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**
**          C A D E T
**        CONSOLE EXPANSION
**
**   Featuring: -
** # PRINTER PORT. Drive a standard
**   parallel printer.
** # 26K BYTES OF SOFTWARE IN ROM: -
** # WORD PROCESSOR EDITOR. Create
**   letters, documents, assignments.
** # TEXT FORMATTER. Add "class" to
**   your printed text.
** # TAPE GAMES LOADER. Load and run
**   fast assembly programs.
** # 32k MEMORY EXPANSION. Used by the
**   above software.
** # ADDITIONAL 32k RAM. Battery backed
**   storage of Word Processor text
**   or games or Basic programs or
**   data files for later use.
** # PERMANENT STORAGE of text files and
**   data files on cassette tape.
** # I/O EXTENSION. Attach Speech Synth
**   or Ramdisk or Peripheral Exp
**   Box. Ramdisk needs special
**   adaptor available separately.
** # Attaches to console I/O port and
**   is powered from the console.
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*****

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The CADET plugs into the I/O port on the right side of the TI-99/4A. The console must be switched off while connecting or disconnecting the CADET. The CADET should not be used on a console with built-in 32k memory expansion.

When the computer is switched on, the colour bar screen appears and, when any key is pressed, a selection list shows on the screen. If a module has been inserted in the module port, the selection screen will give a sixth choice.

- PRESS
- 1 FOR TEXT EDITOR
  - 2 FOR TEXT FORMATTER
  - 3 FOR TAPE GAME LOADER
  - 4 FOR FILE REPORT
  - 5 FOR TI BASIC
  - 6 FOR (Name of the module)

The software to run the first three is housed in the CADET's ROM (Read Only Memory) and is selected by the appropriate keypress. The software for these three can also be loaded through CALLS typed in when in any of the BASIC computer environments. The calls are CALL ED for the text editor, CALL FO for the text formatter and CALL GA for the game loader.

TEXT EDITOR Option 1

This Editor is basically the original version of the TI-Writer editor. You will need a copy of the TIWriter User's Manual as a guide to the use of the word processor.

For the TI-Writer novice, the tabs setting has been preset for a 40 column wide screen but the tabs can be readily changed. A suggestion when beginning to type is to hold the FCTN key down and tap on the "0" key to remove the line numbers showing on the left side of the screen.

### TEXT FILE STORAGE

All the RAM devices are housed in a battery backed memory chip and their contents remain intact even while the computer is switched off and the CADET lies idle. The back-up battery should last for three years or more. It is an inexpensive lithium type commonly used in small calculators and available from electronics component stockists. Types CR2032, CR2025, and CR2020 are suitable.

By using the TIWriter command SaveFile (SF), text files that you have created can be saved to the RAM devices on the CADET. The largest, RAM1, has a capacity of 24k bytes. It will store over 5 full pages of close typed full width text, being about the full capacity of the TI-Writer text buffer. RAM2 has 8k bytes of memory, sufficient for the average sized two page letter.

The supplementary devices, RAM3 and RAM4, are each the same size as RAM2 but overlap the upper parts of the RAM1 file storage space. This has been done to allow up to 4 smaller files to be stored if required. Files saved to RAM1 then may or may not, depending on their size, overwrite the space used by RAM3 or even RAM4.

Text files can be loaded into the Editor text buffer from any of the four devicenames using the command, LoadFile (LF) and entering the appropriate devicename. You don't need to delete a text file stored on a RAM device. If a new text file is saved to the same device that held another text file, the old flags and pointers are overwritten and the old file will be superceded by the new one.

Text files would be saved onto the RAM memory devices for use in the shorter term, for example, when a text file is only partly finished in a particular sitting. When finally finished, it can be printed out directly or through the Text Formatter option or it can be saved to a RAM device or saved permanently to cassette tape.

In saving to cassette tape, the Editor command, SC (SaveCass), allows rewinding of tape, pressing record and finally saving the file to tape. Once the file is saved to tape you have the option of checking the data on the tape. To load a text file from tape, the command is LC (LoadCass) and instructions for tape operation are displayed on the screen.

Only files on tape that were saved by the SC command can be loaded successfully by the LC command. Each text file saved contains a set of text lines, a table of line pointers and the tab settings used by the file. Trying to load other kinds of tape files such as programs or data files will cause unpredictable results.

### TEXT FORMATTER Option 2

This option loads from the ROM a copy of the original TI text formatter with a few modifications. The formatter program is able to take a text file from one of the RAM devices and print it out in the form dictated by the formatting dot commands embedded in

the text file. Refer to the TIWriter manual for full details on how to achieve this.

The first two Formatter screen prompts are normally answered as:-

INPUT FILENAME? Type RAM1, RAM2, RAM3 or RAM4.

PRINT DEVICENAME? Type PIO.LF

For all the other prompts just press <ENTER>.

The formatter program is also entered automatically when exiting from the Editor. Pressing "Q" to quit, then "E" to exit, will bring up the Formatter option screen. The QUIT key (FCTN/=) which was disabled when in the Editor is now active and can cause a computer reset if pressed a few times. The only way of QUITting from the Editor is through the Formatter or by switching off the console. BUT don't exit from the Editor or switch off until you have saved your text file to one of the RAM devices or to cassette tape.

### TAPE GAME LOADER Option 3

This utility will load and run an assembly program from a cassette tape. The Game Loader can also be run by typing CALL GA when in Basic or Extended Basic.

A feature built into the CADET is the ability to store assembly programs (games) in the backup memory normally used as the RAM devices for text files. When a game is loaded and stored, it is done by transferring the whole of memory expansion contents to the backup RAM so any file, whether text, data or program, in all devices will be lost.

If no other files are stored in the RAM devices, an assembly game loaded from cassette will be stored automatically in the backup memory prior to its starting to execute.

If a games program is already stored in the backup memory, you can elect to play either the stored game or another game loaded from tape. This depends on how you answer the screen prompt, "LOAD GAME FROM BACKUP RAM? Y/N". If you choose to load the tape game by answering "N", you have another option to answer, "REPLACE GAME IN BACKUP RAM WITH THIS GAME? Y/N". So, if you wish, you can keep one game in the battery backed RAM and load another from tape or you can store the new game in the backup RAM for reuse at some later time.

If, however, a file is already stored in any of the RAM devices, the tape game loaded will not overwrite the text file unless you direct it to. Your answer to the prompt, "REPLACE DATA IN BACKUP RAM WITH THIS GAME? Y/N" will determine the action taken.

The screen prompt, "START TAPE - PRESS ENTER" gives the opportunity to wind the cassette tape to the required position on the tape before loading. Each games program is stored on tape as a group of files consisting of from one to five files. If a number of programs have been recorded sequentially on tape, the beginning of each program is indicated by a period of silence. There is no silent spot between each file in a program. As each file in a program is successfully loaded the colour at the top and bottom of the screen will change too.

For those with disk drives, the program, TAPEITSAV, is available on request. This program allows you to save assembly games to tape in a form suitable for use by the Games Loader. Only assembly programs that normally run in the Editor/Assembler option 5

environment or Funnelweb option 3 (RUN PROGRAM) are suitable. Some of these programs are copyright and some may be freeware. Use them only if you have paid for the original copyright programs or, out of conscience, have contributed to the freeware author.

Not only games programs but also assembly utility programs can be loaded this way. For example, PagePro can be loaded from tape, a page created and saved to one of the RAM devices and the page can be printed to paper. By returning to one of the Basics, the file in the RAM device can then be saved to cassette tape for future use.

### BASIC PROGRAM STORAGE

Programs from any of the basic environments can be stored on the RAM devices. Saving a program to one of these will overwrite any game or other file already stored in that device. Save a program in the normal way but with the command SAVE RAMx where x = a number from 1 to 4. To load a program from the backup memory, use the commands OLD RAMx. In the Extended Basics the command, RUN "RAMx" is also supported.

The RAM2, RAM3 and RAM4 devices have a smaller capacity, so when saving, if you get an error message, the program may be too large for the memory space available.

The RAM1 device has no memory size limitations for storing programs. It can even handle those extremely large programs normally stored on disk in the INT/VAR 254 format. Remember that large programs saved to RAM1 may overwrite something you have stored in RAM3 or even RAM4.

The RAM devices will also store the merge form of an Extended Basic program. SAVE RAMx, MERGE is the command to save the program in memory. If you later want to merge that with another program in memory just type MERGE RAMx and the two programs will be combined. See the information on MERGE in the Extended Basic manual.

The CADET can run some forms of a data-base as the RAMs can also be used for data storage by a running program and are fully compatible with the file handling of the 99/4A system. See the TI User's Reference Guide that came with your computer from page II-118 to II-136 for full details.

For data storage, RAM1 can hold up to 24302 characters which is equivalent to 752 records each of 32 characters. The data stored in the RAMs can be saved to cassette tape if the ram space is required for something else. Only the amount of memory space actually used is saved in this process. Saving and loading data files are performed through CALLS in the command mode of any of the Basic environments.

CALL SFx (SaveFileRAMx), where x = a number from 1 to 4, will take you through the usual tape recorder procedures to effect a save. On the screen a number will be displayed which indicates how many blocks of data are being saved. A block comprises 64 bytes and each block is written to tape twice. After saving, you are returned to the Basic environment from which you did the CALL.

CALL LFx (LoadFileRAMx) where x = a number from 1 to 4 will transfer a data file from tape to the respective device before quitting to the colour bar screen. CALL LFx will not be able to load a tape file other than one saved by the SFx commands.

Some data files can be in the program form like a page created by PagePro. These must be saved and loaded from cassette tape through the CALLS mentioned above.

You may at times have trouble in creating (opening) a file on one of the RAM devices. This is due to the fact that the new file may have different characteristics from the old one stored there and the system tries to protect the existing file. You must remove the old file with the Basic command such as DELETE "RAMx". Opening a file in the output mode will always overwrite any other file stored in that RAM device and deleting the previous one will not be necessary.

### FILE REPORT

Option 4 from the selection screen will report on what types of files are stored on each of the RAM devices. The possibilities reported include

(a) NO DATA FOUND - No file is stored on that device.

(b) GAME - This will have used the memory space on all the RAM devices.

(3) PROGRAM - A data file in program form stored by some other program.

(4) PROGRAM - B/X - This is a Basic or Extended Basic program and can be loaded by the OLD command.

(5) DIS/VAR 80 - A text file that can be loaded by the text editor.

(6) xxx/xxx XX - Some other type of data file that has been created by a running program. It will be DIS/VAR, DIS/FIX, INT/VAR or INT/FIX and the number following the filetype will show the maximum length of each record of the file.

The numbers displayed furthest to the right show the size of each particular file. The size is measured in blocks of 64 bytes. So RAM2, RAM3 and RAM4 each have a capacity of 128 blocks and RAM1 has a maximum of 380 blocks. As files stored on RAM1 pass the 128 blocks mark, they encroach on the the RAM3 file space, and as the file passes 256 blocks, RAM4 becomes overwritten. The convenience of having four storage devices when required greatly outweighs the inconvenience of having to keep track of the size of the RAM1 file. It is a simple matter to save the RAM3 and/or RAM4 files to tape, anyway.

### ERROR CODES

During loading or saving of files, errors may occur due to various reasons. Errors are reported using code numbers made up of two digits. Each digit has a different meaning.

FIRST DIGIT	SECOND DIGIT
0 OPEN	0 Bad device name
1 CLOSE	1 Device write protected
2 INPUT	2 Bad open attribute
3 PRINT	3 Illegal operation
4 RESTORE	4 Out of space on medium
5 OLD/LOAD	5 Past end of file
6 SAVE	6 Device error
7 DELETE	7 File error/mismatch

## MODULE PROGRAMS

Module programmes can be run through option 6 of the selection screen. However, there is an odd module that may not operate correctly this way. If so, hold down any key when the computer is switched on until the screen shows:

```
PRESS
1 FOR BASIC
2 FOR (Name of module)
```

Then select option 2 to run the module.

At the main menu of the CADET you may notice that options 4 and 6 will not select until you release the key pressed. In option 6 this is to overcome the problem of certain modules like Video Chess, interpreting a lingering keypress as a signal to bypass the introductory screen.

Some modules, like Mini Memory, have multiple selection options but only one option name will appear beside the CADET's 6th option. If you want one of the other module options not listed, just hold down any key when switching power on.

## PRINTING

In Basic or Extended Basic, output can be directed to the printer port using normal programming code. Only display/variable type records will be accepted for the printer, The length of records can have a maximum of 255 characters. You can list programs in one of the Basics to the printer with the command, LIST "PIO".

The printer port responds to the print devicenames of PIO or PIO.LF or PIO.CR. It is capable of data output only, no provision being made for input.

From the Text Editor, the PrintFile command should use the devicename PIO and the text file will be printed out exactly as it would appear on the screen. In Basic programs the devicename, PIO, would normally be used, too.

The Formatter needs to use, in almost all cases, the devicename PIO.LF and makes a printout according to the dot commands in the text file. If the devicename, PIO.LF, does not drive the printer correctly, try PIO.CR.

The printer cable is usually made of a 16 way flat ribbon up to about one and a half metres long with the following plug connections at either end. The CADET PIO port needs a 16pin IDC plug and the printer requires a 36pin Centronics connector preferably of the solder type. The wiring connections are:

CADET	Printer
1	Strobe OUT-1
2	----Data----2
3	----Data----3
4	----Data----4
5	----Data----5
6	----Data----6
7	----Data----7
8	----Data----8
9	----Data----9
10	--Busy IN--11
11	-----GND---20

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12    No connection
13    No connection
14    No connection
15    No connection
16-----GND---20
```

To print from Basic or Extended Basic, normal file programming commands are used. A file to the printer must be opened before printing takes place and the file should be closed when all printing has been completed. Some program lines to test the printer are:-

```
100 OPEN #1:"PIO"
110 FOR I=1 TO 10
120 PRINT #1:"THIS NUMBER IS";I
130 NEXT I
140 CLOSE #1
```

### CONNECTING PERIPHERALS

A TI Speech Synthesizer can be plugged into the I/O extension on the side of the CADET for those games and programs that support speech.

A Peripheral Expansion Box can also be connected to the I/O extension of the CADET but the Memory Expansion Card should be removed first. Although the 32k memory expansion in the CADET and the 32k card in the PEBox can co-exist peaceably, there will be a clash when RAM1 through RAM4 are accessed as these devices are paged in onto the normal 32k expansion addresses.

A Horizon Ramdisk can alternatively be attached through an interface card available separately.

When connecting a ramdisk or the Peripheral Expansion Box to the CADET, any card having a CRU address of >1000 should be changed using its built-in dip switches. The CRU address of the CADET is fixed at >1000,

With the PEBox connected as well as the CADET all PIO output goes through the CADET. The "PIO" device on the RS232 card will not be recognised. To use the PEB "PIO", hold down any key when switching power to the console/CADET.

The CADET houses its own memory expansion so, while any program is running, the PEB can be switched off with no effect on the program. Later, if necessary, the PEB can be switched on, again without affecting the program. In some worst condition cases, power line surges or spikes may cause problems when the PEB is switched. No research has been done in this area.

### FINALLY

The computer can be switched off at any time while in the Editor, the Formatter, the Games Loader or the games themselves with no ill effects. BUT when using the Editor, BE CAREFUL TO SAVE ANY DOCUMENT YOU'VE CREATED onto one of the RAM devices or cassette tape first if it will be required for later use.

It is a good idea to mark your cassette tapes clearly as to whether they contain TEXT files for use with the word processor, GAMES programs to be loaded by the games loader or BASIC programs or DATA files . The method of file storage for each type is different

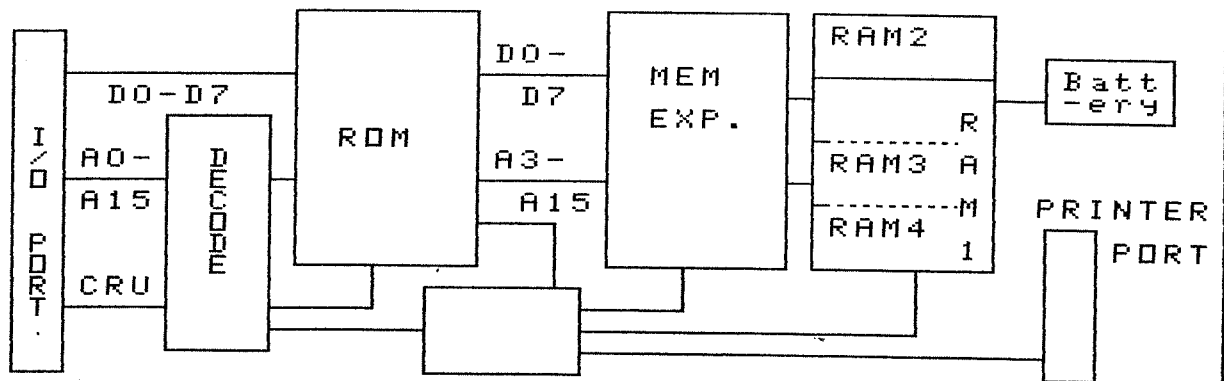
and the files are not interchangeable. You can imagine the problems, too, of mixing files of different types on the same tape.

Here is a list of some of the assembly programs that will load and run from cassette tape. There may be quite a number of others that also would work.

Anteater, Barrage, Beyond Parsec, Bigfoot, Blackjack/Poker, Blasto, Blitz, Break Through, Buck Rogers, Budget Manager, Burgertime, Carwars, Cave Creatures, Centipede, Cerebus, Chisholm Trail, Congo, Crossfire, D-Station, Defender, Demon, Digdug, Dragonmix, Drive Demon, Equations, Facemaker, Fathom, Football, Grammar, Ghost Speller, Hangman, Hid'n'Seek, Hopper, Hustle, I'm Lost, Jumpy, Killer Caterpillar, Kong, Lasso, MS-Pacman, Mash, Meteor Multiplication, Microsurgeon, Minus Mission, Moonmine, Moonsweeper, MS-Pacman, Munchman, Newt, Nightmason, Othello, Pacman, Paddle, Percents, Picnic Paranoia, Pinball, Pizza, Poker machine, Pole position, Popeye, Princess, Q\*Bert, Rabbit trail, Riversaver, Scrabble, Sewermania, Shamus, Slymoids, Soccer, Space Bandit, Space, Spotshot, Star Gazer, St Nicholas, Submarine Commander, Submarine, Superfly, Tafara, Tennis, TI Invaders, Tombstone City, Touch typing, Treasure Island, Video graphs 1, Video Games, War, Wingwars, Wumpus, Xmas tree, Zero Zap.



S Y S T E M   B L O C K   D I A G R A M



F I L E   H A N D L I N G

