EXPANDABLE COMPUTER NEWS

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PUBLIC DOMAIN

FORTH

for

ADAM

ISSUE 18

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Ramblings From The Ridge
by D. Sage

Another year is gone. When I was much younger it seemed like time would never pass; now that I am older it passes all too quickly. I really enjoyed the holidays this year. I was fortunate enough to get to spend some time with our youngest daughter and grandson and some friends and neighbors.

We hope that your holidays were enjoyable also. Here in central Missouri we finally got our first snow of the winter on New Year's Day. We have greatly appreciated the unseasonably mild weather that has prevailed here and through much of the rest of the country.

Unfortunately, I get the feeling that the holidays were not kind to ADAM and those who have been supporting the ADAM. Our sales, renewals, and new subscriptions reached an all time low. From what I hear the situation has been similar with other ADAM companies. I have anticipated this for some time, but did not really expect to see such a drop until after the first of the year.

This issue has turned out to be a great deal of work. For some time I have been planning to put together an index of the preceeding issues. Well, it is finally done. Although it is not as comprehensive as I had hoped for, it does include most major points and references. I am including this at the end of this issue, so that it may be easily removed for use as a reference. I hope that you will find it of some value.

This issue marks the beginning of a series on FORTH for the ADAM and the availability of the FORTH public domain software in ADAM format. I think that you will find these articles to be excellent. Many thanks to Thomas Gilmore for this contribution. It is obvious that he has put a great deal of effort into this project and has done so in spite of a very busy schedule.

Also in this issue, the LOGO series returns. Mike Degner's efforts to provide this series are much appreciated and we look forward to future articles if he can find the time.

John Moore's fine series on the ADAM hardware interface continues. We are please to find that so many of you have found this series to be useful and interesting. Only one BASIC program is included in this issue. The program was submitted by David Clark. It is a directory management program for the ADAM and is extremely well done. In future issues we will be publishing more programs and a hardware project (printer interface) submitted by David. We have also received a number of contributions from our friends in England and will be sharing those with you in the future.

At this point it appears that there will not be any reviews in this issue. This is a first, but is to be expected. Little in the way of new products for the ADAM are appearing. If anything comes in late, we will try to include it.

Industry Observations
by D. Sage

Some analysts were predicting that Christmas sales of computers would be way up this last year (1986). I haven't seen any evidence that would indicate that this was the case. Outside of the Apple II GS, there has been little introduced new that could be considered exciting. If I had to guess, I would say that Atari is probably the only company that has much to celebrate this Christmas season. Apple sales have probably been good, but certainly not at record levels. I would expect that Commodore has not done well this season. Before long I hope to have more concrete information on sales, and will report those next issue.

Oddly enough Apple II C computers have begun showing up in a number of liquidator's listings. I have also noticed that a number of banks are giving IIe's away for opening savings accounts. If my poor memory still works, I seem to recall that it wasn't long ago that banks were giving away Texas Instrument's 99A computer. That is a fate to which even ADAM did not succumb. Unfortunately, the liquidation prices (which involve bundling of other hardware and software) are still not at the levels comparable to what the Apple compatible Laser 128 has been priced. Look for the II C to drop more in price in order for Apple to push the GS and other systems such as the new MAC.

More problems for Commodore seem to be brewing. While Commodore is supposed to be

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readying new Amiga models for the market, there seems to be a problem with getting operating systems for them. The British company that wrote Amigados is rumored to be having internal problems that have caused a delay in writing the new operating systems. Naturally, these problems are outside of the control of Commodore, but could nevertheless be costly for them.

Atari continues to crank out STs. Maybe this is the computer for the rest of us. It certainly is more affordable than a Macintosh and via some software and hardware add-ons can run most Macintosh software, as well as IBM software with some more add-ons. At least it has a relatively open architecture and technical information seems to be readily available. No, I haven't bought one yet and am unlikely to in the near future. Yes, I would like to have one, but can't justify the dollars right now. I also doubt if I could find the time to use it.

Meanwhile the videogame market seems to be heating up. I recently obtained Gyruss for my Nintendo system and am impressed. I still haven't seen the SEGA system, but it's probably best that I don't. In any event I expect that most games that are available for it that I would want, will also be available for the Nintendo system. The only thing new that I have seen for the Atari 7800 system has been Food Fight. Unfortunately, we don't get much of a supply of game carts around here and when the local KayBee does get some, they sell rather quickly. I have seen the new Atari 2600 system in stores and they seem to be selling well. So far I have not seen any of the INTV games or their refurbished Intellivision system. Everybody else seems eager to make predictions at this time of the year. I tried to predict the outcome of some of the NFL play off games and have not done very well. It's hard to give up your loyalties and be objective in making those choices. The computer industry is a little different. Here I should be able to venture a guess or two. After all it really doesn't matter if I'm wrong since no one really listens to these opinions anyway.

Look for IBM to quit making lower end PCs altogether. They will give that end to the PC compatible industry because the margins have disappeared. Apple will finally introduce the open architecture MAC that "everyone" supposedly has been waiting for. Apple will still not become any kind of threat to IBM sales in the business sector. Look for Compaq and Zenith to eat into IBM's share of the PC market in general including the higher end systems.

Who is UNISYS? and who cares. UNISYS and Hewlett Packard will change their TV commercials only after making everyone sick. Tandy will find someone else to play the part of their representative in their commercials. After all, does anyone believe this guy. Better yet, Tandy will switch ad accounts in favor of a company that will advertise their products. While I am on this subject did you ever notice the kind of software that is always running on computers in these commercials? I personally have seen more bar and pie charts (color no less) on TV ads and have yet to see one of these things in an actual business application.

Atari will continue to sell STs in larger and larger quantities as they continue to lower price. Commodore will drop the 64C and may even drop the Amiga.

Coleco will NOT introduce any computers in this year.

No one will introduce a new low end computer aimed at the home market. PC compatibles will begin focusing on this market as prices continue to decline to below $500. The video game market will again approach saturation and cartridge prices will decline as more and more companies try to make money in this market.

And to insure that I get something right, December will again be the last month of the year.

Hello, Goodbye, Hello Again.
by Joe Blenkle

First, I'd just like to say thanks to everyone for all their kind words, comments and letters since I sold my ADAM several months ago. It is gratifying to know I have made so many friends out there. I still want everyone to know that I think the ADAM is a fine machine. I wish I could have kept mine, but economically speaking, it was impossible for me to do that and build up a new system at the same time.

Many people have asked me what computer I have now. The answer is an Atari 520ST. It is a very different machine than ADAM was and though I still miss my ADAM, the 520ST more than makes up for the loss.

For what the original ADAM standalone system sold for way back when, you can buy an Atari monochrome system. This includes the computer, single sided disk drive and monitor. For about $150-200 more you can get the color system, which is what I opted for.

My system now consists of two disk drives, 300/1200 baud modem, color monitor, 520ST computer and a device called Timekeeper which plugs into the cartridge port and acts as a clock card.

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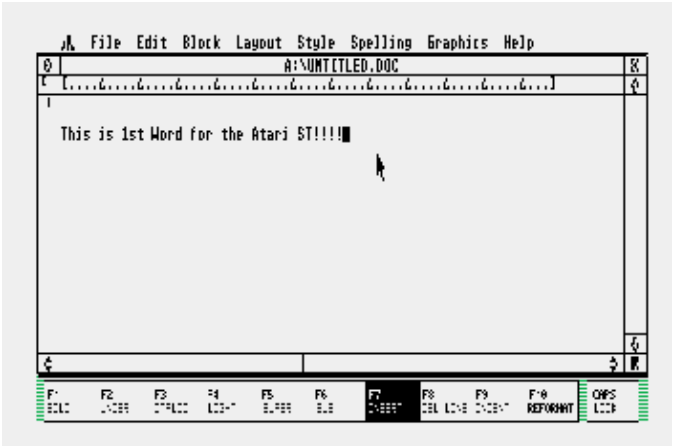
The ST system came with LOGO, BASIC, a drawing program called Neochrome and 1st Word, a word processor. I understand that Atari may drop some of these from the package as the final versions of them are released. I have also collected some 20 disks of programs for the ST, ranging from telecommunications, to music, to spectacular graphics demos. Some have to be seen to be believed.



Atari recently released a program to the public domain called their CP/M Emulator. This program will run CP/M 2.2 programs just like the ones that run on ADAM. Thus far I have managed to reclaim WordStar and a few Infocom games that I had for my ADAM. They all run perfectly...and in 80-columns. Someone has even configured MEX for the ST and I have run it on my modem with no problem whatsoever.

The future really looks bright for the ST. New releases are coming out almost daily. Some of the more impressive packages I've purchased thus far include THUNDER, a 50,000 word spellchecker which loads entirely into memory; Major Motion, a game quite similar to Spy Hunter for the ADAM; Star Raiders; Time Bandits; and Music Studio, a great music program along the lines of FutureVisions music program for the ADAM.

Anyway, to sum things up, I just want to thank everyone again for their kind words over the past few years. I do miss my ADAM, but I would like to encourage everyone who has had thoughts about purchasing another system to give a close look at the ST. If anyone out there already has a system drop me a line at P.O. Box 41746, Sacramento, CA 95841.

ADAM System Calls
by D. Sage

This is the eighth in a series of articles covering ADAM'S system calls.

CALL FD11 (64785) - Port collection routine. This is an initialization routine that must be called.

CALL FD14 (64788) - Switch memory banks. Reg. A holds the switch table value.

CALL FD17 (64791) - Copies ASCII character set to VRAM. HL = character to load first, BC = number of characters, DE = VRAM address to begin storing character maps. The character maps are stored in part of the word processor ROM.

CALL FD1A (64794) - Send bytes to VRAM. DE = VRAM address, HL = location of data to move, BC = number of bytes to move.

CALL FD1D (65797) - Read bytes from VRAM. DE = VRAM address, HL = location to store bytes, BC = number of bytes to move.

CALL FD20 (65800) - Write to a VDP register. B = register number to write to, C = value to write.

CALL FD23 (65803) - Get the VDP status byte. A = returned status byte. Byte also stored in FD63.

CALL FD26 (65806) - Fill VRAM buffer with a constant byte value. A = byte value to fill with, DE = number of bytes in the VRAM memory buffer, HL = VRAM starting address to use.

CALL FD29 (65809) - Initialize VRAM table addresses. A = table value to use, HL = table address. The following are the available table values:

0 - Sprite Attribute table
1 - Sprite Generator table
2 - Pattern Name table
3 - Pattern Generator table
4 - Pattern Color table

CALL FD2C (65812) - Transfer a block of data from RAM to VRAM using table values. A = table code, DE = entry number to start with, HL = address of data in RAM, IY = number of bytes.

Using SmartLogo
by Mike Degner

Sorry about missing the last issue. I've been extremely busy and couldn't find time after putting it off to the last minute. Two issues ago I promised to go over using turtles and the shape editor. Most of this information is covered in chapters 6 and 8 of the SmartLOGO manual.

I will start with chapter 8 which explains how to control the 30 turtles available in SmartLOGO. First I will start with the simplest of the primitives in this section, TELL. The TELL primitive controls which Turtle or Turtles are active. There are two ways to use TELL, with a single turtlenumber or with a turtlenumber list. To use it the first way, type in TELL and follow it by the number (0-29) of the turtle you want to be active. To use TELL the second way you must type in TELL and follow it by an ope bracket ([), the numbers of the turtles you want to be active, and the closing bracket (]) (i.e. TELL [0123] will tell turtles

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0-3 to be active). If a turtle is active it does all of the commands typed in until you change control to another turtle. As soon as you tell another turtle to be active, the current one becomes inactive.

The next primitive is ALL. This is the same typing (TELL [0...29], actually typing out all of the numbers). If you want all 30 turtles to do the same thing at once type in ALL. ALL was used in the demos when all of the turtles moved at once. It can be very useful once you get the turtles in different positions and then have them do the same movements to make interesting shapes.

The next primitive, ASK, temporarily shifts control to the turtle specified after it, telling it to do the instruction list that follows (i.e. ASK 4 [PU FD 30 PD]). ASK can be followed by either a single turtlenumber or a list of turtles. After the instruction list is finished, control reverts back to the last turtle called by TELL. ASK can be very useful if you are having a group of turtles do something and you only want a few of them to do something else. ASK will allow you to tell them to do it and then give control back to the group.

The primitive EACH tells each turtle in the active group to do the instructions which follow one at a time (i.e. EACH [FD 20 RT 90]). This can be used to create effects where one turtle hits, another and causes it in turn to move.

The last primitive is WHO. WHO outputs the list of active turtles. There is a good example of how to use this at the end of the chapter in the manual. Now we will proceed to chapter 6. Chapter 6 deals with the 60 shapes available for the 30 turtles. Shapes 0-35 are user defined, while shapes 36-59 correspond to the default turtle and its variations. If you want to be very creative you can change shapes 36-59 to get shapes that turn as the turtle turns. Shapes 0-35 stay pointing in one direction only.

There are two ways to edit the turtle shapes. The first way is to call it with the primitive ES followed by the shapenumber you want to edit. You will then be presented with what that shape looks like currently. To edit it, you use the arrow keys and the home key to alternate between filled and empty, you can also use control and an arrow key to fill in a square. The turtle is a 16 X 16 grid of squares which are either empty or filled, this is the same as using sprites in Basic, which is what a turtle really is. The CLEAR key will clear the grid, while the MOVE/COPY key will replace the shape with the original, when you are finished with the shape press either the ESCAPE/WP to NOT save the shape or SMARTKEY V! to save the shape under the shapenumber. To permanently save the shape you must change or set a variable equal to the shape definition with a command like: (MAKE "variable GETSH shapenumber), once this is finished, the shape will be saved when you save the workspace or by saving the variables. To load the shape back into memory, you must load the file containing the shape definition, then use the PUTSH command to make a shapenumber equal to the definition (i.e. PUTSH shapenumber :variable), and finally set the turtle to the shapenumber using SETSH followed by the number.

You can also design shapes using the shape editor that is on your SmartLOGO data pack. To use it, load the file EASYSHAPE, it will start up automatically. The program will ask you what shapenumber to start with — you can do up to 10 consecutive shapes in one file. It will then give you commands. When you are finished with a shape it will ask you for a name, if you want to change the shape some more, or if you want to do another shape. When you are finished editing the shapes it will ask you for a filename that will be used to save the shapes. To use the shapes you have to load them like you did before using PUTSH and SETSH. The main difference between the two shape editors is that EASYSHAPE save the shapes for you and allows you to do ten shapes at a time. EASYSHAPE is generally easier to use for the beginner.

That's all for this issue. Next issue, I will explain the sound commands. A few months ago I received word from Roger Fillary, 71 Darfield Road, London, SE4 1ES, England, that he is desperately in need of a SmartLOGO Manual and a place to purchase software. If any of you have an extra copy or place where he can purchase one, please write him and he will send you a Bankers Money Order. Please help him. If any of you have any questions, comments, neat procedures, programs, hints, something you want discussed or something you want covered in this column, please write me: Mike Degner, RR2, Box 293, Shell Lake, WI 54871.

Getting Started With Forth
by Thomas C. Gilmore

This is the first in a series of articles on FORTH for the ADAM computer, now available in two public domain versions from Expandable Computer News.

Descriptions of what FORTH is and how it came to be available for ADAM users will be left until later articles in the series. The first article will focus on WHAT is available and how to put it immediately to work on your ADAM computer.

The "Start-Up" version of FORTH for the ADAM is a set of files directly from FORTH-83, the 1983 International Standard (the previous version was FORTH-79). This is a highly transportable language, usable on just about all top-of-the-line

microcomputers. (In regards to transportability, it may be second only to the "C" programming language). As you may have noticed, the BASIC language often needs considerable alteration between computers, and it also does not provide the speed of compiled programs.

What you need at this time for the "Start-Up" version of FORTH is CP/M 2.2. Commercial versions of FORTH may become available for ADAM, which may eliminate the need for you to have CP/M 2.2, but to my knowledge they haven't reached the market yet.

A disk drive or two is recommended, but they are NOT essential — just very convenient. This article and the ones to follow are based on my use of ONE disk drive with the "Start-Up" version. Do realize, though, that you can use any configuration that suits you. (You can also plunge immediately into the "Advanced Set" if you already know FORTH-83 and/or you're already a veteran hacker; however, I recommend that you learn and work through many exercises and small systems sticking to the "Start-Up" set).

Here's what's in the "Start-Up" version, which is available on either disk or data pack:

* F83.COM - The complete, compiled FORTH-83 system (24K)
* KERNEL80.BLK - The primary source library
* UTILITY.BLK - Another source library
* README.80 - The basic documentation on FORTH-83 for CP/M users.

What is NOT in either of the versions is probably more important. None of the public domain versions (including MS-DOS) provide any real instructions or tutorials in FORTH. And for good reason: already published and available are excellent texts and tutorials, which are strongly recommended by the FORTH Interest Group, including a mention in the README documentation. I can't emphasize too strongly the need for investing at least $22 in one or two of these basic texts from a book store like B Dalton's or Software, Etc. Here are the more tried and true texts:

* Starting FORTH, by Leo Brodie, 348 pages plus appendices, Englewood Cliffs, NJ 07632: Prentice-Hall, Inc., 1981.

* Mastering FORTH, by Anita Anderson and Martin Tracy, 216 pages, Bowie, MD 20715: Brady Communications Co., Inc., 1984.

Even before your software arrives, you can read and study the first 3 chapters of Starting FORTH (SF) and/or the first 5 chapters (they're shorter) of Mastering FORTH (MF).

Then, when your software arrives from ECN, load CP/M 2.2, put on the data pack or first disk, scan the README file, and type "F83".

If you've done the above recommended reading, you are IMMEDIATELY ready to begin doing FORTH on-line. Within a very short time, following the text (Chapter 3 in SF or Chapter 5 in MF), you'll be editing your own program files, using the built-in editor.

Here's one of my first program files:

```
0 \ ASCII utility words
1 : line ( n -- ) \ print ASCII, decimal, and binary
2 cr dup dup 4 spaces emit 9 u.r
3 3 spaces 48 emit dup 65 < if 48 emit then 2 base !
u. dec ;
4 : head ( -- ) \print column heads for ASCII
5 cr ." Printing"
6 cr ." Character Number Binary"
7 cr ." ---------- " cr ;
8 : list ( nl n2 -- ) \ print range of ASCII characters
9 1+ swap do i line loop cr ;
```

And here's what it looks like when you run it for "0" thru "9":

```
cr cr head 48 57 list

Printing
Character Number Binary
--------- ------ ------
0   48     00110000
1   49     00110001
2   50     00110010
3   51     00110011
4   52     00110100
5   53     00110101
6   54     00110110
7   55     00110111
8   56     00111000
9   57     00111001
ok
```

In the next article, we'll discuss some of the views of what FORTH is and isn't, plus another sample or two.

Interfacing With ADAM
by John Moore

If you have followed our first two articles, you have an 8255A programmable peripheral interface connected to your ADAM. We will now look at what this chip can do for you.

The 8255A has several modes of operation that are determined by the various "control codes" you send the chip. The control register in the chip is mapped into ADAM as Port 4B. Any information sent out Port 4B will control your chip.

The 8255A refers to its own ports as A, B, and C.

These are addressed by ADAM as 48h, 49h and 4Ah respectively. Mode controls for each port are fairly independent. The main modes of interest to us are input and output. For output, send an 80 (hex) to port 4B. Input requires a 90 be sent.

If you have CP/M and a voltmeter, you can check out your wiring and see the basis of our controls. Enter DDT, and type A100 (ret). Now type MVI A, 80 (ret), OUT 4B (ret), MVI A,0 (ret), OUT 49 (ret), RST 7 (ret), . (ret). Now read the voltage on Pins 18-25. It should be near +5. Now command DDT 6100 (ret). The voltage should go to near zero. If you change the number in the OUT instruction to 48, you can perform the test on Pins 1-4. Change the number to 4A, and you can test Pins 10-14. Change that "0" in the third instruction to "FF", and all the pins should turn back on again.

Using Port B (49) without any additional decoding, we can turn 8 separate devices on or off. The number we send will determine what combination of devices will operate. Your choices range from 00 (all off) to FF (all on). We will go into more detail about this later.

Since the low voltage level of the computer cannot directly connect to an appliance, we must create an interface that can. The cheapest way I can think of is to use a couple of 2N2222 (or similar) NPN silicon transistors connected as shown. You could get +12 volts from ADAM'S power supply. You also might be able to use a small 5v relay and use the +5v bus already at your circuit.

You will need one circuit for each controlled appliance. The transistors and relays are avail-able at Radio Shack. Be sure that the relay you use has enough current capacity to handle the appliance you choose. Look on the nameplate. Current is equal to the listed wattage divided by the line voltage.

Also remember, line voltage can kill you! Use proper precautions while working, and be sure that no one else can touch any exposed wiring!

This article will also give you instructions on how to connect a Real-time Clock/Calendar. I am assuming you are using the RTCM32.768 from Jameco Electronics. We connect this chip according to the diagram. DO-D3 on the clock go to PAO-PA3 on the 8255A. Lines PC7-PC4 all go to another 74LS04 inverter, since we want these signals to be active high. The inverted signals go to ADD WRT, STOP, RD and WRT. The non-inverted line (PC3) goes to CS2. CS1 is held permanently high.

Operations get a little complex when we interface with the clock. We have to send an address to the chip to tell it what we wish to do, then we must make sure our interface is in the proper mode, and read or write the information. We have to do this twelve times since the clock module reads out the date and time in its own format (which we have to covert to ours!)

ADDRESS	QUANTITY
0	Seconds
1	Tens of seconds
2	Minutes
3	Tens of minutes
4	Hours
5	Tens of hours (and special info)
6	Day of Week (0-6)
7	Day (date)
8	Tens of days
9	Month
A	Tens of months
B	Year
C	Tens of years

The "special" info in Address 5 has to do with whether the clock is set in 24-hour mode or 12-hour mode. If the latter, there is an indication of AM or PM here, too. Our software will have to handle this. The next article will deal with software to use the interfaces we have built. So that the greatest number might benefit, I will write the programs in SmartBASIC, with machine-language modules and explanations for those who are interested.

(The diagrams for this project appeared in Issue #17.)

Bulletin Board

The Bulletin Board is a service to subscribers of ECN. There is no charge for listing items, but we ask that listings be kept brief.

- **WANTED:** SmartLOGO Manual. Contact Roger Fillary, 71 Darfield Road, London, SE4 1ES, England.
- **FOR SALE:** Complete ADAM System - 2 data drives, 1 disk drive, memory expander, modem, books, manuals, software. $700 or best offer. Call Rose at 618/656-2669.
- **FOR SALE:** Large stock of new or like new cartridges for the Colecovision / ADAM for under $10 each. Send SASE for list to Scott Gordon, 12503 Kings Lake Dr., Reston, VA 22091.
- **WANTED:** Would like to hear from other ADAM owners in my area. Contact: Thomas Wozniak, 1163 Delancey Place, West Chester, PA 19382, ph. (215) 431-3888.
- **FOR SALE:** Complete ADAM, w/dual ddp drives, disk drive, Eve printer interface, separate power supply, 64K expander, modem, LOGO, CP/M, ADAMCalc, Filer and more. $650 includes shipping or offer. Contact: Tom Sandwick, 1214 Skyridge St., SE, Olympia, WA 98503, ph. (206) 753-7217 days or (206) 491-1214 nights.

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- Capital Software, P.O. Box 370, St. Louis, MO 63032, is in the process of distributing updates to its color printer interface that will allow printing of PaintMASTER images and another revision that allows you to print directly from SmartBASIC. This company should be commended for its continued efforts to provide owners of its product with updates.
- Iban Management Co., Inc., P.O. Box 1464, Bellevue, NE 68005, has advised us that their tax program is no longer being distributed by Extended Software and TAX 1040-86 is now available directly from Iban for $24. Contact them for more information.
- Mike McCauley author of Stage Fright is notifying owners of a bug in that program. If you own Stage Fright and have not received a notice from Mike, write him for further information.
- Patrick Hayes sends in the following. If you aren't aware of it already, the Orphanware printer interface solves the problem of the extra half line feed in SmartFiler and other Coleco software. It even works with ADAMCalc spreadsheet printouts if they are less than 80 columns wide. Simply use the "Save Values" option to create the print file.
- Glen Miller sends in the following: I have tried the method of merging programs given in Issue #17. This will work but not under software control. After the two POKE commands you can merge under program control by using PRINT CHR$(4); "RUN NAME" if the program to be merged has all line numbers higher than the initial program. The program will start from the original location unless you tell it to branch to the new routine. At the beginning of my program I used, a = PEEK (5): IF a = 1 GOTO 10000. This will cause the restart of the program to jump to 10000, all DIM commands should be before this line. At the end of the subroutine you should restore all POKEs to their original values and then GOTO any point within your original program. The following lines should be added to your original program:

```
POKE 24010, 163
POKE 24011, 62
POKE 5, 1
a = PEEK (5): IF a = 1 THEN 10000
```

Add the following lines to your subroutine that will be merged:

```
POKE 24010, 24
POKE 24011, 228
POKE 5, 255
GOTO # (in original program)
```

I hope others will find this information useful.

User Group News

The list of users' groups continues to grow. If there isn't one in your area to join - start one!

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Programs, Programs, Programs

Instructions for this program are included in the REM statements and when the program is RUN. The listing starts on the following page.

```
10  REM  Directory Management Program
20  REM
30  REM  Lists file name, starting block of file,
         length of file In bytes & whether file is deleted
40  REM You can delete or recover files or Just
         recover lost blocks
```

```
50  REM When recovering lost blocks, all previously deleted files are removed from the directory
60  REM  CREATED BY DAVID CLARK
70  REM  VERSION 2
80  REM  SEPTEMBER 1986
90  REM
100 HOME: VTAB 12: HTAB 7: PRINT "ONE MOMENT PLEASE": POKE 16149, 255: POKE 16150, 255
110 FOR x = 0 TO 32: READ d: POKE 56320+x, d: NEXT x
120 DATA 58, 181, 65, 1, 0, 0, 17, 1, 0, 33, 0, 212, 205, 243, 252
130 DATA 32, 1, 201, 195, 233, 94, 1, 0, 0, 33, 0, 0, 17, 0, 0, 237, 176, 201
140 ONERR GOTO 610
150 CALL 56320
160 fl = 0
170 DIM a$(40), b$(40), c$(40), a(40), b(1): b(0) = 2
180 FOR x = 54350 TO 55269 STEP 26
190 FOR i = 0 TO 11: e$ = e$+CHR$(PEEK(x+i)): IF PEEK(x+i) = 3 THEN j = i: i = 11
200 NEXT i
210 b$(y) = LEFT$(e$, j-1):  a$(y) = MID$(e$, j, 1): a(y) = x
220 c $ ( y )  =  S T R $ ( P E E K ( x + 1 3 ) ) +"/"+STR$(((PEEK(x+19)-l)*1024)+(PEEK(x+22)*256+PEEK(x+21)))
230 IF LEFT$(e$, j) = "BLOCKS LEFT" THEN x = 55269: b(l) = a(y)+17: GOTO 250
240 a(y) = x: b(0) = b(0)+PEEK(x+17): y = y+1: e$ = ""
250 NEXT x
260 x = 54272: FOR i = 0 TO 11: f$ = f$+CHR$(PEEK(x+i)): IF PEEK(x+i) = 3 THEN j = i: i =  11
270 NEXT i: f$ = LEFT$(f$, j)
280 IF fl = 1 THEN RETURN
290 HOME: PRINT TAB((31-9)/2); "DIRECTORY": PRINT
300 PRINT "  Volume:  "; f$: PRINT
310 i = 0
320 PRINT " "; aS(i); " "; b$(i); TAB(15); c$(i);
330 IF PEEK(a(i)+12> = 20 THEN PRINT TAB(24); "File del"; : GOTO 350
340 PRINT
350 IF i >= y-1 THEN 380
360 IF i = 11 OR i = 23 OR i = 35 THEN 390
370 i = i+1: GOTO 320
380 PRINT: PRINT: PRINT "  Blocks free "; PEEK(b(1))
390 VTAB 21: PRINT " R/D - Recover/Delete file": PRINT " K/C - Krunch/Check directory"
400 PRINT " E/P - Exit/Permanent to source";: PRINT " B/N - Reboot DIR/Change DR#";
410 GET q$: IF q$ = "p" OR q$ = "P" THEN 840
420 IF q$ = "r" OR q$ = "R" OR q$ = "d" OR q$ = "D" THEN 770
430 IF q$ = "k" OR q$ = "K" THEN 890
440 IF q$ = "c" OR q$ = "C" THEN 570
450 IF q$ = "b" OR q$ = "B" THEN CLEAR: GOTO 150
460 IF q$ = "e" OR q$ = "E" THEN END
470 IF q$ = "n" OR q$ = "N" THEN 490
480 GOTO 410
490 VTAB 20: PRINT CHR$(24): PRINT " Select drive # (1-4)"
500 PRINT: PRINT " Enter (0) for menu "; : GET q$
510 IF qS = "0" THEN  VTAB 20: PRINT CHR$(24): GOTO 390
520 IF q$ < "1" OR qS > "4" THEN 490
530 IF q$ = "1" THEN  POKE 16821, 8: CLEAR: GOTO 150
540 IF q$ = "2" THEN  POKE 16821, 24: CLEAR: GOTO 150
550 IF q$ = "3" THEN  POKE 16821, 4: CLEAR: GOTO 150
560 POKE 16821, 5: CLEAR: GOTO 150
570 HOME: PRINT TAB((31-9)/2); "DIRECTORY": PRINT
580 PRINT "  Volume:  "; f$: PRINT
590 IF i >= y-1 THEN 310
600 GOTO 370
610 HOME: IF ERRNUM(0) <> 8 THEN PRINT: PRINT " Check manual for error #"; ERRNUM(0):  CLRERR: END
620 IF PEEK(16821) = 8 THEN PRINT " Default drive tape #1": GOTO 660
630 IF PEEK(16821) = 24 THEN PRINT " Default drive tape #2": GOTO 660
640 IF PEEK(16821) = 4 THEN PRINT " Default drive disk #1": GOTO 660
650 IF PEEK(16821) = 5 THEN PRINT " Default drive disk #2"; GOTO 660
660 PRINT: PRINT " TAPE #1 - 1": PRINT " TAPE #2 - 2": PRINT "DISK #1 - 3": PRINT "DISK #2 - 4"
670 VTAB 10: PRINT CHR$(24): PRINT "Select drive # (1-4) ";: get q$: IF q$ < "1" OR q$ > "4" THEN 670
680 VTAB 10: PRINT CHR$(24): PRINT " Are you sure about drive #"; q$: PRINT: PRINT " Enter (Y/N) "; : GET qq$
690 IF qq$ = "y" OR qq$ = "Y" THEN 720
700 IF qq$ <> "n" AND qq$ <> "N" THEN 680
710 GOTO 670
720 IF qS = "1" THEN POKE 16821, 8: GOTO 760
730 IF q$ = "2" THEN POKE 16821, 24: GOTO 760
```

```
740 IF q$ = "3" THEN POKE 16821, 4: GOTO 760
750 POKE 16821, 5
760 CALL 56320: RESUME
770 VTAB 20: PRINT CHR$(24)
780 INPUT " File name please "; n$
790 FOR k = 0 TO y: IF b$(k) = nS THEN j = k: k =
    y
800 NEXT k
810 IF q$ = "d" OR q$ = "D" THEN  POKE a(j)+12,
    20: POKE b(1), PEEK (b(1))+PEEK (a(j)+17):
    GOTO 830
820 IF q$ = "r" OR q$ = "R" THEN  POKE a(j)+12,
    16: POKE b(l), PEEK(b(l))-PEEK (a(j)+17)
830 CLEAR: GOTO 170
840 VTAB 20: PRINT CHR$(24): INPUT " Are you
    sure (Y/N)? "; q$
850 IF q$ = "n" OR q$ = "N" THEN 390
860 IF q$ <> "y" AND q$ <> "Y" THEN 840
870 POKE 56333, 246: CALL 56320: POKE 56333,
    243: CALL 56320
880 CLEAR: GOTO 170
890 HOME: PRINT: PRINT " This routine removes
    all": PRINT " deleted files from the"
900 PRINT " directory and recovers all": PRINT "
    lost blocks."
910 PRINT " May take up to (2) minutes": PRINT "
    so please be patient."
920 VTAB 10: PRINT " Press (C) to continue":
    PRINT: PRINT " Press any other for menu"
930 GET q$: IF q$ <> "c" AND q$ <> "C" THEN i =
    -1: GOTO 570
940 VTAB 15: HTAB 5: FLASH: PRINT "          ":
    NORMAL
950 VTAB 16: HTAB 5: FLASH: PRINT "
    KRUNCHING "; : NORMAL: PRINT " Catalog"
960 VTAB 17: HTAB 5: FLASH: PRINT "          ":
    NORMAL
970 i = 0
980 IF PEEK(a(i)+12) = 20 THEN 1010
990 IF b$(i) = "BLOCKS LEFT" THEN POKE b(1)-4,
    b(0): POKE b(1), 255-b(0): CLEAR: f1 = 0:
    GOTO 170
1000 i = i + 1: GOTO 980
1010 POKE 56345, (a(i)+26)-256*INT((a(i)+26)/256):
     POKE 56346, INT((a(i)+26)/256)
1020 POKE 56348, a(i)-256*INT(a)i)/256): POKE
     56349, INT(a(i)/256)
1030 le = 55296-a(i): POKE 56342,
     le-256*INT(le/256): POKE 56343, INT(le/256)
1040 CALL 56341: CLEAR: fl = 1: GOSUB 170
1050 GOTO 970
```

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