN PRESS ENTER`

7.   `* PRESS CASSETTE PLAY CS1`
        `  THEN PRESS ENTER`

8.   Computer displays message:

        `* READING`

9.   Computer displays message:

        `* DATA OK`

10.   `* PRESS CASSETTE STOP CS1`
        `  THEN PRESS ENTER`

11.   Wait for the flashing cursor to appear in the lower left-hand corner of your monitor or TV screen.

12.   Type: `RUN`

13.   Then: press **ENTER**

14.   The computer will then return back to the Extended Basic screen with the message:

        `* READY *`

        and the cursor will once again be flashing in the lower left-hand corner of your monitor or TV screen.

Clyde Colledge's High-Speed Cassette Loader is now loaded.

14.2. Instructions for using Clyde's Loader

1.   After you have loaded Clyde's Loader type:

        `CALL LINK("OLD")`

2.   Then: press **ENTER**

3.   You can now load in any program which you have on cassette in half the amount of time that it would have taken you normally!

4.   Just follow the directions as they appear on your monitor or TV screen: that's all there is to it!

Clyde's Loader has two very special features that should not go without mention.

First, the high-speed cassette routines are exactly the same as Texas Instruments cassette routines, making this program very user friendly.

Second, once the load program has been placed in the 32K memory, it will stay in memory, even if you accidentally hit **FCTN QUIT**. Just retype `CALL LINK("OLD")` and you are ready to go. You can't lose the load program unless you turn off the console!

If you wish to purchase this program please send $5.00 to:

Pittsburgh User Group
PO Box 8043
Pittsburgh, PA 15216
Attn: PUG Librarian

15. Will McGovern's Cassette Loader and Disk to Cassette Transfer Program

For those of you who are not familiar with these two programs, written by Will McGovern, (of Funnelweb Farm fame), let me say that these two programs are a must for anyone who has a cassette system and 32K.

What makes these two programs different from Clyde Colledge's High-Speed Cassette Loader . . . well . . . it's hard to say. To be honest I was there when Clyde worked on his High-Speed Cassette Loader, so I do know first-hand that his program was written from scratch. However, I do recognize two very big advantages that Will's programs have over Clyde's.

First, both programs written by Will McGovern are fairware, which means they can be found through a variety of sources, such as TI user groups and TI bulletin boards.

Second, Will not only provides the `LOAD` program, which you need, but he also provides the `DISK TO CASSETTE TRANSFER PROGRAM`, so that those of you who know a disk user, can get them to transfer Editor/Assembler program image files to a cassette tape. In other words, a whole new area of excellent computer programs are now available to you.

What more can I say about these two programs, except: Thank you, Will McGovern.

15.1. Instructions for Using Will McGovern's Disk to Cassette Transfer Program

1.   Insert the Extended BAsic module into the computer.

2.   Select Option 2 — Extended Basic.

3.   Type: `OLD DSK1.CASSTRANS`

4.   Then: Press **ENTER**

5.   Follow the directions as thegy appear on your monitor or TV screen:

6.   `INPUT FILENAME:`

7.   Type: `DSK1.OHMUMMY_1` (or whatever your first program file is).

8.   Then: Press **ENTER**

9.   `OUTPUT FILENAME:`

10.   Type: `CS1.OHMUMMUY_1` (same as above, but this time CS1 instead of DSK1).

11.   Then: Press **ENTER**

12.   Screen changes and displays:

        CURRENT FILENAME: DSK1. OHMUMMY_1

        PRESS ENTER TO LOAD FILE

13.   Press: **ENTER**

14.   Screen changes and displays:

        CURRENT FILENAME: CS1. OHMUMMY_1

        PRESS ENTER TO SAVE FILE

15.   Press: **ENTER**

16.   Follow the directions as they appear on your monitor or TV screen:

17.   * REWIND CASSETTE TAPE CS1
          THEN PRESS ENTER

18.   * PRESS CASSETTE RECORD CS1
          THEN PRESS ENTER

19.   Computer displays message:

        * RECORDING

20.   * PRESS CASSETTE STOP CS1
          THEN PRESS ENTER

21.   Computer displays message:

        * CHECK TAPE (Y OR N) ?

22.   Type: N (or Y if you wish to check your tape).

23.   Screen changes and displays:

        CURRENT FILENAME: DSK1.OHMUMMY_2

        PRESS ENTER TO LOAD FILE

24.   Press: **ENTER**

25.   Screen changes and displays:

        CURRENT FILENAME: CS1.OHMUMMY_1

        PRESS ENTER TO SAVE FILE

26.   Press **ENTER**

27.   Computer displays message:

        REWIND CASSETTE TAPE CS1
        THEN PRESS ENTER

        ↑ **Ignore this message** ↑

28.   * PRESS CASSETTE RECORD CS1
          THEN PRESS ENTER

29.   Computer displays message:

        * RECORDING

30.   * PRESS CASSETTE STOP CS1
          THEN PRESS ENTER

31.   Computer displays message:

        * CHECK TAPE (Y OR N) ?

32.   Type: N (or Y if you wish to check your tape).

33.   Screen changes and returns to the start-up screen.

34.   Press: **FCTN =** to quit the program.

Note: Will McGovern's DISK TO CASSETTE TRANSFER PROGRAM auto increments the filenames that must be saved, and will automatically go through each "save sequence" till all of the program's files have been transferred. Only then will you be returned back to the start-up screen.

15.2. Instructions for Using Will McGovern's Cassette Loader Program

1.   Insert the Extended Basic module into the computer.

2.   Select Option 2 — Extended Basic

3.   Type: `OLD CS1` (or `DSK1.CASSTRANS`)

4.   Then: Press **ENTER**

5.   Follow the directions as they appear on your monitor or TV screen:

6.   `* REWIND CASSETTE TAPE CS1`
`   THEN PRESS ENTER`

7.   `* PRESS CASSETTE PLAY CS1`
`   THEN PRESS ENTER`

8.   Computer displays message:

`* READING`

`*DATA OK`

9.   `* PRESS CASSETTE STOP CS1`
`   THEN PRESS ENTER`

10.   Type: `RUN`

11.   Then: Press **ENTER**

12.   Screen changes and displays the cassette loader title screen.

13.   Press: **ENTER**

14.   Screen clears

15.   Follow the directions as they appear on your monitor or TV screen:

16.   `* REWIND CASSETTE TAPE CS1`
`   THEN PRESS ENTER`

↑ **Rewind to your first E/A program file** ↑

17.   * PRESS CASSETTE PLAY CS1
          THEN PRESS ENTER

18.   Computer displays message:

          * READING

          * DATA OK

19.   * PRESS CASSETTE STOP CS1
          THEN PRESS ENTER

20.   Computer displays message:

        IGNORE REWIND TAPE MESSAGE

          * REWIND CASSETTE TAPE CS1
            THEN PRESS ENTER

21.   * PRESS CASSETTE PLAY CS1
          THEN PRESS ENTER

22.   Computer displays message:

          * READING

          * DATA OK

23.   * PRESS CASSETTE STOP CS1
          THEN PRESS ENTER

Now sit back and enjoy the fun!

16. Addendum

16.1. Keeping up with Cassettes (1)

Time and time again I have been asked by members of the TI community, "Will you ever write more cassette articles for the TI cassette user?"

My response has varied, but has always been something like, "I no longer use a cassette system" . . . "I am pursuing other interests these days" . . . "Most of my computer time is now spent working on projects for MS Express Software, (a TI software company in which I am part owner)" . . . "It's time for someone else to take over from where I left off."

Get the picture . . . I am not doing anything more with cassettes these days . . . at least that was until now.

The fact is, others HAVE written articles specifically for the cassette user — but most never got the recognition that they deserved!

Well, I hope to change all that with the start of this new series.

In all cases, I shall try my best to accurately give credit where credit is due.

This month's cassette tidbit comes via the July 1990 issue of The Bluegrass 99 Computer Society's newsletter.

To abort cassette loading or saving hit **SHIFT E**.

For those of you who have not yet ordered my series *Getting The Most From Your Cassette System* — a professionally typeset, loose-leaf, 52-page booklet now is the time to do so, as I have only a few copies left.

The cost is $9.95 plus $2.50 shipping and handling.

My address is — Mickey Schmitt, 196 Broadway Avenue, Lower Burrell, Pa 15068.

16.2. Keeping up with Cassettes (2)

This month's article comes to us via an article that I read in the February 1991 issue of The St. Louis 99ers newsletter. It was entitled "Cassette Trick" and was written by Harold Hoyt.

If you have a tape recorder that apparently won't load data or programs to the 4A, try removing the red (microphone) jack while loading or verifying data. Put the microphone jack in only when saving data or programs to tape.

At this late date, Gene and I have discovered a nasty kink in the cassette Input/Output of the TI-99/4A. We think that we are the only people to have noticed this, and have never seen anything about it in all the newsletters we have read over the years.

Ordinarily, the cassette interface is a very well behaved part of the 4A. Wide variations of tape quality, recording levels and junky tape recorders work well with the 4A. Inexplicably, till now, some tape recorders refused to work with the 4A.

Most older tape recorders have a little impedance matching transformer which isolates the tape recorder's electronics from the monitor speaker. A look at the console schematic shows the monitor lead from the cassette recorder (white lead, pin 8 and it's return, pin 9) ungrounded in the console. In fact, the 4A requires a "floating", ungrounded input from the recorder since the 4A mixes a gating signal on the pin 8-9 combination.

Some modern tape recorders save the price of the output transformer by driving the speaker directly from an integrated circuit, which has no electrical isolation. Pulling out the microphone lead allows the tape recorder to "float".

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