TRS-80® Microcomputer News

Volume 5, Issue 2
FEBRUARY 1983 $1.50

- Utilities Issue
- Model 12
- RS-232 Switch

Fort Worth Scene

Utilities from PATCH to BACKUP to BUILD and DO are discussed in this issue to make us all smarter and happier TRS-80 users. Some of the utilities are familiar and some are not so familiar. We're re-running two pertinent articles, "The PATCH" and "Backups—Insurance Against Disaster" because of the continuing need for information regarding these two utilities.

In addition to all the utility articles, there's so much that's new this month that it's hard to even begin. We have tried to hit the highlights as much as possible, since it would be impossible to cover everything.

MODEL 12, RS-232 SWITCH, AND 12 MEG HARD DISK

First there's a brand new computer, the Model 12. It comes on line to replace the very popular Model II and brings with it the kind of additional enhancements and attractive prices that should make it a real winner.

Still another new hardware item is the RS-232 Switch. Customer requests have resulted in this useful switch which lets the user change RS-232 devices with the flip of a switch instead of struggling with cables.

The 12 Megabyte hard disk was also announced in January, and you can read about it right here.

A MULTI-USER OPERATING SYSTEM

Still another exciting item is TRS-Xenix, a subset of the very popular Bell Lab's operating system UNIX™. Xenix will be available for the Model 16 for use in a hard disk multi-user environment. It is a very sophisticated operating system which is tremendously versatile.

From what we've seen of this operating system, it promises to be very exciting, and we hope that you'll get a little excited about it, too, after reading the Multi-user article.

THE SOFTWARE MAINTENANCE PROGRAM

In the ever continuing effort to support theTRS-80 customer, Radio Shack has recently installed the Software Maintenance program to insure that purchasers of our software have the latest changes in their programs.

TWO UNIQUE SOFTWARE PACKAGES

Microsoft™ Multiplan™, a sophisticated electronic worksheet, for Models II/12 and 16, will be another Radio Shack product. Robot Battle, an introduction to the concepts and procedures of programming, is a new product with a game-like format for the Color Computer.

MAGAZINES

Below are two magazines of special interest to TRS-80 owners that we believe have editorial content of high quality and will be of use to our customers.

80-US (Covers all TRS-80's.)*
3838 South Warner Street
Tacoma, WA 98409

Rainbow (Covers the TRS-80 Color Computer.)
5803 Timber Ridge Dr.
Prospect, KY 40059

*Write them to receive a free sample cop

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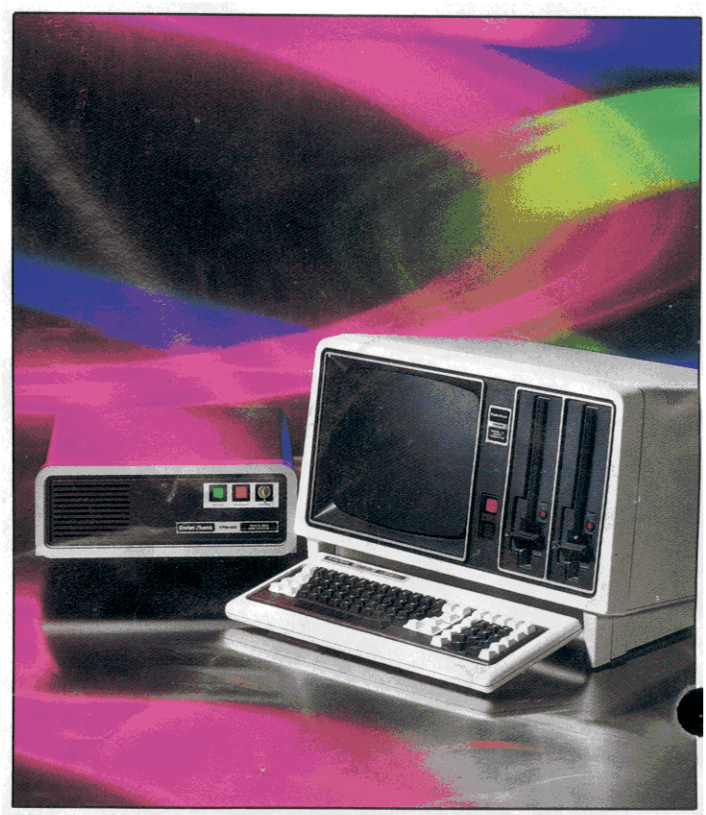

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The TRS-80 Newsletter welcomes the receipt of computer programs, or other material which you would like to make available to users of TRS-80 Microcomputer systems. In order for us to reprint your submission, you must specifically request that your material be considered for reprinting in the newsletter and provide no notice that you retain copyrights or other exclusive rights in the material. This assures that our readers may be permitted to recopy and use your material without creating any legal hassles.

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Material may be submitted by mail to P.O. Box 2910, Fort Worth, Texas 76113-2910, or through CompuServe. The Microcomputer News' CompuServe user ID number is 70007,535.

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Further, while Microcomputer News is a product of Radio Shack, the programs and much of the information published here are not Radio Shack products, and as such can not be supported by our Computer Customer Service group. If you have questions about a program in the Microcomputer News, your first option is to write directly to the author of the program. When possible, we are now including author's addresses to facilitate communications. If the address is not published, or if you are not happy with the response you get, please write us here at Microcomputer News. We will try (given the limited size of our staff) to find an answer to your question and, in many cases, will publish the answer in an up-coming issue of Microcomputer News.

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TRS-80® Microcomputer News

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The Software Maintenance Program

by Annette Zamberlin-Main

In last month's issue of the Microcomputer News, Mr. Jon Shirley made an announcement in "View from the 7th Floor," that we thought you might like some additional background and information about.

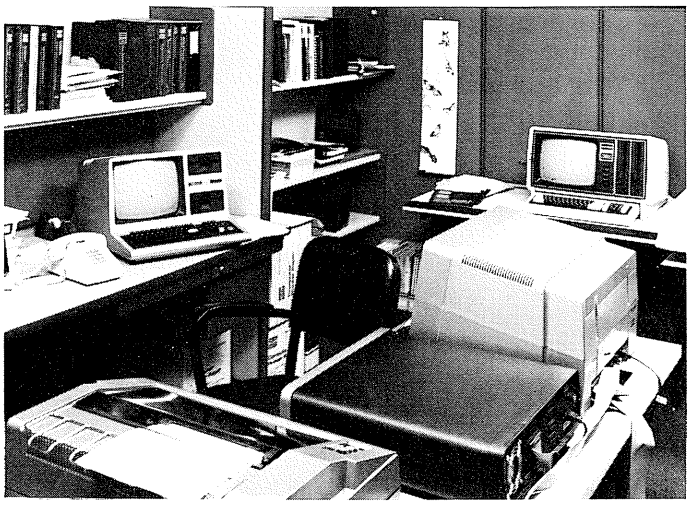
Mr. Shirley dedicated two paragraphs to a new policy for software support, which began here on January 1, 1983 and is quite exciting when you consider all the ramifications.

PRESENT SYSTEM

Presently, the means employed for assisting customers (i.e. answering questions and generally assisting during the implementation phase) works very well, as far as it goes. The problem is, it doesn't go quite far enough. Radio Shack not only wants to help by providing answers to your questions (which we presently do), we also want your software to be maintained and kept up-to-date. By keeping your software updated with the latest improvements, you will need less and less "one-on-one" assistance and that is good for both of us.

But, back for a moment to the present system. Up until now you have probably depended upon the Radio Shack Computer Center, Computer Departments or participating Radio Shack dealers to answer your questions, to keep you informed of changes to your software and otherwise assist you in using your computer system.

The personnel in these stores are further backed by a very competent group of individuals at Computer Customer Services in Fort Worth. The customer can call direct to Computer Customer Services about any problems he is experiencing. (See Computer Customer Service article in this issue for appropriate telephone numbers).



And last, but surely not least, we (the Microcomputer News) would publish entire sections in our newsletter dedicated solely to the bugs, errors, and fixes for each software package, under its respective model as we became aware of them during the course of a given month. As an aside, you may have noticed, with the January issue that the various "Bugs, Errors and Fixes" sections have now become one section in the News, subdivided by model.

The above detailed system will remain in place. To it, however, is being added an additional level of support not matched by any other manufacturer/retailer of microcomputers. That additional level of support is to ensure that each user of a specific software package is kept current on all changes, revisions, etc. for their particular package.

This additional level of support is based upon a highly accurate mailing list, which in turn is based upon the completed and returned software registration cards, which the customer finds contained in all disk-based software binders (games and color software excluded).

Software Registration Card

Cat. No. _____

Version _____

SAMPLE

Name _____

Company _____

Address _____

City _____ Phone (___) ___-____

State _____ Zip _____

CUSTOMERS' RESPONSIBILITIES

If you already own a disk-based (non-game) software package and have not sent in the software registration card included within, do so at once.

You might also want to contact your local Radio Shack store where you purchased the package or telephone Computer Customer Services in Fort Worth to find out if there have been any revisions, corrections, etc. to the software since your date of purchase, which you might have missed. What you are attempting to do here is to insure that your software is as up-to-date as possible, so that any future corrections will fit right into place. Be sure as well, to note these revisions somewhere in the package for later reference.

R E A D M E F I R S T

All computer software is subject to change, correction, or improvement as the manufacturer receives customer comments and experiences. Radio Shack has established a system to keep you immediately informed of any reported problems with this software, and the solutions. We have a customer service network including representatives in many Radio Shack Computer Centers, and a large group in Fort Worth, Texas, to help with any specific errors you may find in your use of the programs. We will also furnish information on any improvements or changes that are "cut in" on later production versions.

To take advantage of these services, you must do three things:

1) Send in the postage-paid software registration card included in this manual immediately.

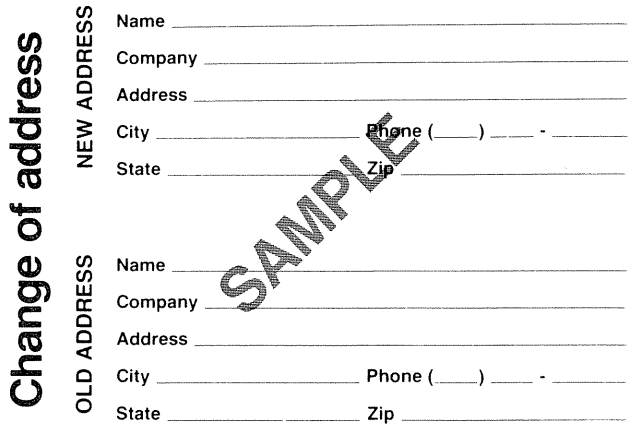
2) If you change your address, you must send us a change of address card (enclosed), listing your old address exactly as it is currently on file with us.

3) As we furnish updates or "patches", and you update your software, you must keep an accurate record of the current version numbers on the logs below. (The version number will be furnished with each update.)

Keep this card in your manual at all times, and refer to the current version numbers when requesting information or help from us. Thank you.

APPLICATIONS SOFTWARE VERSION LOG			OP. SYSTEM VERSION LOG

We have included a sample of our new Version Log with this article. This will be placed in the front of all disk-based, non-game software packages that are produced after January 1 of 1983. You may want to take a minute to copy this sample log and place it in the front of all software packages that you presently own. The Version Log will be handy for keeping track of revisions that are made under the auspices of this program. The only time that you should make an entry in this log is when we notify you by mail of an update. In the Customer Service Bulletin itself we will provide you with a new version number to enter into your log, if applicable. By using this method, we can try to keep track of your version number in Fort Worth, knowledge of this number can be very helpful when inquiring about your software.



Change of address cards have also been included. The currency of the mailing list will be the primary responsibility of the customer. We need to know where you are in order to insure that you receive the information in a timely fashion.

WHAT TO EXPECT

And what exactly will be coming in the mail? A first class letter will be sent to you, as the need arises, which will inform you of all PATCHes and re-releases (you may know them as Radio Shack's 700 numbers).

The types of changes involved include four major categories:

(1) A serious problem fix.
(2) A simple necessary PATCH.
(3) A low level obscure fix.
(4) A special situation PATCH.

If a re-release of a program is made, information on the new "700-xxxx" number will be contained in the letter. No disks will be sent thru the mail. It will be the customers' responsibility to go to his local Radio Shack Store, Computer Center, or participating dealer to pick up the disk and any additional new documentation. All detail information will be included in the letter.

Radio Shack in Fort Worth will also send the same letters to all stores and computer centers.

So please, send those software registration cards in. You need to be kept up-to-date on all corrections or revisions that might be made to the software package(s) which you own and Radio Shack has the mechanism in place to keep you current.

Merge BASIC Programs on the Color Computer

George Fraser
3403 Bear Creek Drive
Newbury Park, CA 91320

Here is a handy little program which I have used to merge two or more BASIC programs together into one program for the Color Computer. I have tested it only with Extended Color BASIC 1.0.

```
1Ø '  "MERGE" FOR THE COLOR COMPUTER
2Ø '  BY G.FRASER   MARCH 1982
3Ø CLEAR 2ØØ,16364
4Ø FOR A = 16365 TO 16381
5Ø READ B: POKE A,B: NEXT
6Ø DATA 158, 25, 175, 14Ø, 12, 158, 27, 48, 3Ø
7Ø DATA 32, 3, 174, 14Ø, 3, 159, 25, 57
```

Here is the procedure to merge program "B" onto the end of program "A."

1. Program "B" must be CSAVED on tape.
2. CLOAD "MERGE" or key it in from this listing.
3. Run program "MERGE".
4. CLOAD program "A" (or key it in after doing a "NEW"). Note the last line number in program "A."
5. EXEC 16365 (a "LIST" will now show no program in memory, but do not believe it. "A" is still there.)
6. CLOAD program "B."
7. Use the "RENUM" command to renumber program "B" if necessary so that the first line number of "B" is greater than the last line number of "A." For example, if "A" ends with line number 760, you can "RENUM 800." Apparently you can also edit program "B" at this point without harm to "A."
8. EXEC 16376

The merge is now complete. At this point, if you wish to merge a third program "C" onto the end of "A + B," repeat steps 5 through 8. Step 5 moves the address of the end of the BASIC program in memory to BASIC's pointer which normally points to the beginning of the program. This fools the "CLOAD" command of Step 6 and the "RENUM" of Step 7. Program "B" is loaded into memory following "A" instead of on top of "A," as is the usual case. Step 8 then restores BASIC's beginning of program pointer to its original value.

You may publish this program in Microcomputer News if you wish. Here is the assembly language listing.

```
          ORG    $3FED
BEFORE    LDX    $19         BEGINNING OF BASIC POINTER
          STX    SAVE,PCR    SAVE IT FOR LATER
          LDX    $1B         END OF BASIC POINTER
          LEAX   -2,X
          BRA    +3
AFTER     LDX    SAVE,PCR
          STX    $19
          RTS
SAVE      RMB    2
```

Disk Utilities

The disk operating systems for the various TRS-80 computers all have utility programs. They are designed both for the most sophisticated user developing his own software and for the most straightforward user running any packaged software programs.

The purposes of the utilities are many and varied, and shortage of space precludes the possibility of talking about all of them in this column.

Not all the following comments will apply to your particular machine or circumstances, but read on anyway—any one of the following comments may "save your bacon" at some time in the future!

FORMAT (DSKINI on the Color Computer) is the utility which prepares a floppy disk for storage of data-files and programs. It lays out a string of characters along a sector and places between sectors a group of characters to identify the sector and track. If what has just been written cannot be read back successfully and verified, then the sector (and on most machines the track) will be flagged as flawed. FORMAT is therefore a good test of a disk drive and of the floppy itself and can be used periodically to check drive alignments and disk quality. If the same disk has tracks flawed when FORMATted on one drive but not another, you may have a faulty drive; if the same disk always shows flaws, then it is time to bulk-erase or discard it. If you find that a disk works in one drive but not in another, or you get TRSDOS errors 4, 5, or 40, you may come to the same conclusion. If you need to have the drives serviced, please tell the service department that you have 23 million disks (or however many it is) all written on a crooked drive; they can leave one drive crooked enough for you to be able to read the rotten disks and FORMAT and BACKUP onto a straightened drive. (Of course, you go back the next day to get the crooked one straightened out as well!)

In a system that requires drive alignment, you may just be able to keep going with disks FORMATted in the drive in which they are going to run. Only use this trick if bankruptcy or an employee walk-out is imminent, otherwise go in for that service-call.

FORMAT has a different set of options on each operating system, for disk-name, password, and possibly for position of primary and alternate directory tracks. However, check your package manual to see if there are any special instructions for particular disks, before changing any of the defaults. You may have a SIZE option, to give you a different sized directory track. If you have the option to change the verification level during FORMAT, then only use the lower level if you are desperately short of time—your data may not live to regret it!

FORMAT is good for all drives except a primary hard drive where INITialize is required. INIT formats the drive (with options) but then proceeds to copy the appropriate operating system onto the drive for later use.

FORMAT on one operating system, may write different sectors and tracks to a disk than those written by another operating system. FCOPY, CONVERT, XFERSYS, or DUMP may be the answers to the resulting incompatibility. However, two such radically different systems as the Model 16 multi-user and the regular hard disk operating system may make poor bedfellows; programs designed for the Z-80 chip (such as SCRIPSIT, PROFILES, and VISICALC) will still need to be run from the floppy disk operating system in the event that you decide to go multi-user for your COBOL-based programs. (Don't forget that four one-meg floppies are a possibility here though.)

Both LDOS and TRSDOS for the Model III have convert utilities which allow you transfer files from a Model I disk to a Model III disk but not vice versa. XFERSYS transfers new system files to an older TRSDOS version disk on the Model II and III but again, not vice versa.

FCOPY on II/16 does allow transfer of files between TRSDOS 4.1 and 2.0a and 2.0b in both directions, which gives a great deal more flexibility. Also, the Assembly Language Development System for the Model II (26-4712) has utility programs that allow you to transmit almost any sort of file between the I, II, III, and 16 in any combination.

It seems that list of utilities and their functions is almost endless, and as operating systems become more sophisticated so the list becomes longer. Since at the time of writing, the Model 16 Multi-user operating system is not available, a short comment seems appropriate. The Multi-user operating system must have utilities much as I have described above. The syntax for the utilities will undoubtedly be different to some extent, but their purposes are going to be the same. The user must still seek out the utilities required to protect the integrity of his data by systematic storage of backup copies. The user must still follow the required procedure to maintain his programs in the most current version, using the published changes. No matter what machine or what operating system, the utilities are there to help you the user to achieve all this.

Computer Customer Service Address and Phone Numbers

8AM to 5PM Central Time
Computer Customer Services
400 Atrium, One Tandy Center
Fort Worth, Texas 76102

Model I/III Business Group	(817) 390-3939
Model II/16 Business Group	(817) 390-3935
Languages and Compilers	(817) 390-3946
Color and Pocket Computer Group	(817) 390-3944
Hardware and Communications Group	(817) 390-2140
Educational Software	(817) 390-3302
Games, Books, and New Products	(817) 390-2133
Newsletter Subscription Problems	(817) 870-0407

BUILD a DO File

by Linda Miller

BUILD—MODELS I DOUBLE DENSITY, II, AND III

The Models I Double Density, II, and III manuals define BUILD as a disk command that lets you create an "automatic command input file." This may be expanded a little by saying that the primary purpose of BUILD files is to pass command lines to TRSDOS just as if the command lines had been typed from the keyboard at the TRSDOS READY level. Commands like PATCH, BASIC, SETCOM, and COPY can all be "built" into an "automatic command input file" to make repetitive operations seem automatic. (Note: The Model I Double Density manual and the Model III manual caution against using the CLEAR statement when BUILDing a file.)

FOR EXAMPLE . . .

To run the hypothetical BASIC program BIGSORT/BAS, there are several steps that have to be repeated each time. If the computer has just been initialized there is a required response to date and time. On the Model III, these responses will not be required again (except when requested by software), unless the computer has been turned off. Other steps in running this program are:

1. At TRSDOS READY, a machine language routine called SORT/CMD is loaded into memory which will be accessed by the BASIC program BIGSORT/BAS. This is accomplished by typing

```
LOAD SORT/CMD <ENTER>
```

2. To load BASIC, reserve space for six files, protect memory above 50000 for the machine language program SORT/CMD, and run the BASIC program, the procedure shown under "a" may be used. An alternate procedure shown in "b" can also be used with the Model I Double Density or the Model III.
   a. Models I (Double Density), II, and III.
      At TRSDOS READY type:

```
BASIC BIGSORT/BAS -F:6 -M:5ØØØØ <ENTER>
```

      This loads BASIC, reserves space for six files, protects memory above 50000, and loads and runs BIGSORT/BAS.
   b. Model I Double Density and Model III (alternate method)
      BASIC is loaded by typing BASIC ⟨ENTER⟩ at TRSDOS READY.
      The number of files is specified by typing 6 ⟨ENTER⟩ at the prompt HOW MANY FILES?.
      Memory above 50000 is protected by typing 50000 ⟨ENTER⟩ at the MEMORY SIZE? prompt.
      Finally, typing RUN"BIGSORT/BAS" ⟨ENTER⟩ loads and executes the program.

All the steps of these two procedures can be built into an automatic command input file which can contain as many up-to-63-character lines on the Model I/III or up-to-80-character lines on the Model II as are necessary to perform the task. For this example, the file built will be named GOSORT. The first step is to type:

```
BUILD GOSORT <ENTER>
```

Messages can be included in the BUILD file by using the PAUSE statement. A description of the file created might read something like this:

```
PAUSE LOADS SORT & BASIC, RUNS BIGSORT/BAS
```

The format for PAUSE is

```
PAUSE message
```

When the file is executed, PAUSE will appear followed by the message. After the PAUSE message, the following prompt will appear.

```
PRESS <ENTER> TO CONTINUE
```

PAUSEs may be inserted in the file anywhere that it is deemed necessary to prompt or pass information to the user.

1. The next step is to load the machine language routine SORT/CMD into memory before loading BASIC. This is accomplished by typing:

```
LOAD SORT/CMD <ENTER>
<ENTER>
```

   The second ⟨ENTER⟩ stores the line in the file being built.
2. Once the machine language program has been loaded, the appropriate procedure below may be followed.
   a. For the Model I Double Density, Model II, and Model III enter the following from the keyboard.

```
BASIC BIGSORT/BAS -F:6 -M:5ØØØØ <ENTER>
<ENTER>
```

      Once the file is created, press ⟨BREAK⟩ to end the file which should now appear on the disk directory as GOSORT.
   b. An alternate procedure for the Model I Double Density and Model III is:

```
BASIC <ENTER>
<ENTER>      'To store the line

6 <ENTER>
<ENTER>

5ØØØØ <ENTER>
<ENTER>

RUN BIGSORT/BAS <ENTER>
<ENTER>
```

These steps will load BASIC, specify that six (6) files can be opened, set Memory Size to 50000, and load and run BIGSORT/BAS.

(Continued on Page 11)

Backups–Insurance Against Disaster

How many times have you found yourself with a crashed disk with either no backup or a backup with the same problem? When this happens (and it has happened to all of us), the only option is starting over. To avoid all this grief in the future you need to follow a reasonable backup procedure. How many backups should you have, and how often should you make a backup?

Every day that information is changed, deleted, or added to disk files, those disks should be backed up. We suggest that you make backups more than once a day if the amount of information being added to the files is large. We cannot give you any hard and fast rules, but you might ask yourself this question: "How long will it take to re-enter all of the information that has been added since the last backup?" If it will only take twenty minutes to re-enter the entire mornings information, then you may not want to make another backup. If the answer is five hours, and it is only one o'clock you might consider another backup. Backups can often be made in a way that will not overly disrupt the working day. When the computer operator takes a coffee break or goes down the hall to make a stack of photo-copies, let the computer make backups at the same time. If you leave to go to lunch, have the computer do a backup while you are away. Of course, this assumes that you have at least two disk drives on your system so you do not have to be present while the backup is being made.

Backups which are made during the day, or on a daily basis, should have a three disk "family." We are going to talk about one backup a day, made at the end of each day. If you make more than one backup a day, use this procedure, and each "generation" will simply be for a shorter time period than a day. On the morning of day one (say 01/03/83) you create a disk with program and data files (working copy) for your newly acquired Accounts Receivable program. (We will call this set A.) At the end of the day (01/03/83) you make your first generation of backups. You should now have two sets of identical disks. The first set (set A—the father generation) is the working copy you created that morning. The second set (set B—the son generation) is the backup of set A that you made at the end of the day.

When you begin work on 01/04/83, you should use Set B as your working disks, with Set A put aside. At the end of the day (01/04/83), you will make the second generation of backups. Your working disks (set B) will be backed up onto blank diskettes to create a set C. You now have two identical sets of the most current information (sets B—the new father and C—the new son) and one copy of information which is a day old (set A—which now becomes the grandfather generation).

On 01/05/83, you start the day by using disk set C. The purpose of using three sets of disks (A, B, and C) is to give you insurance. If you discover that set C is glitched (i.e. when you try to use set C, the program crashes), you go to the original (set B). Hopefully, set B is alright. You make a new backup set C and continue by using the new set C (DON'T use set B as your working disk for 01/05! If set B is good, it is your insurance in the event that set C fails again.) If you find that set B is also glitched, and you have followed our procedure so far, disk set A contains good information from 01/03/83 and all you have to redo is 01/04/83. A lot of work maybe, but not as much as if you had to reconstruct both 01/03 and 01/04.

At the end of 01/05/82, backup set C onto set A. Again, you have two sets with current information (C, the new father generation, and A which becomes the new son generation). You also have one set that is one day out of date—set B, the new grandfather generation.

At the beginning of each day (or backup period if you backup more frequently), you use the son as the working disk. At the end of the day, the son becomes the father of a new son, and the old father becomes a grandfather. Grandfathers pass away and become new sons.

On 01/06 you would begin the day using set A. Set A is the son disk you created from father set C on 01/05. Set B is the grandfather set to A. At the end of the 01/06, father A creates son B, and C is the new grandfather. You would then follow this procedure for a three generation daily backup system.

The daily three generation backup system gives you good day-to-day protection, but what happens if a ten ton elephant breaks into your office and sits on all three sets?

On a weekly basis, backups need to be made every Friday. On the first Friday, a backup will need to be made of the work completed on that Friday. If the end-of-Friday daily-father-disk is B, then B would be used to make the regular daily C son copy, and A would still become the daily grandfather. You would also use B to make a weekly backup set D. The D backup set should be stored in a location which is physically separate from you normal operations. That way, if disaster strikes, once you get the elephant out of the office you will have all work through the previous Friday on backup set D, and the only work to be reconstructed will be what has been done in the current week.

We recommend a two generation weekly backup. At the end of our first week, we created backup set D. At the end of week two (the second Friday), a backup will need to be made on a clean set of diskettes. Leave set D undisturbed and create a new weekly backup set E. On every Friday thereafter, backups will need to be made rotating between the two weekly sets D and E.

For extra protection, set up a monthly backup procedure. The monthly procedure, just as the weekly, would be a once a month 2-generation procedure (sets F and G). You

may wish to keep the monthly backup diskettes in a safe deposit box, or some other location where they will be protected from any possible mishap.

The chart included in this article should help you see what the whole procedure looks like. (What is shown is an example only. The actual disk "names" backed up will depend on your situation.) You will notice that the chart includes one additional backup which we haven't mentioned. That is a final backup at the end of the year. In general, this annual backup would be used more for archival purposes than for data reconstruction.

The point, of course, is to make frequent backups and to keep "insurance" copies. If the monthly backup sets F and G are only removed from the safe-deposit box on the last Friday of each month (only one set, either F or G), then the safe-deposit box will always contain a disk set which is no more than one month old. The whole purpose of backups is to minimize the amount of data that can be lost and to make reconstruction as easy as possible. We hope that you never have to call on backup sets D through G to actually reconstruct data. But, if the worst happens, those disks will make the reconstruction as easy as possible.

Back Up Chart

	Daily Backup	Weekly Backup	Monthly Backup	Yearly Backup	Insurance Copies		
	Disk to Disk	Disk to Disk	Disk to Disk	Disk to Disk	Daily	Weekly	Monthly
Day 1	A B						
Day 2	B C				A		
Day 3	C A				B		
Day 4	A B				C		
Day 5 }							
Week 1 }	B C	B D			A		
Week 2	C A	C E			B	D	
Week 3	A B	A D			C	E	
Week 4 }							
Month 1 }	B C	B E	B F		A	D	
Month 2	C A	C D	C G		B	E	F
Month 3	A B	A E	A F		C	D	G
•							
•							
•							
Month 11	B C	B D	B G		A	E	F
Month 12	C A	C E	C F	C H	B	D	G

TRUE OR FALSE—HARD DISKS NEVER FAIL

While all this information on backing up floppies makes for fascinating reading in and of itself, what (you may be asking yourself) if I have hard disk? Is it safe to assume that you needn't make hard disk backups because hard disks never crash? No. Hard disk requires a reliable backup procedure to protect against losing information just as floppies do. The likelihood of hard disk failure is reduced, but again we're talking about insuring work so that in the event of failure, all will not be lost.

The frequency with which hard disk backups are made depends on the volume of information added and how often data is added. A good rule of thumb for hard disk backups might be once a day or even twice a day if data entry is intensive.

MODEL II HARD DISK

To backup a Model II hard disk, you SAVE the information on the hard disk to floppies which can then be stored. The TRSDOS-HD command SAVE :4 TO 0 [SYS,ALL] will write all the SYStem and ALL other files on drive 4, the first hard disk, to drive 0. Now as you know hard disks store a much larger amount of information than do floppies, so you will be prompted to insert another diskette when each one becomes full.

A nice feature of TRSDOS-HD is that you can specify that you want to backup only the data that has been entered since (or before) a specific date.

```
SAVE :4 TO :Ø {DM>MMDDYY}
```

This command will back up all data that was created on a DM (date of modification) greater than MMDDYY. By changing the > to a < symbol, you can backup all data that was created on a DM less than MMDDYY.

Once the information has been saved on floppies, it can be written to hard disk again using the RESTORE command. Any files that were stored on floppy diskettes with the SAVE command can be recovered to hard disk using RESTORE.

MODEL III HARD DISK

LDOS, the Model I/III Hard Disk operating system, assigns logical numbers to the floppy and hard disk drives. The first four numbers (0—3) will always be assigned to the hard disk drives whether you have as few as one or as many as four hard disk drives. In a hard disk environment, the floppy drives are assigned the numbers 4—7 with the drive that would be the 0 floppy drive in a non-hard disk environment being given the number 4.

Backing up the Model I or III hard disk to floppy disks requires starting up or resetting the computer with the START-

UP diskette. Next, the amount of floppy disk space that will be required to back up the hard disk has to be calculated. This is done by looking at the directory of the hard disk to be backed up, adding up the total amount of disk space used by all the files on the hard disk, and dividing that number by a number which represents the amount of storage capacity on the formatted floppy disk. (Note here that if a single hard disk file consumes more space than there is space available on the floppy diskette, then the HARDCOPY utility for moving large hard disk files to floppy disk will have to be used to copy that file.)

The quotient which results determines the number of formatted floppy diskettes required to back up the hard disk in this example. After formatting the derived number of floppy diskettes, place one of the formatted diskettes in drive four and type the "BACKUP :source drive # :destination drive #" command. In the example below, each file on hard disk 1 would be backed up to the floppy disk in drive 4.

```
BACKUP :1 :4 <ENTER>
```

When the floppy disk in drive 4 becomes full, LDOS prompts the operator to insert another formatted diskette in drive 4. The prompt will continue to appear at appropriate intervals until LDOS Ready appears indicating that the BACKUP is complete.

Once the hard disk is backed up, how does one get the information back to the hard disk in the event of hard disk failure? It's really quite simple. The HARDCOPY utility was used to move hard disk files that exceeded the filespace available on a single floppy diskette to floppies, and HARDCOPY is used to move the floppy disk files back to hard disk. Where the hard disk files were backed up to floppy using the BACKUP utility, the destination and source drives are be changed to reflect the direction of the backup. So, where the backup was from 1 to 4 before, the format would be:

```
BACKUP :4 :1 <ENTER>.
```

BUILD a DO File (From Page 8)

DO filename

DO executes a file (in this case GOSORT) created with the BUILD command. Auto command input from the disk file GOSORT is begun by typing:

```
DO GOSORT <ENTER>
```

Now each time DO GOSORT ⟨ENTER⟩ is typed at TRSDOS READY the auto command file GOSORT will be executed. The procedure can be further automated by typing:

```
AUTO DO GOSORT <ENTER>
```

Once the procedure has been AUTOmated, it will be executed without user intervention each time that TRSDOS READY would normally appear on the screen after resetting or initializing the computer.

EXAMPLE II

When executing the Model II file in the example below, the A port will be turned off, serial communication parameters for the A port will be set to 600 baud, with a word length of 8, no parity, and 2 stop bits. Finally, the Terminal program will be loaded in.

```
BUILD COMFIL <ENTER>
SETCOM A=OFF <ENTER>

<ENTER>
SETCOM A=(6ØØ,8,N,2) <ENTER>
<ENTER>
TERMINAL <ENTER>
<ENTER>
```

This file is "done" or executed with the DO command by typing the following at TRSDOS READY.

```
DO COMFIL <ENTER>
```

It can be set up to be executed AUTOmatically when the disk is reset in drive 0 by typing:

```
AUTO DO COMFIL <ENTER>
```

EDIT16 WITH THE MODEL 16

In place of BUILD, the Model 16 uses the Editor (EDIT16) to build DO files. (Note: The Model 16 manual cautions against using the SPOOL command in one of these files.) To enter the Editor, type:

```
EDIT 16 <ENTER>
```

When the C? prompts appears, type:

```
IN <ENTER>
```

to begin entering command lines. When you are ready to exit the Editor, press ⟨ENTER⟩ and then type:

```
SA filename <ENTER>
```

(where filename is the name you've assigned to the file). Exit the Editor by typing:

```
QU <ENTER>
```

A quick look at the directory will reveal that 'filename' is now listed as one of the disk files. How is the file executed? DO will do the job. Type:

```
DO filename <ENTER>
```

The Model 16 Owner's Manual shows an example file named HELLO which prints the current date and then displays the amount of free sectors on the primary disk drive. Entering the sequence of keystrokes which appear in the left hand column below will create the example file. The right column contains remarks (') for clarification.

```
EDIT16 <ENTER>        'load the editor
IN <ENTER>            'enter the insert mode
DATE <ENTER>          'gets the date
FREE <ENTER>          'for available disk space
<ENTER>               'exit the insert mode
SA HELLO <ENTER>      'save the file
QU <ENTER>            'exit the Editor
```

To execute HELLO, type the following:

```
DO HELLO <ENTER>
```

HELLO is done or executed by prefacing the file name HELLO with the DO command. As with the other computers, this file can be AUTOed so that it will be automatically executed whenever you start-up TRSDOS-16. To do this type:

```
AUTO DO HELLO <ENTER>
```

The PATCH: A Series of Guidelines to Help Remove the Headaches (or) Caveat Patchor: Let the Patchor Beware.

by George Robertson

Editor's Note: With the advent of the new Software Maintenance Program, as introduced by Jon Shirley in our January 1983 issue and detailed further in this issue; we felt it appropriate to reprint an article which appeared in the December 1981 Microcomputer News.

This article is written for those computer users who have, at least once, lost many hours of work because a "simple immediate fix" has caused more problems than it solved. It is a rare person who has never lost any data or programs when, upon applying a "quick fix", he discovers a new bug has appeared in a totally unexpected and unrelated area. I can tell you that it has happened to me any number of times.

I confess that I have lost data, programs, and my temper, on some of these occasions. "How could you lose anything if you are following your own procedure?", you might ask. It happened because I said to myself, "I'm really in a hurry . . . I don't have time to use the methodical procedure . . . This patch is so simple that it couldn't possibly affect anything else . . . This patch has been well tested by others so it can't be bad . . . This patch is "official," I got it straight from the programmer . . . My guru gave it to me . . . The home office told me it was good . . . etc."

If you are like me, you really get angry with yourself for not being more careful. Also, we want to try to blame someone else for our failure to be responsible for our own decision to continue with no thought of recovery.

Let's face it, there is no such thing as a perfect computer program. Most people who have ever used a computer program for a while have unexpectedly "discovered a bug." Some of these "bugs" are more serious and frustrating than others.

A vocabulary has surfaced which describes the discovery of the more serious types of bugs, such words as: Bomb, Blow Up, Silent Death, Hang, Crash, Limbo, Never-Never Land, and several unprintable epithets. From this choice of words, you can see what the state of mind is when a problem is suddenly discovered.

This state of mind is why patches are usually accepted for immediate use, no matter what the problem circumstances are. What we would like to point out is that patches may also contain (or cause) unexpected bugs. While patches are tested, they can not be tested under the same rigorous conditions as the original program. The result may be a patch which doesn't appear to cause any problems in general, but which causes major problems in some "obscure" portion of a program.

With this in mind, we would like to suggest that you not patch or correct a diskette unless you are specifically instructed to. For example, if we issue a patch which affects users of DMP 200, and you have a DMP 400, don't make the patch! Further, if we issue a patch that says some users are experiencing error code XX, and you are not getting error code XX, again—don't make the patch. This sounds like a trivial warning, but you would be surprised at the number of people who apply every patch they are able to get their hands on and then start complaining of problems in a program that "has always worked fine."

As with most suggestions, there are exceptions to this one. Occasionally Radio Shack will find a problem which we know will occur, or which, if it occurs will cause serious damage. In these extreme cases we will state that the patch should be applied whether the noted problem is occurring or not.

As the responsible manager of my computer, I know that patching any program is an inexact science. Patches are developed to solve a bug in a particular section of a program. Even though the original creator of the program has developed the patch, the problem is that the final testing of the patch usually does not include the multitudes of situations that can exist in the many different user environments.

As the responsible user of my computer, I never assume that any patch given to me will work in my situation. Also, I am not a perfect typist, so I double (triple) check myself at each stage. Indeed, I also have a healthy disregard for the perfection of the patches developed by myself.

The following method was developed as a cure for all of this advanced paranoia. I am lazy. I don't like recovery and re-entry work. If you will use the following method EVERY TIME you install a patch, I will guarantee to you that you will somewhere save yourself many hours of non-productive recovery work, not to mention the peace of mind that comes from knowing that you can always go back to where you started.

There are no revelations in this procedure. It is simple, obvious, and straightforward. Unfortunately, I have found that almost no one uses this procedure exclusively. I think though, that it is only the ones who do not use it (or something similar) that call me for help or describe to me their horrors.

1. The absolute first thing to do before anything else is done is to BACKUP your diskettes. Backup every diskette which has anything to do with the problem program you are attempting to fix. Backup both your program diskettes and your data diskettes. This will allow you to come back and start over if necessary. I can't stress enough about how important this first backup step is. Using these backup copies as your patched testing diskettes from this point forward allows you to retrace any number of steps that you may have taken by simply going back to the originals.
2. The second step is to use the BUILD command (BUILD is available on both the Model II and III) to create a DO file which contains the PATCH commands. The first statement in the DO file should be a PAUSE command which contains a comment about this patch. The PATCH command(s) should follow the PAUSE command and the last item in the DO file is a DO command for this file itself. Name the patching files sequentially so that they can be traced in the same sequence that they were applied.

   For example:

BUILD PATCH01 ⟨ENTER⟩
PAUSE This patch is to make accounts transfer to next month. ⟨ENTER⟩
PATCH FRED:1 A=621F F=330455 C=000000 ⟨ENTER⟩
PATCH HERMAN:1 A=9BA2 F=0044 C=BCDF ⟨ENTER⟩
DO PATCH01 ⟨ENTER⟩
⟨ENTER⟩

   This second step is important for two reasons. First, you can print out the DO file and compare it VERY CAREFULLY against the original document from which you were keying. There is now no reason for keystroke errors or for forgetting what was entered at the console. Secondly, it allows you to build and maintain a single "Master Patching Diskette" which contains all of the DO files from every patch which you have ever applied to your current system. This diskette gives you an audit trail in case of trouble.

   If you are a multiple disk drive owner, you should make all of your PATCH commands patch a disk in drive 1. In this way you can create your master patching diskette and put it into drive 0 while you insert diskettes that require patching into drive 1. The reason for the PAUSE command contained in the DO file, is to enable you to insert the diskette in drive 1 before you press ⟨ENTER⟩ to patch it. The reason for the last DO command in the DO file is to allow you to continue automatically to the next diskette to be patched in the same way.

   Take the printout of the DO file, which you have carefully checked against the original patch information several times, and clip it to the original document from which you were keying. Handwrite the date you applied the patch, which bug you were correcting, and which diskettes were patched. This is an important audit trail also. The more you write down, the less trouble you will have in retracing your steps in the case that problems occur later. File this paperwork in chronological sequence somewhere so that you can find it as needed. The printout also will enable you to remove a patch by reversing the "find and change" operands of the PATCH command.
3. The third step is to patch your backup copies (created in the first step). This should be done by using your verified and stored DO file (created in step two). Don't patch ANY OTHER DISKETTES until you have completed step four.
4. Step four is to TEST your patches by running the previously failing program from beginning to end. Use the backup copies to complete this run. If everything turns out okay, your completed run is now ready for you to continue with your normal procedures, using the backups as your production diskettes. If anything fails, you merely go back to the original (unpatched) diskettes and develop a new plan.
5. Step five is to apply this same patch to the rest of your failing diskettes. Note: never patch a diskette which is not backed up. Test each diskette which you are patching in the same manner as step four. After this step is completed, you have your problem fixed, you have an audit trail of what happened, and you have not been in a panic. You have not lost any data or programs and generally you have a good feeling that all is well.

With this five-step procedure, anyone can maintain his own system to his own satisfaction. You can immediately see that most of the headaches are gone and that you can always bring a diskette up to the current standards for your system by using the master patching diskette created in step two.

I wish all of you the best of luck in using these five simple steps as a way to being totally responsible for maintaining your own systems. Remember that no one else has your exact set of problems to deal with and that there is also no such thing as a perfect PATCH.

Periods to Commas in Data Statements

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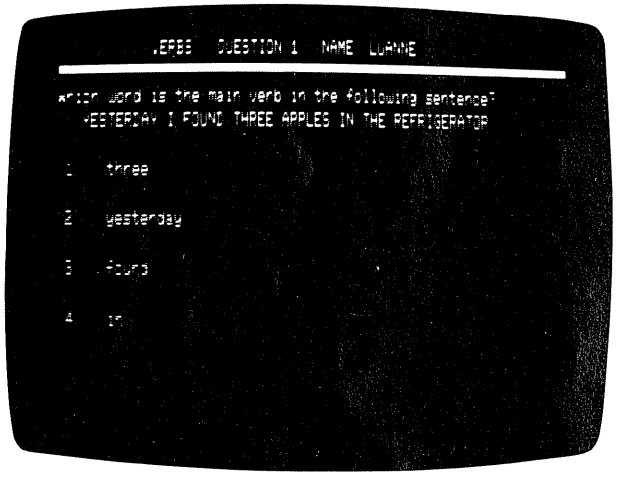
A most thankful trick when entering data is to use the convenient period key on the number pad instead of the awkward comma key on the main keyboard. When done, change all the periods to commas with this:

```
FOR Z= 17129 TO VARPTR (Z)
: IF PEEK(Z) = 46 POKE Z,44
: NEXT ELSE NEXT
: CLS
: LIST
```

Type in the data lines first because the above will obviously change all periods to commas.

Creating Quick Quizzes (in Any Subject!) with the TRS-80 Model III or Model I

Radio Shack's Quick Quiz program was designed by a former teacher for teachers. The program lets you create a quiz in any subject on the TRS-80 Model III or Model I computer, and administer the quiz in two ways—at the computer or on paper. Each quiz can consist of up to 40 multiple-choice questions, with up to four answer choices per question.



ADMINISTERING QUIZZES AT THE COMPUTER

Once the teacher has used the computer to create the quiz, he or she saves the quiz on diskette. Students can then take the quiz by working at the computer. As each student completes the quiz, his or her score is automatically stored in a results file on the diskette. The results file can hold the results of up to 50 student test sessions at any one time. To continue using the test results file, you can print out a permanent record of test results (if you have a line printer) and then erase the contents of the results file after every 50th test session.

Of course the multiple-choice format of Quick Quiz does not have to be used to create a quiz—instead you might prefer to create exercises for drill and practice. In either case, the program provides a basic framework or skeleton with which a teacher can easily create CAI (Computer-Assisted Instruction) materials to meet the specific needs of his or her students.

ADMINISTERING QUIZZES ON PAPER

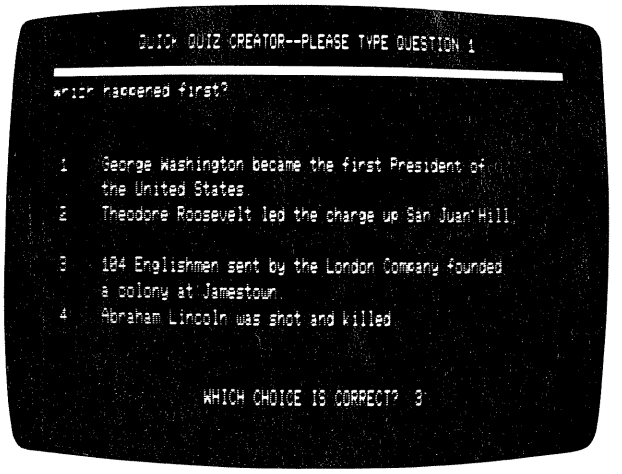
Once a quiz has been stored on diskette it can be printed out on a line printer and handed out to the class. You can make up a heading for the quiz (using up to fifteen characters) and you can select the number of copies you want to print. The specified number of copies, plus a copy of the answer key for that test, will then be printed out.

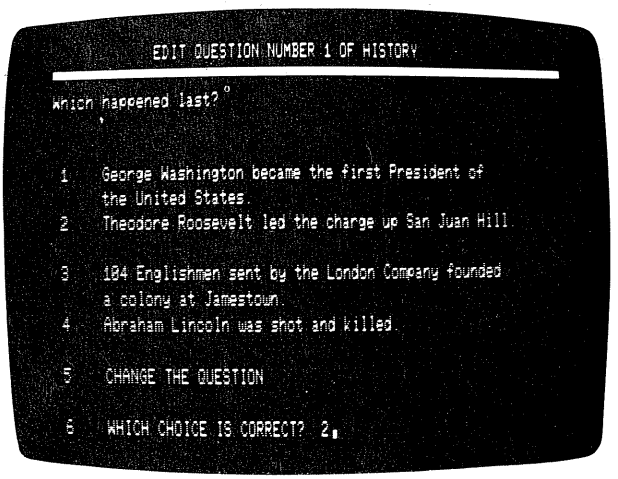
As was suggested for another program in an Education article last fall, you may want to try some variations with the line printer. You can save time by printing out one copy of the quiz and answer sheet and then photocopying as many copies as are desired. Or, if your photocopy budget is limited, you can print one copy of the quiz onto a spirit master and then run off the copies as you need. Either of these options can save you time when you are in a hurry or when several teachers want to use the same computer.

EDITING THE QUIZ

Once you have created a quiz and stored it on diskette, you can go back and edit the quiz—not only to correct any errors but also to change some questions for a make-up quiz or for use with a different class. You can choose whether the edited quiz will replace the earlier version of the quiz, or whether BOTH versions of the quiz will be saved.

The question, the answer choices, and/or the number of the correct answer choice can be edited for any multiple choice question(s) in the quiz. For example, you might want to change every second or third question; in this case editing would allow you to retype only those questions in the quiz that were being changed. Or, you might find that making minor changes in some questions was a convenient way to provide a new quiz. In the example below, the question was retyped and the number of the correct answer choice was changed. The answer choices did not have to be retyped:

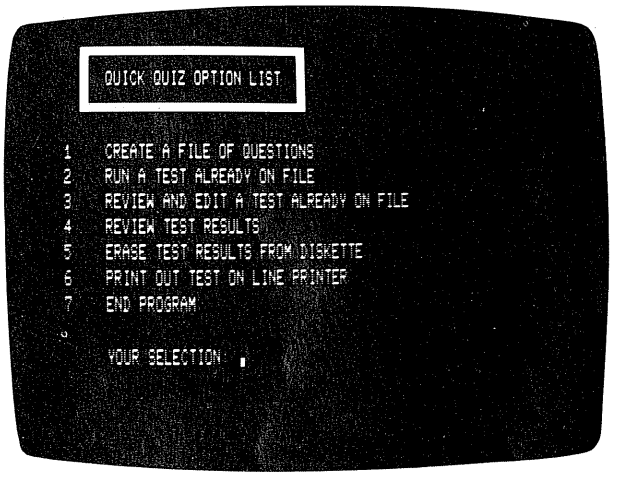




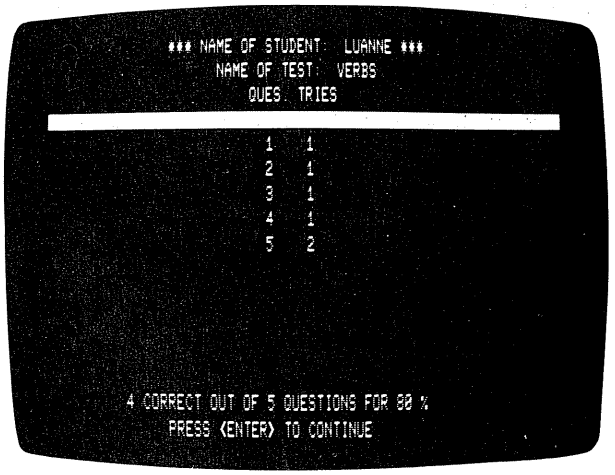
To make the edited quiz replace the original quiz, save it under the same filename. To keep both versions of the quiz, save the edited quiz under a new filename.

CREATING A QUIZ

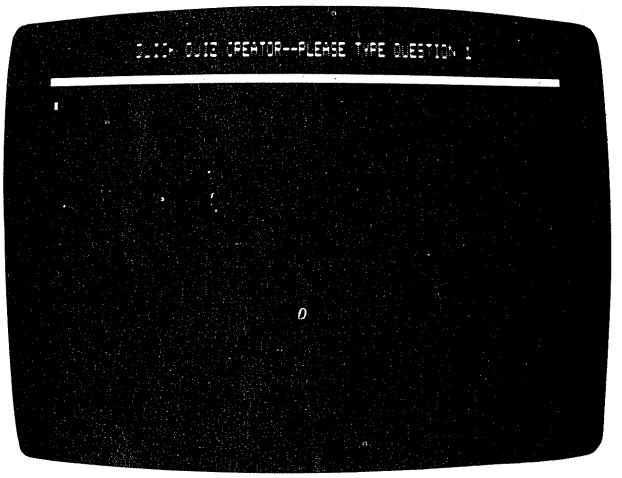
Let's take a look at the process of creating a quiz with the Quick Quiz program. Once the program is loaded and running and the title screen has been displayed, a menu of options appears.



If you chose option 2 at this point ("Run a test already on file"), you could take the sample quiz that is already stored on the Quick Quiz program diskette when you buy the package. You'd see that the questions are displayed on the screen as shown in the photographs above, and that a score report appears once the student has completed the lesson:



But to create a quiz, you'll begin with option 1, "Create a file of questions." The computer will prompt you to enter the number of questions in the quiz (up to 40) and to enter the number of choices for each question (up to 4). You'll then see this screen:

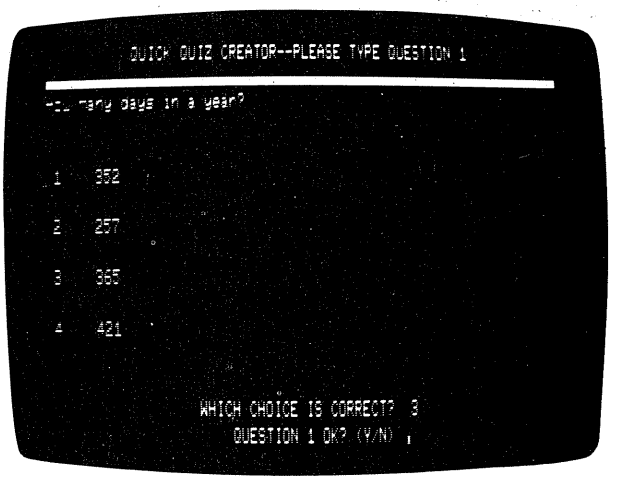


You can now enter the question, which can be up to three lines long. To start a new line, you simply press the down-arrow key. To indicate that you have finished typing the question, you simply press ⟨ENTER⟩.

The computer then prompts you for your answer choices, one at a time. Answer choices may be up to two lines long.

Next, the question "WHICH CHOICE IS CORRECT?" appears at the bottom of the screen. You enter the correct choice.

Finally, the question "QUESTION 1 OK (Y/N)?", appears. At this point, you can look over the question and the answer choices to make sure they're right. If they are, enter Y to continue to question 2. To re-do the question, enter N, and the question will be erased from the screen so you can start over.



When you have typed in all of the quiz questions that you asked for, you'll see the message, "WHAT FILENAME DO YOU WANT TO USE FOR THE TEST ON DISKETTE?" You then enter a filename (which consists of up to eight upper-case letters and numbers). The computer will then save your test on the diskette under that filename and return you to the option list.

Once your quiz is stored on diskette, the following options are available for use with that quiz:

Option #2—"Run a Test Already on File"
Option #3—"Review and Edit a Test Already on File"
Option #6—"Print Out Test on Line Printer"

And once a student has taken your quiz, you can use the following options to review and maintain the student quiz scores. (Remember that these scores are automatically recorded by the program every time a student takes a quiz):

Option #4—"Review Test Results" (If you have a line printer, this option also lets you print out the scores.)

Option #5—"Erase Test Results From Diskette"

Each of the options mentioned above guides you through easy steps, using prompting messages displayed on the screen.

DEVELOPMENT OF QUICK QUIZ

Radio Shack's Quick Quiz: A Mini-Authoring System was designed and programmed in 1980 by Dennis F. Tanner, who is now Manager of Educational Product Development for the Radio Shack Education Division. Before coming to Radio Shack, Tanner was an elementary-school teacher with six years of teaching experience, mainly at the kindergarten level. He has a Master's degree in Education with an emphasis on Reading. Tanner created Quick Quiz in response to a need for an easy-to-use program for test design and administration.

HOW YOU CAN USE THE QUICK QUIZ PROGRAM

While Quick Quiz provides a handy framework for quiz creation, it is at the same time very flexible. Quizzes in any subject matter and at any grade level can be created.

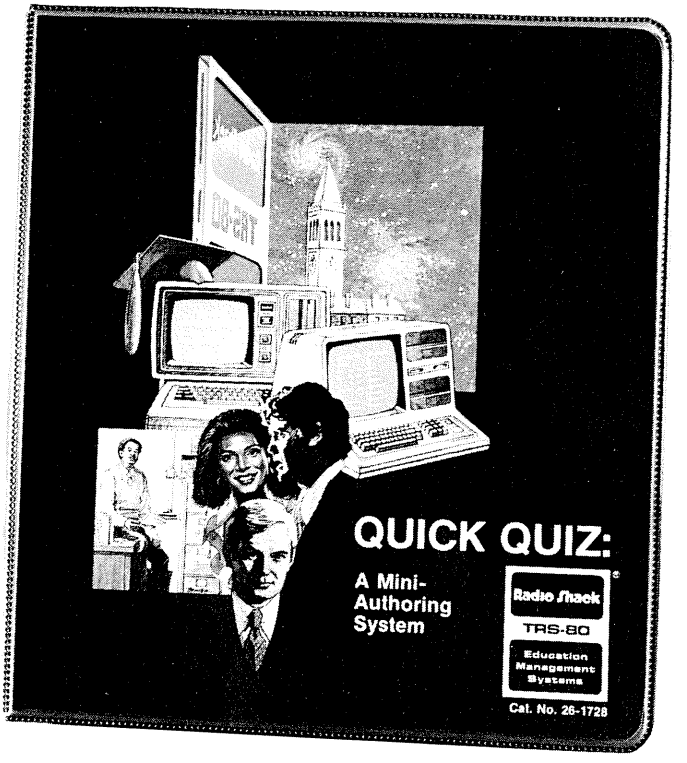
Quizzes created on the Model I can use upper- and lower-case letters if the Model I has a lower-case driver installed. And users of any Model III can create quizzes in upper case or in upper and lower case. To get into upper-and-lower-case mode, Model III users simply press ⟨SHIFT⟩⟨0⟩ once the program is loaded into the computer. (When entering a filename for the quiz, Model III users should hold down the ⟨SHIFT⟩ key to make sure that all letters in the filename are upper case.)

Quick Quiz: A Mini-Authoring System can be used with the TRS-80 Model III or Model I disk system with at least 32K of memory. The program is furnished on Model III diskette—but Model I users can trade in the Model III diskette and obtain free replacement software for Model I by writing to the Radio Shack address given in the Quick Quiz program manual.

Listed at $39.95,* Quick Quiz: A Mini-Authoring System (Catalog Number 26-1728) is a real bargain for the school—especially for those teachers who have little or no experience with computers but who would still like to be able to create computer-based instructional materials.

For further information, contact your local Radio Shack store or Computer Center. Or contact your local Radio Shack Regional Educational Sales Coordinator. (23 Coordinators are located nationwide to help schools and districts meet their microcomputing needs.)

* Prices may vary at individual stores and dealers.



OUT 255, 0 in 32 Character Mode

Micheal Cianciosi
714 North Abingdon Street
Arlington, VA 22203

I was writing a program recently, and I discovered something peculiar. It seems that on my Model I Level II TRS-80, the use of the BASIC "OUT255,0" command while in 32 character mode causes characters to return to normal size. The machine still seems to be in 32 character mode, as characters are printed 32 characters per line (with a space between them), but the characters are normal size. If the program ends or if you hit the break key, the screen will be in 32 character mode with large letters again. This is demonstrated by the short program I have enclosed. Notice what happens when you run it and then hit the break key.

```
5 REM STRIPES BY MICHEAL CIANCIOSI
10 CLS
    : CLEAR 200
20 A$ = STRING$(112,191)
30 PRINT CHR$(23);
40 OUT 255,0
50 PRINT A$; A$; A$; A$;
60 GOTO 60
```

Communications Corner

By Al and Dru Simon

Welcome back to Communications Corner. This month we're going to try to clear up some of the mysteries of that dark and sinister tower of complexities, LCOMM.

LCOMM is a communications program which you can use with your LDOS system to allow your TRS-80 to communicate via modem with timesharing systems, other TRS-80s, or remote Bulletin Board Services (such as the Forum network or the like). It also allows you to send or receive programs from these sources as well. Although it seems complicated at first, you'll get the hang of it in a surprisingly short time.

There are a few things you must keep in mind when you use the LCOMM utility. The first thing you must be sure of when using LCOMM is that you have set *KI (the device driver) to the KI/DVR program BEFORE you enter LCOMM. This will allow you to use the special function keys which will be explained below. You must remember NOT to have your Spooler in use since LCOMM has its own spool buffer. It is also a good idea to create a file for receiving large files when using the utility just so you will have the space allocated and available to you. The syntax of the LCOMM command is clearly defined in the LDOS Manual in a specific section called (cryptically enough) LCOMM UTILITY. LCOMM does not directly interface with the RS232 hardware. It uses what we like to call *CL. (We're not being mysterious, it just means "Communications Line".)

OK, now let's get down to business. LCOMM uses your top row of keys as PROGRAMMED FUNCTION keys in conjunction with your ⟨**CLEAR**⟩key. (From now on we'll call this the ⟨**CLR**⟩ since our fingers get tired easily.) You can call up the menu of the programmed functions at any time by simultaneously pressing the ⟨**CLR**⟩, ⟨**SHIFT**⟩, and ⟨**?**⟩ keys. The manual refers to the programmed function keys as PF keys, so for clarity's sake we'll do the same here. The functions of these PF keys are varied. Some control parameter selection for filespecs, others turn logical devices on or off, and others are utilities for ease of interface. Let's go over these PF functions:

Hitting your ⟨**BREAK**⟩ key will send a true break (i.e. an extended Null). In order to send a TRS-80 break (01H) you can use a "Control A."

*KI ⟨**CLR**⟩⟨**1**⟩ This designates the keyboard device. When you enter LCOMM it is ON. If you wish to turn off the keyboard device use this command followed by a ⟨**CLR**⟩⟨**-**⟩. Turning off this device at this point will not turn off any of the other PF keys.

*DO ⟨**CLR**⟩⟨**2**⟩ Video display device. When you enter LCOMM it is ON. To turn it off use the ⟨**CLR**⟩⟨**2**⟩ followed by ⟨**CLR**⟩⟨**-**⟩. Turn it on again by using the ⟨**CLR**⟩⟨**2**⟩ followed by ⟨**CLR**⟩⟨**:**⟩.

*PR ⟨**CLR**⟩⟨**3**⟩ Printer device. When you enter LCOMM the device is off. To turn it on, do a ⟨**CLR**⟩⟨**3**⟩ then a ⟨**CLR**⟩⟨**:**⟩. (Do you see a pattern emerging with these "ON/OFF" commands?). Don't worry about the speed of your printer either, by the way. Output to the printer is fully buffered.

*CL ⟨**CLR**⟩⟨**4**⟩ Communications Line device. If you want to review a file before you transmit it, you would want to block it from being transmitted so you may turn off the CL. After it is off you can go to half-duplex and do a File Send (FS) which would put the file on your screen without sending it through the CL. Remember though, that as long as the CL is off you will not receive any transmission from the remote source and depending on who you're communicating with, you might miss a good offer!

*FS ⟨**CLR**⟩⟨**5**⟩ File Send device. This is used as the first step in a two part process for the purpose of sending a file. You would first use the ⟨**CLR**⟩⟨**5**⟩, followed by another PF key appropriate to the function you wish to perform, which will be discussed as the specific functions are listed below.

*FR ⟨**CLR**⟩⟨**6**⟩ Yes, you can guess it. File Receive. It uses the same PF keys as the FS function listed above.

DTD ⟨**CLR**⟩⟨**7**⟩ Dump to Disk is used to write the memory buffer used with FR to the disk. DTD may be turned on before or after a file has been received.

MENU ⟨**CLR**⟩⟨**8**⟩ As we mentioned at the start, this displays your command menu. We will duplicate here the neat little chart which is in the LCOMM section of the LDOS manual:

ID ⟨**CLR**⟩⟨**9**⟩ Identification. Used with FS and FR. Its function is to designate and open a file. When receiving a file from a bulletin board for example, you would perform an FR-ID. You would then be prompted to enter a file name. After you enter the filename you desire, the file opens and is ready, but is NOT turned on. (Remember, ON is ⟨**CLR**⟩⟨**:**⟩.)

RESET⟨**CLR**⟩⟨**0**⟩ This function closes files. A received file MUST be turned "OFF" and then closed.

ON ⟨**CLR**⟩⟨**:**⟩ You already had this one figured out, but we thought we'd mention it anyway. It is used in conjunction with other PF keys, as you doubtless figured out already. Re-

member that devices must be "ON" before they will function!

OFF ⟨CLR⟩⟨-⟩ Naturally this works the same way as the ON PF key; that is in conjunction with other keys.

Okay, all that was easy enough, so now we're going to get to some of the good stuff. There are additional functions available to you, which you may access by using ⟨CLR⟩⟨SH⟩ (which means Clear-Shift) functions. They are as follows:

DUPLEX ⟨CLR⟩⟨SH⟩⟨!⟩ This performs like a toggle switch for half or full duplex. In LCOMM ON/OFF mode, DUPLEX ON means half duplex, and DUPLEX OFF is full duplex. You start in LCOMM in the full duplex state. If you prefer half duplex you would perform the function as follows:
⟨CLR⟩⟨SH⟩⟨!⟩ then ⟨CLR⟩⟨:⟩
The above (freely translated) means DUPLEX ON

ECHO ⟨CLR⟩⟨SH⟩⟨"⟩ When you turn on your echo everything that you receive from the remote computer is re-transmitted. If both your computer and the remote one are in Echo On state however, the first character sent will be echoed back and forth incessantly until one of you turns off your echo.

ECHO-LINEFEED ⟨CLR⟩⟨SH⟩⟨#⟩ This is needed when communicating with a dumb hard-copy-only terminal (no offense) which expects line feeds to be sent by the host computer. When this function is ON, a line feed will be added to any transmitted carriage return.

ACCEPT-LINEFEED ⟨CLR⟩⟨SH⟩⟨$⟩ Turning this function ON will cause all line feeds to be accepted. (LCOMM normally ignores the first line feed received after carriage returns.)

REWIND ⟨CLR⟩⟨SH⟩⟨%⟩ This function, used with either the FR or FS devices, "rewinds" a file to its beginning.

PEOF ⟨CLR⟩⟨SH⟩⟨&⟩ This function positions a file to its end in case you wish to add to it.

DCC⟨CLR⟩⟨SH⟩⟨'⟩This function will force a display of any character received that has a value less than an X'20' as a two digit hexadecimal number surrounded by braces.

CLS ⟨CLR⟩⟨SH⟩⟨(⟩This function will erase the contents of the screen without transmitting any character to communications line.

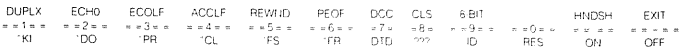
8-BIT ⟨CLR⟩⟨SH⟩⟨)⟩ This function is ONLY used when the RS232 word length is set to 8. It makes certain that transmitted characters are valid. If it is not turned on, bit 7 is stripped from each character received.

HANDSHAKE ⟨CLR⟩⟨SH⟩⟨*⟩ When you turn on the handshake function there are four control code options which LCOMM responds to when received from the CL:

X'11' DC1 Resume transmission
X'12' DC2 *FR ON
X'13' DC3 Pause transmission
X'14' DC4 *FR OFF

DC2 and DC4 function in exactly the same way as the PF keys for FR ON and FR OFF do. The DC3 control stops transmission through the CL until a DC1 is received. DC3 can also be overridden by the *CL ON command as well.

EXIT ⟨CLR⟩⟨SH⟩⟨=⟩ Easy. This function returns you to the LDOS command level.



Of course the middle row is for the number keys themselves, the bottom row for the "lower case" commands, and the top line for the ⟨SHIFT⟩ed commands. You may call up this menu at any point without LCOMM losing any other data. It is only for your quick reference, and of course, each of these commands is clearly explained in the LCOMM section of the LDOS manual.

FILE TRANSFERRING

Please remember that files must be in ASCII to be transmitted.

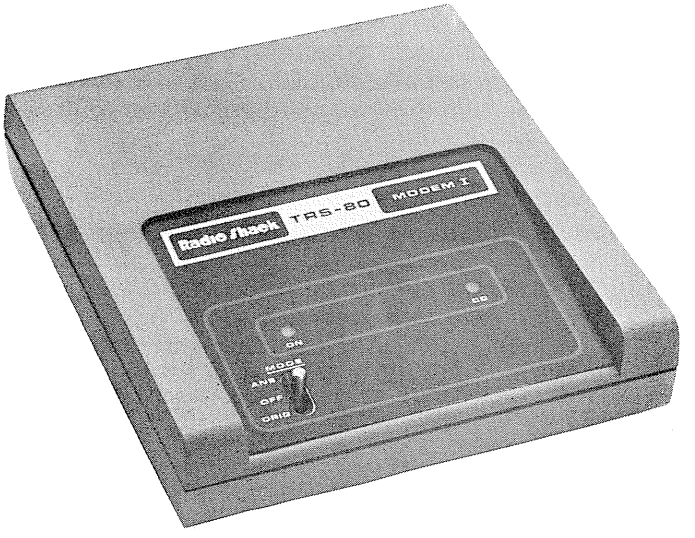
It is very easy to receive (download) a file using LCOMM. First you must identify the file by using FR, then ID. As we mentioned above you will be prompted to enter the filespec but just doing that does NOT start the transmission of data. In order to accomplish that you must do FR ON. Once your file is received, don't forget to do FR OFF and then FR RESET when you wish to close the file.

When you wish to send (upload) a file, the procedure is slightly different. You must perform FS-ID and enter the filename you wish to send. Then you must provide a 10 second pause. After this, you start to transmit by entering FS-ON. If both sending and receiving computers are in half duplex mode (DUPLEX-ON), you will see your file on your screen while it is transmitted. Always be certain that your entire file has been received on the other end before performing your FS-OFF.

That's all there is to it! You thought it was as complex and sinister as a Russian historical novel, but it's really quite simple, isn't it?

You will find the LCOMM section of the LDOS manual quite helpful and not difficult to read or understand.

In next month's column we will start a two-part discussion of the basic theory of Asyncronous Communication. Watch for it!



Downloading to the CoCo from CompuServe

We recently installed on the CompuServe Information Service support for downloading BASIC programs to the Radio Shack TRS-80 Color Computers running Videotex. With this new procedure, Color Computer owners can use the Radio Shack Videotex cassette tape or ROMPAK to obtain free copies of programs in the extensive Color Computer section of our on-line ACCESS library. The process uses the "B" protocol that was implemented in Videotex to assure that the user gets an error free copy in memory. The user then saves the program to cassette so that he can later run the program.

So far this feature has been very well received by members of the CompuServe Color SIG, and several Color SIG members who were unaware that such a capability existed in the Videotex ROM have switched back to using Videotex instead of a terminal package.

THE PROCEDURE FOR COLOR COMPUTER DOWNLOADING

It is now possible to download files from ACCESS to your Color Computer, if your computer has at least 16K of RAM and the Videotex program (version 1.0, 1.1, or 1.2) on cassette tape or in a ROM pack. How, you may ask. Very simple. Just follow these directions and cross your fingers.

1. Enter a download command:

```
DOW FILNAM.EXT[71111,111]
```

There will be a pause while your Color Computer is checked out by the host. You (the user) will be asked if your computer has at least 16K of memory.

2. Enter appropriately: Y or N

Why, you may ask. Well, due to some limitations of the system, the 4K Color Computers do not have enough memory available to download via this program.

The host will then copy the file requested into the disk area (the user's if in PUBLIC ACCESS or into the SIGs area if in SIG ACCESS). The length of the file is checked. If the file requires more storage than the 16K computer can handle, the program will ask if your machine has 32K of memory. If it only has 16K, you will receive a message stating that the file is too large for your system. Then the program will gracefully return you to the appropriate ACCESS prompt.

For your information, the 16K computer can store files up to 6400 characters; the 32K computer can store files up to 22784 characters. Any file larger than 22784 characters will be too large for the Color Computer and the user will receive the "too large" message if he tries to download it. Now, if you've made it this far without any problems, you're in great shape.

Next, the program will display this message:

```
***Important notice***
This file must be saved to
tape or disk and re-loaded
before it can be executed.

After BASIC starts,
type: EXEC 8000
type: CSAVE "FILENAME",A
now turn machine off/on
type: CLOAD "FILENAME"
type: RUN
```

Please copy or memorize this information for later use.

Next, the host takes your file, rearranges it into something that the Color Computer can understand and ships it down. Dots will appear if everything is moving along properly. When it has finished downloading, the Color Computer will be in BASIC. (There will be an "OK" prompt given, not by CompuServe but by the Color Computer.) At this point you are to enter all the instructions given before the downloading started.

3. Type: EXEC 8000
4. Save the program.
   To cassette, type: CSAVE "FILENAME",A
   To disk, type: SAVE "FILENAME",A
5. Turn machine off and then back on.
6. To run the program
   For cassette, first rewind the tape and type:

   CLOAD "FILENAME"

   For disk, type: LOAD "FILENAME"

Or you can return to the host at this point. If that's the case, go to step 8.

7. To run the program, type: RUN
8. You should return to the host now. (You are still connected to CompuServe.) Reload the Videotex program.
   By ROM pack, type:EXEC &HC000' 32K
   or:EXEC 49152 '16K
   By tape type:CLOADM
   type:EXEC

Chances are when receiving the "PLACE CALL" prompt there will be a slight delay, sometimes up to about a minute or two, especially if you try to return as soon as you've downloaded your file. So save it first and then try to return to the host.

9. The program will return you to the appropriate ACCESS prompt.
   OK

Introducing the Model 12 and the 12 Megabyte Hard Disk

by Linda Miller

Looks aren't everything, but even with computers good first impressions are based on appearance, and the Model 12 scores high on first impressions. While similar in appearance (and operation) to the Model II, the 12 has immediately noticeable differences obvious to even the most casual observer.

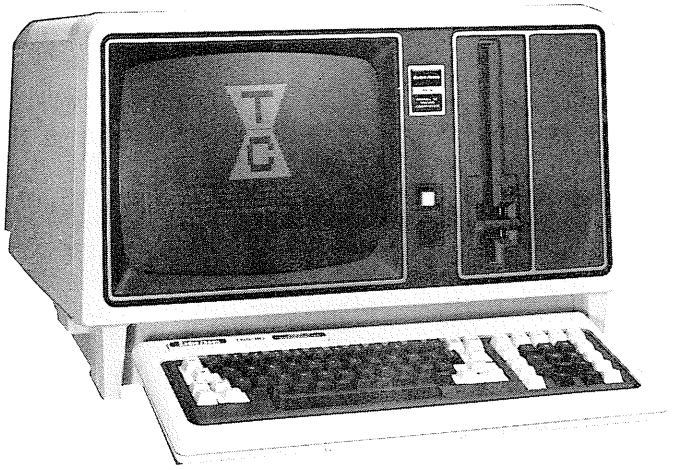


Photo 1. The TRS-80 Model 12 microcomputer

Model 12 has the same well received fawn gray color of the Model 16, an attractive, sculptured keyboard, a lower profile, one or two thin line drives in the display console, and a green screen.

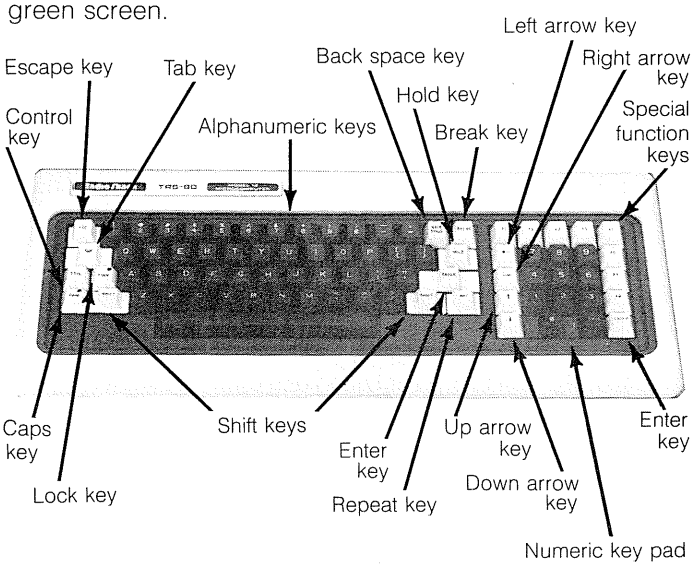


Photo 2. The ergonomic Model 12 keyboard

THE KEYBOARD

The attractive Model 12 keyboard attaches to the display console by means of a coiled cable which gives the operator the latitude of holding the keyboard in his/her lap.

Note the numeric keypad on the right hand side of the keyboard. Across the top and down the right hand side of the numeric key pad are the eight special function keys (F1 - F8). The Model II has only two (F1 and F2).

THE CONSOLE DISPLAY

Model 12 has a 24-line by 80-character 12″ green video display like the Model 16. There is a flat, square, slightly-recessed RESET button in the same position as the RESET switch of the Model II. This recessed button should eliminate the problem of accidentally resetting the machine by inadvertently flipping the RESET switch. The position, which is occupied by the power switch on the Model II, is replaced on the Model 12 by a power indicator light which signals when the power is on or off.

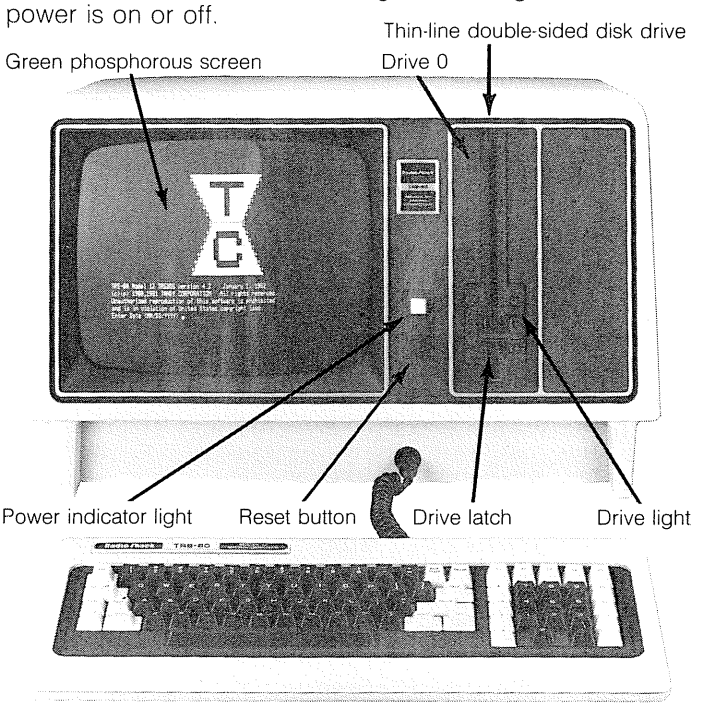


Photo 3. The Model 12 Console Display

The power switch and the brightness and contrast control knobs are located on the lower left side of the console display. Another outstanding feature is the either one or two thin line drives installed in the console display.

The rear panel of the twelve has the same connectors as the Model 16—Channel A and B RS-232 ports, parallel printer port, and power plug.

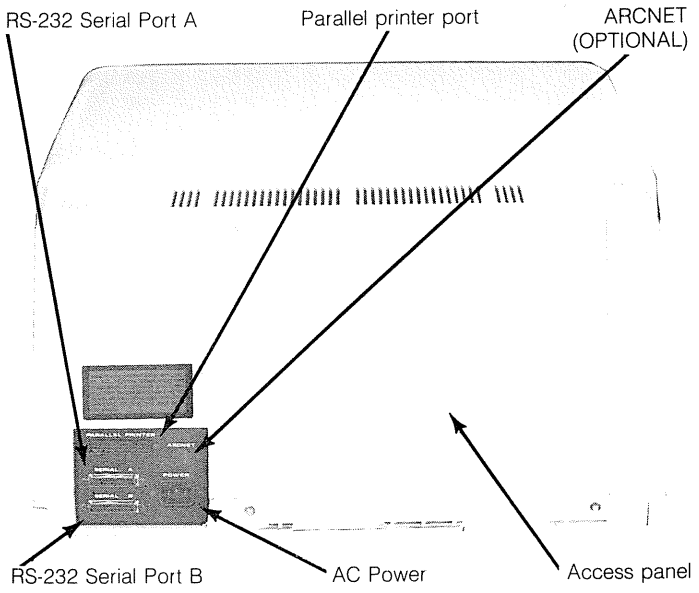


Photo 4. A rear view of the TRS-80 Model 12

SO MUCH FOR LOOKS, WHAT'S INSIDE?

A full 80K of memory is inside for openers. 16K of the memory is required to use the double-sided disk drive operating system. Like Model II, Model 12 has a single CPU, the Z-80A. Internally, Model 12 has two boards, the main board and a video board, and up to seven boards can be plugged into an optional card cage ($199.00).

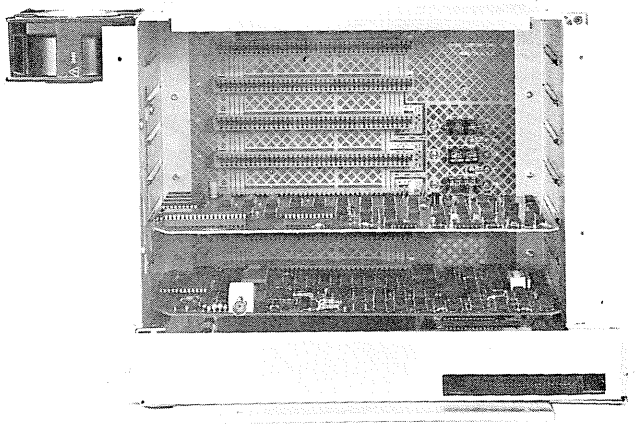


Photo 5. The Model 12 Optional Card Cage.

The card cage is accessed through an access panel on the back of the computer. The Model II has only four open slots compared to seven on the Model 12. Existing Model II expansion cards will work in the Model 12.

The Model 12 is a single-user-system which is expandable up to 512K of internal memory.

THE OPERATING SYSTEM AND MODEL II COMPATIBILITY

Model 12 will be delivered with TRSDOS 2.0B and TRSDOS 4.X (X until we know the release version). By booting the Model 12 with TRSDOS 2.0B, a utility called "Thinline" is loaded which lets the Model 12 operator run any Model II TRSDOS 2.0A program with the thinline drives (in a single-sided format only). Copying "Thinline" to a TRSDOS 2.0A applications disk changes the 2.0A disk into a 2.0B disk. However, a 3-drive Model II application which called for swapping disks during program executions will still require three disks.

All currently existing Radio Shack Model II software package will run on the Model 12. Radio Shack will continue to distribute software on TRSDOS 2.0B in support of stock Model IIs and Model IIs which have had the Model 16 upgrade. While Model II owners will continue to be supported, the Model 12 does replace the Model II.

IS IT UPGRADEABLE?

The Model 12 can be upgraded to a Model 16 with the distinct advantage that not only does it act like a Model 16, it even looks like a 16 with the thin line drives, green screen, and fawn gray color.

AND THE PRICE?

A Model 12 equivalent of a four drive Model II sells for $3,999 compared to $5,849 for a 4 drive Model II system. It is anticipated that one drive Model 12 systems will be used by hard disk users and two drive floppy systems will be used by non-hard disk users. A one drive Model 12 with 80K of memory sells for $3,199.00, and the two drive system sells for $3,999.00.

12 MEGABYTE HARD DISK DRIVES

On the outside this 5 1/4" drive looks just like the 5 megabyte hard disk for the Model III, but there the similarity ends. Unformatted these drives are 14 megabytes. A formatted primary drive is just under 12 megabytes, and a formatted secondary drive is a full 12 megabytes.

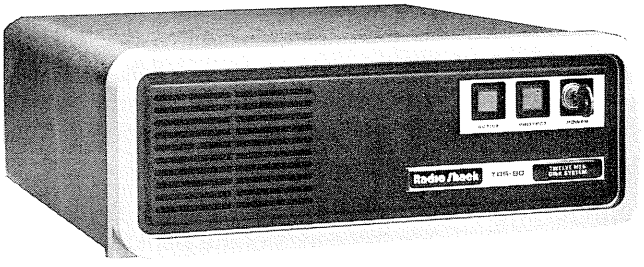


Photo 6. Radio Shack's 12 Megabyte Hard Disk

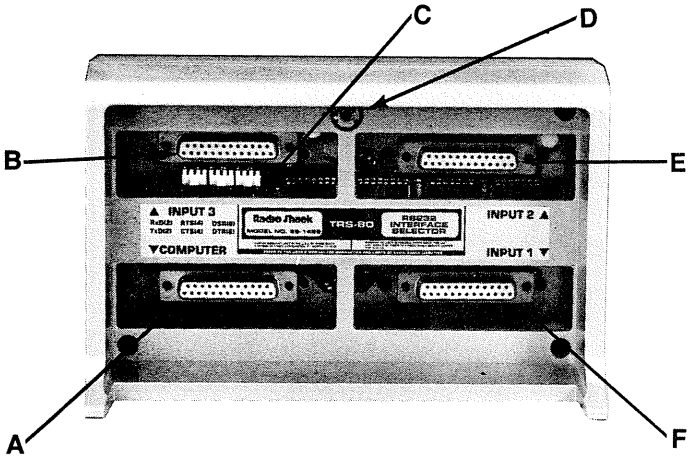
The primary drive sells for $3,495 and the secondaries sell for $2,495. The 8 megabyte hard disk drives will still be offered for some time for those who want to add additional hard disks. The 8 and 12 megabyte drives cannot be intermixed within the same system.

Radio Shack Introduces the RS-232 Interface Selector

by Annette Zamberlin-Main

Well here it is! A "wouldn't it be nice if Radio Shack had it" product which has become a reality, thanks to our customers' suggestions. Yes, we are listening to you out there in TRS-80 land! No need to swap cables when changing your computer's peripheral devices from one to another. This little gem allows you to just flip a switch instead.

The RS-232 Interface Selector (26-1499), as its name implies, has the capability to interface a TRS-80 microcomputer, whether it be a Model I, Model II, Model III, Model 16, Color Computer and now (because of the RS-232C Interface for the PC-2) the Pocket Computer, with such peripheral devices as the DT-1, serial printers, modems, plotters, etc.



A COMPUTER Connector. Connect your TRS-80 computer here using the appropriate RS-232 Cable.

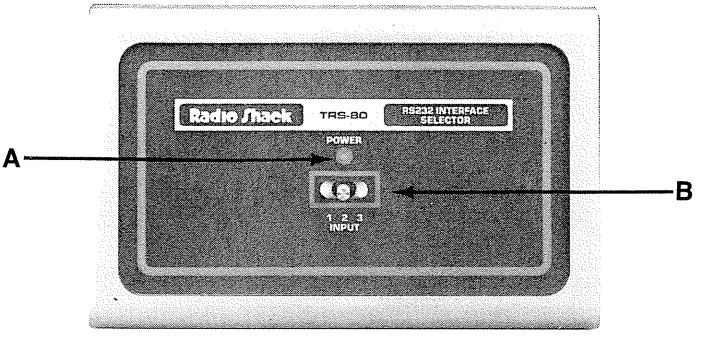
B INPUT 3 Connector. The main purpose of INPUT 3 is to allow your TRS-80 computer or data terminal to be linked to another computer without having to use a null modem. Other peripheral devices can be connected to INPUT 3 as well.

C Configuration Switches. These three switches allow you to configure INPUT 3 to the needs of the particular device.

D AC Power Supply Connector. Connect the Power Supply included with the package to this connector.

E INPUT 2 Connector. Connect any TRS-80 compatible RS-232 device to this connector.

F INPUT 1 Connector. Connect any TRS-80 compatible RS-232 device to this connector.



A POWER ON Indicator.

B Selector Switch. When the switch is set to 1, the device connected to INPUT 1 can be used. When the switch is set to 2, the device connected to INPUT 2 is enabled and when set to 3, INPUT 3 can be used.

Other uses for the RS-232 Interface Selector, besides the one photographed above include the following examples of:

(a) A single Model 16 connected to a DT-1 and a modem.
(b) A Color Computer that needs to use a serial printer, a modem, and a plotter.

And the possibilities are almost endless. What are your special needs? Could the switch be of use to you in your office or home environments?

Model 16 Multi-User Operating System

Article by Bruce W. Elliott

The new TRS-XENIX Model 16 Multi-User operating system was announced during January. TRS-XENIX is the most powerful operating system available today for a microcomputer. This is a true "Bell" Unix based operating system developed by Microsoft, and every owner of a Model 16 or a Mod 16 upgrade kit is entitled to the runtime (or "CORE") system. Model 16 and 16 upgrade owners will be notified by mail that they should phone or drop by the Computer Center (or dealer) where the system was purchased and make arrangements to pick up the operating system and manuals. This software should be available now as catalog number 700-2052 and is a no charge item to owners of Model 16's and Model 16 upgrades.

The "CORE" system includes the modules required to set up and operate your Model 16 as a hard disk based Multi-User system. The "CORE" includes a hard disk initialization routine, a minimal text editor for modifying the parameters of the system, utilities to transfer files from TRSDOS diskettes, etc. It also includes RUNCOBOL to support Radio Shack COBOL application software. Applications software for the Multi-User system will be furnished on data diskettes without RUNCOBOL or other system software and will be on single sided diskettes so it can be installed on an upgraded Model II or 12 as well as a Model 16.

This "CORE" system does not contain any language and it cannot be used for software development. The "CORE" is designed only to run Radio Shack applications software. In this first release the "CORE" will only operate on a Model 16 (or 16 upgrade) with a hard disk and a minimum of 256K memory. If you shift to the multi-user system, you will no longer be able to run TRSDOS 16 on your hard disk, but you may still run it on floppy disk.

There are currently seven applications packages for the Model 16 (all in COBOL) that will be made available to operate under TRS-XENIX in full Multi-User. By full multi-user we mean that up to 3 users may operate the same program or 3 different programs at the same time. In addition, Multi-tasking background operations such as print spooling may also be run. Record locking is implemented to prevent two users from trying to write to the same record at the same time.

For example, an owner of the inventory control system might want all 3 operators to work on just that program while an accounting department might want to operate General Ledger, Accounts Receivable, and Accounts Payable at the same time. Either application is fully supported.

Releases of the 7 current packages will start the same time that the TRS-XENIX "CORE" system is available with General Ledger (26-6201) and Accounts Payable (26-6205) being the first available. They will be followed by Accounts Receivable (26-6204), Order Entry (26-6207), Sales Analysis (26-6208), Job Costing (26-6209), Inventory-16 (26-6302), and Payroll (26-6203) with availability of all scheduled for end February.

IMPORTANT: As a current hard disk user, you should not install TRS-XENIX until you have the new versions of ALL the Radio Shack application programs you are running, as you will not be able to use the old programs once TRS-XENIX is installed on the hard disk (except on floppy only).

There will also be a series of 700 upgrades to move Model II applications (26-46XX) to Model 16 TRS-XENIX operating system. As above, your current Model II data is transferable. There will be a charge for these upgrades, with the suggested charge being the difference in price between the Model II and Model 16 version of the program as shown in catalog RSC-8.

You need to understand that some 3 user combinations of the largest accounting packages will require an upgrade to 384K. In general, 3 users will see better performance in 384K or 512K than in 256K.

Hardware required to run the multi-user system will be a Model 16, or upgraded Model II/12 with a hard disk and a minimum of 256K of memory. The one or two DT-1 terminals will, of course, require an RS-232 cable to the Model 16 and a null modem adapter (26-1496).

A full TRS-XENIX Development system will be sold separately and includes the balance of the TRS-XENIX system including the 'C' compiler, MAIL, a better text editor, sorting, cut, paste, etc. The entire development system contains about 250 modules for multi-user development. This is for program development only and is not needed to run applications or other languages. The development system is expected to be available about 2/15/83, with a suggested price of $750 (26-6401).

Below is additional information about TRS-XENIX. Please realize that most of these items are NOT included in the "CORE" package, and that you do not need them unless you are doing program development.

XENIX

The following article was compiled using the XENIX™ operator and systems manuals:

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and modified to fit the Model 16 environment.

The XENIX System is an enhanced version of the UNIX™ operating system. UNIX has been field tested for almost a decade, largely in university environments where it has demonstrated a capacity to withstand abuse and function under heavy workloads.

XENIX is a multi-user, multi-tasking operating system. It allows more than one user full and complete access to all of the XENIX resources on a time sharing basis. Each user has the illusion that he, and he alone, has absolute access to the computer's resources.

To help you understand the XENIX system, we need to introduce you to four terms: User, Group, Protection, and Shell.

USER

Generally, a user is an individual authorized to log in, edit, compile or perform other everyday functions using the Model 16's resources. Once logged in, a user has access to any directory or file in the system which allows the appropriate access. A user has full access rights to all files and directories which extend from his home directory.

GROUP

It is generally a good policy for a user to restrict access to the files and directories he owns by setting the various permission bits associated with each file. However, if some of the files and directories in the Model 16 need to be shared by several individuals, the individuals can be identified to the computer as a group.

The group affiliation is a facility that allows groups of users to share files while still restricting access to unaffiliated users.

PROTECTION

Each file or directory created has a set of "protection bits." There are a total of nine bits, which are divided into three categories of three bits each. The three categories are User, Group, and other. The User is generally the owner of the file, the Group includes members of the same group, and Other is everyone else. The three bits in each category are, in order, the read, write, and execute permissions.

Read Permission—When an individual has read permission for a directory, the user can read any file within that directory which also has the read bit set. If the user has read permission for a file, he can read the contents of the file.

Write Permission—Write permission on a directory allows the user to add, delete, remove, and rename any file within the specified directory. If the user has write permission for a file he is able to change the content of the file.

Execute permission—Execute permission for a directory is better termed "search" permission. Search permission means that the user can search the contents of the directory for other directories or files. Execute permission for a user simply means that the user can execute the file.

SHELL

For most users, communication with the system is carried on with the aid of a program called the shell. The shell is a command-line interpreter: it reads lines typed by the user and interprets them as requests to execute other programs.

For the more experienced user, the XENIX shell, as command language interpreter, is a full programming language. The shell provides settable variables, conditional, recursive, and iterative constructs, and a user environment that can be tailored to individual or group needs. XENIX allows a user or a command procedure to:

- Supply arguments to and run any executable program.
- Use pipes to execute a series of processes so that the output of one process is connected to the input of the next.
- Compose compound commands using:
  if . . . then . . . else,
  case switches,
  while loops,
  for loops over lists,
  break, continue and exit,
  parentheses for grouping.
- Initiate background processes.
- Perform Shell programs, i.e., command scripts with substitutable arguments.
- Construct argument lists from all filenames satisfying specified patterns.
- Take special action on traps and interrupts.
- User-settable search path for finding commands.
- Executes user-settable profile upon login.
- Optionally announces the presence of mail as it arrives.
- Provides variables and parameters with default settings.

XENIX SYSTEM OVERVIEW

The XENIX time-sharing system is a general-purpose, multi-user, interactive operating system specifically engineered to give you a simple, efficient, and productive computing environment.

XENIX can be characterized as:

- A hierarchical file system that permits organization of files and directories in a logical and flexible way.

Other features of XENIX include:

- A powerful, easy-to-use command language that can be "tailored" to meet specific user needs.
- The ability to execute sequential, asynchronous, and background processes.
- The high-level programming language, C, conducive to structured programming.
- Flexible document preparation and text processing facilities. In XENIX, one obtains a very useful "word processing" system—an editing system, text formatting systems, a typesetting system, and spelling error-detection facilities. There are also excellent facilities for formatting and typesetting complex tables and equations.
- Sophisticated "desk-calculator" packages.
- Simple and consistent naming conventions: names can be absolute, or relative to any directory in the file system hierarchy.
- Mountable and dismountable file systems and volumes.
- File linking across directories.
- Automatic file space allocation and deallocation invisible to users.
- Facilities for creating, accessing, moving, and processing files, directories, or sets of these in a simple, uniform, and natural way.
- Device independent I/O: each physical device, from interactive terminals to main memory, is treated like a file, allowing uniform file and device I/O.

SOFTWARE SUMMARY

Almost all of XENIX is written in C. XENIX is totally self-supporting: it contains all the software that is needed to generate it, maintain it, and modify it. XENIX includes the time-sharing operating system with utilities, an assembler, and a compiler for the programming language C—enough software to regenerate, maintain, and modify XENIX itself, and to write and run new applications.

A representative set of XENIX software is summarized below by command. Some commands, options, and features have been omitted for the sake of brevity.

USER ACCESS CONTROL

LOGIN—Signs on a new user:

NEWGRP—Changes the working group or project ID. This provides protected access for groups of related users.

PASSWD—Changes a password:

- The user can change his own password.
- Passwords are kept encrypted for security.

STTY—Sets up options for optimal control of a terminal.

TABS—Sets the terminal's tab stops. XENIX "knows" several "standard" tab formats.

MANIPULATION OF FILES AND DIRECTORIES

CAT—Concatenates one or more files onto the standard output. CAT is often used to display the contents of files on the terminal screen.

CD—Changes the current working directory.

CHMOD—Changes access permissions of files.

COPY—Copies one set of files to a directory. It can be used to recursively move an entire set of directories from one directory to another.

CP—Copies one file to another. Works on any file regardless of contents.

DD—Physical file format translator, for exchanging data with non-XENIX systems.

ED—Interactive context editor. ED provides random access to all lines of a file.

FIND—Searches the directory hierarchy for, and performs specified commands on, each file that meets given criteria.

LN—Links another name to an existing file.

MKDIR—Makes and creates one or more new directories.

MV—Moves a file. Used for renaming files or directories, and for moving files into new directories.

PR—Prints files with title, date, and page number on every page, with optional multi-column output.

RM—Removes (deletes) files. If any names are linked to the file, only the name being removed goes away.

RMDIR—Removes one or more empty directories.

SED—A stream editor. SED is non-interactive, and is used primarily to perform global changes on files that are to big for ED.

SPLIT—Splits a large file into more manageable pieces.

SUM—Computes the check sum of a file.

EXECUTION OF PROGRAMS

ECHO—Prints its arguments on the standard output. Useful for diagnostics or prompts in Shell procedures, or for inserting data into a "pipe."

KILL—Terminates named processes.

NICE—Runs a command in low (or high) priority.

SH—The Shell, or command language interpreter.

SLEEP—Suspends execution for a specified time.

WAIT—Waits for termination of processes that are running asynchronously.

STATUS INQUIRIES

DATE—Prints the current date and time.

DF—Reports the amount of free space in the file system.

DU—Prints a summary of total space occupied by all files in a hierarchy.

FILE—Tries to determine what kind of information is in a file by consulting the file system index and by reading the file itself.

LS—Lists the names of one, several, or all files in one or more directories.

PS—Reports on active processes.

PWD—Prints the name of your current working directory.

TTY—Prints the "name" of your terminal (i.e., the name of the port to which your terminal is connected.)

WHO—Tells who is logged into the system.

INTER-USER COMMUNICATION

CALENDAR—An automatic reminder service.

MAIL—Mails a message to one or more users. Also used to read and dispose of incoming mail. The presence of mail is announced by LOGIN.

MESG—Inhibits or permits receipt of messages from WRITE.

WRITE—Establishes direct, interactive terminal-to-terminal communication with another user.

SOFTWARE DEVELOPMENT PACKAGE

ADB—Interactive debugger.

AS—Assembler.

AR—Maintains the library archives.

LD—Linkage editor. Combines relocatable object files.

LIBRARY—The basic run-time library. It is used freely by all system software:

- Number Conversions.
- Time conversions.
- Mathematical functions: sin, cos, log, exp, atan, sqrt, gamma.
- Random number generator.
- An elaborate library for formatted I/O.
- Password encryption.

MAKE—Controls the creation of large programs.

NM—Prints the namelist (symbol table) of an object program.

OD—Dumps any file.

PROF—Constructs a profile of time spent in each routine from data gathered by time-sampling the execution of a program; gives subroutine call frequencies and average times for C programs.

SIZE—Reports the main memory requirements of one or more object files.

STRIP—Removes the relocation and symbol table information from an object file to save file space.

UTILITIES

CMP—Compares two files and reports disagreeing bytes.

COMM—Identifies common lines in two sorted files.

CREF—Makes cross-reference listings of a set of files.

DIFF—Reports line changes, additions, and deletions necessary to bring two files into agreement; can produce an editor script to convert one file into another.
GREP—Prints all lines in one or more files that match a pattern of the kind used by ED (the editor.)
SORT—Merges and/or sorts ASCII files line-by-line.
TIME—Runs a command and reports timing information about it.
TR—Does character translation according to an arbitrary code.
UNIQ—Deletes successive duplicate lines in a file.
WC—Counts lines and "words" (strings separated by blanks or tab characters) in a file.

THE PROGRAMMING LANGUAGE C

CB—C beautifier that indents and formats C programs.
CC—Compiles and/or link-edits programs in the C language.
LINT—A C program checker that checks for inconsistencies, inefficiencies, and type incompatibilities.

CALCULATING LANGUAGES

BC—A C-like interactive interface to the desk calculator DC.
DC—Interactive programmable desk calculator. Has named storage locations, as well as conventional stack for holding integers and programs.

FORMATTERS

MS—A standardized manuscript layout for use with NROFF/TROFF.
EQN—A mathematical preprocessor for TROFF.
NROFF—Advanced formatter for terminals.
TBL—A preprocessor for NROFF that translates simple descriptions of table layouts and contents into detailed formatting instructions.
TROFF—This software generates output on a Graphic Systems, Inc., C/A/T System/1 phototypesetter.

OTHER TEXT PROCESSING TOOLS

PTX—Generates a permuted index.
SPELL—Finds spelling errors by looking up all uncommon words from a document in a large spelling list. Knows about prefixes and suffixes.

PROGRAMS FOR DEMONSTRATION AND TRAINING

ARITHMETIC—Tests your ability in math and arithmetic
CAL—Prints a calendar of the specified month or year between A.D. 1 and 9999.
FISH—The popular children's game.
FORTUNE—Prints out a fortune for the day.
HANGMAN—The popular word-guessing game.
QUIZ—Tests your knowledge of Shakespeare, presidents, capitals, etc.
WUMP—Thrilling hunt for the mighty wumpus in a dangerous cave.

Passing Information Between BASIC Programs

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L.W. Host's suggestion in the February Microcomputer News about using the random disk file buffers to pass information to an assembly program got me to thinking about using the buffers to pass information from one BASIC program to another. Previously I had been creating either a special trailer record in a file or even another file to pass information; this obviously slowed down the programs and required the use of more memory. The following programs demonstrate the techniques used to pass information from one BASIC program to another.

TEST1/BAS creates the file TEST/DAT. Note that there are two FIELD statements with overlapping fields; this is perfectly permissible and very handy. The FOR . . . NEXT loop is used to show that the file is being used in a normal way. The INPUTed message is a string of characters (but could just as well be a series of variables and literals) that is then LSET into T3$. The last statement uses the "R" option of RUN; it will leave all files open for the next program.

```
100 REM TEST1/BAS
110 CLS
    : CLEAR 1000
120 OPEN "D",1,"TEST/DAT"
130 FIELD 1, 2 AS T1$, 25 AS T2$
140 FIELD 1, 100 AS T3$
150 FOR I% = 1 TO 5
160     LSET T1$=MKI$(I%)
170     LSET T2$="THIS IS A TEST"
180     PUT 1,I%
190     PRINT I%
200     NEXT I%
210 INPUT "ENTER MESSAGE ";A$
220 LSET T3$=A$
230 RUN "TEST2/BAS",R
```

TEST2/BAS does not begin with a CLEAR! If you use CLEAR then all field contents are lost and the "R" option was negated. Note also that there was no OPEN for TEST/DAT since it is already opened (new files must be OPENed and FIELDed, however). The message from TEST1/BAS is printed and then the file is accessed and printed to show that it has not been affected.

```
100 REM TEST2/BAS
110 FIELD 1, 80 S F3$
120 FIELD 1, 2 AS F1$, 25 AS F2$
130 PRINT "MESSAGE FROM TEST1/BAS ="
140 PRINT F3$
150 FOR I% = 1 TO 5
160     GET 1,I%
170     PRINT CVI(F1$) ,F2$
180     NEXT I%
190 CLOSE
200 END
```

This passing of information is similar to using COMMON in FORTRAN or COM in Compiler BASIC. It also works using MICROSOFT BASIC-80 under CP/M.

Business Profiles

Editor's Note: With more than 55,000 subscribers, Dow Jones News/Retrieval is the leading provider of on-line business and financial information. We will keep you up-to-date on new software, new data bases and new prices in upcoming issues of TRS-80 Microcomputer News. Dow Jones News/Retrieval is sold at Radio Shack stores nationwide and in Canada.

Usually in this space we tell you about something new. And that's been easy because we've had much that's new to talk about—nine data bases have been introduced in the past year alone, from sports and weather to 10-K extracts from the Securities Exchange Commission. At the News/Retrieval editorial staff likes to say, we're not just news and quotes anymore.

But they also like to say this: more is not necessarily better. It isn't the continued addition of News/Retrieval data bases that matters, it's the way those data bases are coordinated—to provide easy access to the entire range of information our subscribers seek—that makes News/Retrieval different. So this time, instead of discussing something new, we'll talk about what's old—and the newest, and best, ways to use it.

If News/Retrieval is a wealthy vault of broad information, then one symbol is all you need for a key. One symbol—the stock symbol for the company you're interested in—will pull information from half a dozen data bases or more. Rather than having to rely on a single data base—a single kind of information—to gain a knowledge of his subject, the News/Retrieval user can quickly run through several, in only a few minutes, to learn about a firm's every aspect—past, present, even future. And it's easy.

Take, for instance, Tandy Corp. The creation of a Tandy profile likely would begin at News/Retrieval's foundation: news and quotes. Once on-line, type //CQ to enter the current quotes data base, and then type TAN (the stock symbol for Tandy). When we did so last December 8, somewhere near midday, Tandy was trading at 59 on a volume of 464,500 shares.

```
CURRENT DAY QUOTES BEING ACCESSED

ENTER QUERY
TAN

DOW JONES STOCK QUOTE REPORTER SERVICE.
STOCK QUOTES DELAYED OVER 15 MINUTES
*=CLOSE PRICE ADJUSTED FOE EX-DIVIDEND


STOCK  BID      ASKED
       CLOSE    OPEN  HIGH     LOW      LAST   VOL(1ØØ'S)
TAN    59 3/4   59    59 3/4   58 5/8   59     4645
```

By quickly typing //DJNEWS and entering .TAN you can read the latest Dow Jones News Service story about Tandy—on December 8 is was an item stating that the firm's November, '82 sales were up 21% over those in the same period a year earlier. The story had been filed on December 3. Probably you'd want to check more headlines of recent stories dealing with Tandy. Type .TAN 01 and the headlines (and their access codes) will appear. The example below shows stories about September and October sales increases, about how "Imitators go after market for IBM Personal Computer," and more.

```
DOW JONES NEWS IS BEING ACCESSED

ENTER QUERY
.TAN

N  TAN       Ø1/Ø2 AO 1/1
 /TAN                    /      /
     12/Ø3 TANDY SAYS NOVEMBER
   (DW) SALES ROSE 21%
   FORT WORTH -DJ- TANDY CORP SAID CONSOLIDATED SALES
FOR THE MONTH OF NOVEMBER WERE $213,256,ØØØ, AN
INCREASE OF 21% OVER THE NOVEMBER 1981 SALES OF
$176,227,ØØØ.
   TANDY'S U.S. RADIO SHACK DIVISION RECORDED A 2Ø%
GAIN TO $17Ø,Ø6Ø,ØØØ DURING NOVEMBER 1982 FROM
$141,441,ØØØ IN NOVEMBER 1981.
   SALES OF U.S. RADIO SHACK STORES IN EXISTENCE MORE
THAN ONE YEAR ROSE 11% DURING NOVEMBER 1982, IT SAID.
   12 51 PM.TAN Ø1

N  TAN      Ø1/Ø2
AO 12/Ø3 TANDY SAYS NOVEMBER
   (DW) SALES ROSE 21%
AN 12/Ø3 HEARD ON STREET: INSTITUTIONS
   (WJ) SELL ENERGY HOLDINGS IN RALLY
AM 11/11 TANDY CORP. PLANS TO BEGIN
   (WJ) SELLING POCKET PAGERS
AL 11/Ø9 JUSTICE DEPT., AT&T ASK JUDGE
   (DW) TO SEND APPEALS TO HIGH COURT
AK 11/Ø8 DESKTOP COMPUTERS PROVIDE NEW
   (WJ) DEMAND FOR AT&T'S UNIX SYSTEM
AJ 11/Ø4 INITIATORS GO AFTER MARKET
   (WJ) FOR IBM PERSONAL COMPUTER
AI 11/Ø3 TANDY OCTOBER SALES
   (DW) INCREASED BY 19%
AH 1Ø/22 DESKTOP COMPUTER MAKERS FIGHT
   (WJ) FOR RETAIL DISPLAY SPACE
AH 1Ø/18 TANDY CORP. 1ST QTR SEPT 3Ø
   (DW) NET 52C A SHARE VS. 42C
AF 1Ø/11 TANDY CORP. LATEST ENTRANT
   (BN) IN FARMING VIDEOTEX SERVICES
AE 1Ø/Ø6 TANDY CORP. SAYS SALES
   (DW) IN SEPTEMBER ROSE 2Ø%
```

You have, then, the most current information on Tandy—but a fuller picture can be had. Type //MEDGEN for Media General Financial Service to get the latest figures on Tandy's earnings, dividends, price-earnings ratios and stock price performance relative to market indicators on 3200 companies listed on the New York and American exchanges (plus selected over-the-counter companies).

```
MEDIA GENERAL-FINANCIAL SERVICES, INC.
MARKET AND FUNDAMENTAL DATA ON
COMMON STOCKS AND RELATED
SUMMARY MATERIAL ON INDUSTRY
GROUPS, COPYRIGHT (C) 1982.
```

```
ENTER QUERY
TAN/P

TANDY CORPORATION
-PRICE & VOLUME- 12/Ø3/82  (433)

PRICE CHANGE      (1)
-LAST TRDNG WK 1Ø.Ø%
-LAST 4 WKS 14.3%
-LAST 13 WKS 81.8%
-LAST 52 WKS 68.6%
-YR TO DATE 63.Ø%
CHANGE VS. S & P 5ØØ
-LAST TRDNG WK 1Ø7%
-LAST 4 WKS 117%
-LAST 13 WKS 161%
-LAST 52 WKS 153%
-YR TO DATE 144%
TAN/F

TANDY CORPORATION
-FUNDMNTL DATA- 12/Ø3/82   (433)
REVENUE
-LAST 12 MOS $2,178 MIL
-LAST FISCAL YEAR $2,Ø33 MIL
-PCT CHANGE LAST QTR 34.4%
-PCT CHANGE YR TO DATE 34.4%
EARNGS 12MOS $234.9Q MIL
EARNGS PER SHARE
-LAST 12 MONTHS $2.27
-LAST FISCAL YEAR $2.17
-PCT CHANGE LAST QTR 23.8%
-PCT CHANGE FY TO DATE 23.8%
-PCT CHANGE LAST 12MOS 24.7%
-FIVE YR GROWTH RATE 35.Ø%
//FTS
```

If you want to compare Tandy's numbers with the composite figures for its industry group (Retail—electronics, radio and TV) simply type 433/P (for price and volume information) or 433/F (for fundamental information).

Media General includes reports about Tandy's performance over the past 52 weeks, but more historical information is available in the historical quotes and Free Text Search data bases. Daily stock quotes extend back a year, and quarterly quotes back to 1978. For a look at Tandy's progress in 1982 (and a splendid 1982 it was for Tandy), we retrieved monthly quotes, showing the firm's share-price decline from 35 3/4 to 26 7/8, and then skyrocket to 59 3/4 (as of early December).

```
DOW JONES HISTORICAL
STOCK QUOTE REPORTER SERVICE

STOCK  TAN

    1982  MONTHLY SUMMARY
 DATE       HIGH       LOW        CLOSE      VOL(1ØØ'S)
Ø1/82       36 1/2     32         35 3/4       7Ø346
Ø2/82       36         3Ø 5/8     32           6Ø594
Ø3/82       32 7/8     26         3Ø 1/4      1Ø2791
Ø4/82       33 3/8     3Ø 5/8     32 1/8       6Ø5Ø7
Ø5/82       32 5/8     26 3/8     26 7/8       92654
Ø6/82       29 1/4     26         27 1/2       84Ø27
Ø7/82       31 7/8     26 1/4     28 7/8       85593
Ø8/82       3Ø 1/8     22 3/4     29 3/8      139371
Ø9/82       31 5/8     27 3/4     28 5/8      1Ø1638
1Ø/82       44 3/4     27 7/8     41 5/8      135Ø76
11/82       53 1/4     41 5/8     53           96799
12/82       6Ø 3/4     51 3/4     59 3/4       31426
```

Want to research some special aspect of Tandy's past? We did. By typing //FTS (Free Text Search), you will have access to several years of back news files, and can get stories about exactly what you need to know by typing in a few key words or dates. We asked for all stories that included the words "Tandy" and "color computer." We found four documents that had them and printed the first, "Four companies fight for lead in big home computer market" (in the example below, only part of the article appears).

```
      1_:
      1_:   TANDY AND COLOR ADJ COMPUTER

RESULT        4 DOCUMENTS

      2_:   ..PRINT

            DOCUMENT=       1
AN      1ØØ611-Ø57Ø.
HL      FOUR COMPANIES FIGHT FOR LEAD IN BIG HOME
        COMPUTER MARKET
DD      Ø6/11/82
SO      WALL STREET JOURNAL (J)
CO      TAN   WCI   CBU   TXN
IN      COMPUTERS (OFF)
TX         VIDEO-GAME MANIA IS SWEEPING THE COUNTRY,
        AND MANY CONSUMERS - WHICH HELP THEM STUDY
        AND PERFORM BOOKKEEPING TASKS AS WELL AS PLAY
        GAMES - ARE MORE PRACTICAL PURCHASES THAN
        VIDEO-GAME CONSOLES. AT THE SAME TIME, PRICES
        HAVE DROPPED SHARPLY, AND RETAILERS LIKE
        BLOOMINGDALE'S, MARSHALL FIELD & CO. AND J.C.
        PENNEY CO. PLAN TO CARRY THE MACHINES SOON.
AS A RESULT, ANALYSTS PREDICT THAT
        HOME-COMPUTER SALES THIS YEAR WILL BE SIX TO
        SEVEN TIMES GREATER THAN LAST YEAR'S $12Ø
        MILLION. IN FACT, EACH OF FOUR LEADING
        MANUFACTURERS - WARNER COMMUNICATIONS INC.'S
        ATARI DIVISION, TANDY CORP., TEXAS
        INSTRUMENTS INC. AND COMMODORE INTERNATIONAL
        LT. - EXPECTS TO OUTSELL LAST YEAR'S INDUSTRY
        SALES TOTAL OF 16Ø,ØØØ UNITS.
```

Supplementing this view of Tandy's past is a prognosis about its future. Type //EARN for the Corporate Earnings Estimator data base. Based on estimates provided by 1,000 research analysts at more than 50 brokerage firms, earnings per share forecasts are made for the current and (in most cases) coming fiscal year.

```
CORPORATE EARNINGS ESTIMATOR
ZACKS INVESTMENT RESEARCH INC.
CHICAGO, ILL.

THIS WEEKLY DATABASE PROVIDES CONSENSUS FORECASTS OF
EARNINGS PER SHARE FOR 2,4ØØ COMPANIES BASED ON
ESTIMATES PROVIDED BY 1,ØØØ RESEARCH ANALYSTS AT MORE
THAN 5Ø MAJOR BROKERAGE FIRMS FOR CONSISTENCY,
ESTIMATES ARE CONVERTED TO PRIMARY EARNINGS BEFORE
EXTRAORDINARY ITEMS.
-------------------------------------------------------
PLEASE ENTER DESIRED STOCK SYMBOL AND PRESS RETURN
TAN

TANDY CORP
--FISCAL YEAR ENDS   6/83

EARNINGS PER SHARE ESTIMATES
--MEAN     2.72
--HIGH     2.85
--LOW      2.25
NUMBER OF ANALYSTS  18
P/E RATIO (ESTIMATED EPS)  19.73


PAST EARN PR SH ESTIMATES (MEAN)
--WEEK AGO    2.72
--13 WEEKS AGO  2.74
--26 WEEKS AGO  2.79
-------------------------------------------------------
```

THE NEWS/RETRIEVAL GUIDE

The News/Retrieval Guide is designed to explain our new prices and help subscribers take full advantage of the complete News/Retrieval service. For a total information picture of your subject, use this guide – which can be detached and kept close to your terminal – as a quick and easy directory to the data bases you'll want to check.

SUBJECTS

SUBJECTS	//DJNEWS Dow Jones News	//FTS Free Text Search[1]	//UPDATE Weekly Econ. Update	//WSJ Wall Street Journal	//CQ Current Quotes	//DJA Historical DJ Averages	//HQ Historical Quotes	//DSCLO Disclosure II[2]	//EARN Corp. Earnings Estimator	//MEDGEN Media General	//MMS Weekly Econ. Survey	//INTRO Intro[3]	//ENCYC Encyclopedia	//MENU Master Menu	//MOVIES Movie Reviews	//NEWS General News Wire	//SPORTS Sports Report	//WTHR Weather Report	//WSW Wall Street Week
Subsidiaries and Private Companies		●																	
Public Companies	●	●			●		●	●	●	●									
Foreign Companies		●																	
Canadian Companies	●	●																	
Industries	●	●									●			●					
Government	●	●		●										●			●		●
Securities Markets	●	●		●	●	●	●												●
Economic News	●	●	●	●		●						●							●
Forecasts										●		●							●
General Information		●		●										●		●	●	●	
Subscriber News and Instructions													●		●				

SERVICES	Dow Jones Business & Economic News	Dow Jones Quotes	Financial & Investment Services	General News & Information Services
Prime Time Price	$1.20	$.90	$1.20	$.60
Non-Prime Price[4]	.20	.15	.90	.30

Membership savings: Executive – 33⅓% anytime; Blue Chip – 33⅓% non-prime time.

NOTES: [1]Free Text Search, part of the Dow Jones Business & Economic News group, will cost $.60 per minute during non-prime hours. [2]Disclosure II has an additional access fee of $4 for each company search in prime time, or $2 in non-prime time. [3]Intro is free of charge at all times. [4]Non-prime time begins at 6:01 p.m. local time, and ends at 4 a.m. Eastern, 3 a.m. Central, 2 a.m. Mountain and 1 a.m. Pacific times. These prices apply to 300 baud transmission. News/Retrieval also is accessible at 1200 baud, in which case rates are 70% higher.

A SUMMARY OF DATA BASES

Dow Jones News
//DJNEWS
• From The Wall Street Journal, Barron's, and Dow Jones News Service • Stories 90 seconds to 90 days old

Free Text Search
//FTS
• Search Dow Jones News back to June, 1979 using any combination of words, dates or numbers

Weekly Economic Update
//UPDATE
• A review of the week's top economic events and a glimpse of the month ahead

Wall Street Journal Highlights Online
//WSJ
• Headlines and summaries of major stories • Includes front page news, front and back page features, market pages, editorial columns and commentary

Dow Jones Quotes/Current
//CQ
• Common and preferred stocks and warrants • Corporate and foreign bonds • Mutual funds, options, U.S. Treasury issues

Historical Dow Jones Averages
//DJA
• Historical data on all four averages • By specific date or 12-day period

Dow Jones Quotes/Historical
//HQ
• Daily volume, high, low and close • Monthly summaries to 1979 • Quarterly summaries to 1978

Disclosure II
//DSCLO
• 10-K extracts, company profiles, detailed data on more than 6,000 companies • From SEC filings

Corporate Earnings Estimator
//EARN
• Latest earnings-per-share forecasts of top Wall Street analysts • Covers 2,400 widely followed companies

Media General Financial Services
//MEDGEN
• Detailed corporate financial information on 3,150 companies • Major categories include revenue, earnings, dividends, volume, ratios, shareholdings and price changes

Weekly Economic Survey
//MMS
• Weekly economic survey from nation's top financial institutions • Includes median forecasts of monetary and economic indicators

Intro
//INTRO
• Free on-line information on News/Retrieval • Includes new data base announcements

Academic American Encyclopedia
//ENCYC
• Comprehensive, easy-to-use reference tool • Revised and updated electronically twice a year

Master Menu
//MENU
• Complete on-line listing of data bases • Instructions on how to access them

Cineman Movie Reviews
//MOVIES
• Reviews of current movies, updated weekly • Previews of coming attractions

News/Retrieval World Report
//NEWS
• Foreign and national news • Tomorrow's headlines today

News/Retrieval Sports Report
//SPORTS
• Scores, stats, standings, stories and schedules for most major sports • Professional, major college and top amateur

News/Retrieval Weather Report
//WTHR
• Weather tables for more than 50 major cities • National weather summary and forecast by geographic region

Wall $treet Week Online
//WSW
• On-line transcripts from the television program, Wall $treet Week • Four most recent programs available

```
PLEASE RETURN FOR NEXT PAGE

TANDY CORP
-FISCAL YEAR ENDS    6/84

EARNINGS PER SHARE ESTIMATES
--MEAN      3.46
--HIGH      3.5Ø
--LOW       3.35
NUMBER OF ANALYSTS    4
P/E RATIO (ESTIMATED EPS)   15.49

PAST EARN PR SH ESTIMATES (MEAN)
--WEEK AGO      3.46
--13 WEEKS AGO    3.35
```

To complete the Tandy profile, enter the Disclosure II data base (by typing //DSCLO). Below is the introductory example for information about Tandy; you can select to read recent balance sheets, a report on management discussion, a listing of officers and directors, and more.

```
DISCLOSURE II
COPYRIGHT (C) 1982
DISCLOSURE INC.

FINANCIAL AND DESCRIPTIVE INFORMATION ON PUBLIC
CORPORATIONS BASED ON REPORTS FILED WITH THE
SECURITIES AND EXCHANGE COMMISSION

--------------------------------------------------
TO CONTINUE, ENTER COMPANY STOCK SYMBOL AND PRESS
RETURN TAN

COMPANY NAME:            TANDY CORP
ENTER    FOR

 1      CORPORATE PROFILE
 2      BALANCE SHEETS FOR 2 YEARS
 3      INCOME STATEMENTS FOR 3 YEARS
 4      QTRLY INC STATEMENTS (CUR FY)
 5      LINE OF BUSINESS DATA
 6      5-YR SUMMARY DATA (REVS, INCOME, EPS)
 7      FULL FINANCIAL DATA (2 THRU 6)
 8      OFFICERS AND DIRECTORS
 9      OWNERSHIP AND SUBSIDIARIES
1Ø      OTHER CORPORATE EVENTS
11      MANAGEMENT DISCUSSION
12      CORPORATE RECORD (1 THRU 1Ø)
13      FULL CORPORATE RECORD (1 THRU 11)
14      2-YR LIST OF REPORTS ON FILE WITH THE SEC
99      HOW TO ORDER FULL TEXT OF SEC REPORTS
--------------------------------------------------
```

The search for company information is only one example of what News/Retrieval editors call "the integrated nature" of the service's data bases. The accompanying chart will help guide you to the data bases with direct bearing on the subject in which you may be interested. To use the chart, simply find the subject you're after among the subject areas on the chart's left, and then follow the dots.

In researching Tandy, we looked for information in each data base where a dot was placed among the Public Companies line: Dow Jones News, Free Text Search, current quotes, historical quotes, Disclosure II, the Corporate Earnings Estimator, and Media General Financial Services. If you sought, say, government information, the charted dots would direct you to: Dow Jones, Free Text Search, Wall Street Journal Highlights Online, the encyclopedia, the World Report, and Wall Street Week transcripts.

Information about any given subject may appear even in unspecified data bases, but those data bases which are listed are most certain to yield the best knowledge. In many cases, messages in the text of the data bases will direct you specifically to another source of information—to the encyclopedia, for instance, or to a fuller treatment in the World Report of an item you've discovered in Dow Jones News. Follow the messages, and follow the dots. The full range of information will be yours.

Labels and Renumbering on the PC-2

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These two programs are written for the PC-2. The first program is LABELS. This short program for the PC-2 computer lets you print out your own labels for your table, the office door, or even on your computer.

You need, of course, the Pocket Computer 2 with a printer-cassette-interface, and make sure you have paper.

```
1Ø: INPUT "Label? ";A$
    : TEXT
    : LF 5
2Ø: FOR I = 1 TO LEN A$
    : COLOR Ø
3Ø: GRAPH
    : ROTATE 1
    : CSIZE 9
4Ø: GLCURSOR (1ØØ, Ø)
    : SORGN
5Ø: B$ = MID$ (A$, I, 1)
6Ø: FOR J = 1 TO 5
7Ø: GLCURSOR (-J, J)
    : LPRINT B$
8Ø: COLOR 1
    : NEXT J
9Ø: TEXT
    : NEXT I
1ØØ: LF 8
    : END
```

The second program I call RENUMBER. These three BASIC lines will allow you to renumber your programs with increments of 10. The routine acts on the memory locations where the line-numbers are stored. Include lines 60000, 60010, and 60020 in any program that you want to renumber or it doesn't work.

```
6ØØØØ: "X" W = 16581
     : POKE W, Ø, 1Ø
     : A = 1Ø
6ØØ1Ø: W = W + 3 + PEEK (W + 2)
     : IF PEEK W = 234 END
6ØØ2Ø: A = A + 1Ø
     : POKE W, INT(A / 256), (A - 256 * INT(A / 256))
     : GOTO 6ØØ1Ø
```

Profile III+: Math Appeal

The small Computer Company
P.O. Box 2910
Fort Worth, TX 76113-2910

Profile III+ Section By Ivan Sygoda, Director, Pentacle

In recent articles, we've seen the power and flexibility of the Profile III+ data base management system. An important component of that power and flexibility is the system's math capability. This month we'll explore some of the ways that Profile III+'s math ability can make your life easier.

Simply put, PROFILE III+ can add, subtract, multiply or divide the numerical contents of data fields and put the results into other fields. You can then sort and/or select records according to the results of these calculations.

LANDLORDS AND TENANTS

Here's an example: Suppose you're a landlord using PROFILE III+ to keep track of your tenants and their rent payments. You have to set up fields for name, apartment number, telephone, date lease expires, and so forth. The Profile III+ math package easily computes monthly rent, records payments, and determines any balances due (or overdue—these are hard times). The following fields are involved (I've numbered them beginning with 1 to simplify the illustration; Payment 1 and Balance 1 refer to January, P2 and B2 to February, etc.):

Field	Heading	Length	Field	Heading	Length
1	Year rent	5	14	B6	5
2	Open balance	5	15	P7	5
3	Payment 1	5	16	B7	5
4	Balance 1	5	17	P8	5
5	P2	5	18	B8	5
6	B2	5	19	P9	5
7	P3	5	20	B9	5
8	B3	5	21	P10	5
9	P4	5	22	B10	5
10	B4	5	23	P11	5
11	P5	5	24	B11	5
12	B5	5	25	P12	5
13	P6	5	26	B12	5

Table 1: Defining fields for the rent program

For each month, you must subtract the rent paid from the amount due, which is 1/12th the yearly rent, plus any past due balances. Here's how.

The Monthly Rent From the Creation menu, select "Define Math Formulas." You are presented with a screen or grid that allows you to specify up to 16 equations. The rent is the same each month: 1/12th the value stored in field 1. This is expressed as 1/"12." The first 1 is not the number one, but field 1—or more precisely, the numerical value you have stored in field 1 (i.e., the year's rent) when you first entered information in your tenant data base. The operator for division is /. To distinguish an absolute value from a field number, the value must be enclosed in quotes. Therefore, "12" refers to the number twelve, not field 12, which happens to be the May balance due in this example. The use of quotes is one of only two tricky things to remember about the Profile III+ math package.

Past Due Rent At this point, we have to add any past due amounts to the rent owed for the current month. Profile III+ offers two entirely different ways to make adjustments such as this.

The first way of making adjustments uses the two special field indicators identified on page 23 of the Profile III+ user manual: the "add to field" (+) and the "subtract from field" (−). They work as follows. We've defined field 4 as January balance due. This appears in your format screen as !4, protected by the"!" indicator because the amount is calculated for you by the math package. Any place below the position of !4 on the screen, or to the right of it on the same line, you can label an area called "Adjustments (to current balance due)." Field +4 (don't forget to allot five spaces as you did for !4) is where you enter any amounts to be added to the current value in !4. Field −4 (allot five spaces) is where you enter any amount to be subtracted from !4. When you exit the update mode for the current record, the amount stored in field 4 is automatically adjusted by the amounts in +4 and −4, and both the "+" and "−" fields are reset to zero.

There's only one problem: This procedure leaves no audit trail. If your application does not require such a trail—perhaps if you're only adding bonuses or subtracting special discount incentives, for example—then this method is quick and easy.

But if you do need a trail of these adjustments, as our landlord does, the adjustments must be incorporated into the math formula table. This is the second way. Remember that the initial past due amount is stored in field 2 (opening balance). Therefore, the total rent due in January is 1/"12" + 2. This leads to the second and last tricky point: The order of expressions in your formulas and the order of formulas in the math table is crucial.

You must remember that the Profile III+ math package reads formulas from left to right and from top to bottom of the "Define Math" screen. Each time it encounters one of the valid operators (+, −, *, /) it performs the operation called for and uses, as the two operands, the subtotal carried forward and the value immediately following the operator. In

otherwords, the math package works like a hand-held calculator. Parentheses are not supported.

Look what happens when you reverse the order of elements in the January rent formula:

2 + 1/"12"
instead of
1/"12" + 2

The program adds any past due amounts to the total yearly rent, and then divides by 12, amortizing overdue payments over twelve months. It would be wonderful if landlords everywhere did this, but I doubt that they would intentionally.

Now you must subtract the January payment, which you will be entering in field 3:

1/"12" + 2 – 3.

The result of this calculation will be stored automatically in field 4, under

"January balance due":

4 = 1/"12" + 2 – 3.

Saving Space If you left the formula like this, the program would display the values involved in dollars and cents format, which is the default. If the numbers you are working with are something like $522.33 per month, you have no choice. But if rates are set up so that only whole numbers are involved, then you can save precious space—three characters per field—by specifying integer format. This is accomplished by placing an "I" anywhere in the body of the formula:

I1/"12" + 2 – 3
or
1/"12" + 2I – 3
or
1/"12" + 2 – 3I

as we have it in figure 2. If your application requires full floating decimal format, substitute an "F" for "I." (The numbers on the left side of the equal sign are the fields into which the results go.)

```
 4 = 1/"12" +  2 –  3I
 6 = 1/"12" +  4 –  5I
 8 = 1/"12" +  6 –  7I
10 = 1/"12" +  8 –  9I
12 = 1/"12" + 10 – 11I
14 = 1/"12" + 12 – 13I
16 = 1/"12" + 14 – 15I
18 = 1/"12" + 16 – 17I
20 = 1/"12" + 18 – 19I
22 = 1/"12" + 20 – 21I
24 = 1/"12" + 22 – 23I
26 = 1/"12" + 24 – 25I
```

Table 2: Math formulas for the rent program

KNOWLEDGE IS POWER

You now know almost everything about the Profile III + math package that you need to finish the rent formulas on your own. However, as usual, there are a number of ways to go about it and a number of improvements and alterations that can be implemented.

For example, leases are not always for one year. You may want to define a new field, field 27, as the length of the lease in months, and change field 1 to represent the total value of the lease. Then, instead of using 1/"12" for the monthly rent, you would use 1/27 (no quotes). You may also want to add a series of twelve fields (stored in another data segment) for any applicable adjustments (seasonal fuel adjustments, escalator clauses, etc.). You can define a screen format as an invoice form and use "Mass Hardcopy" to send bills to everyone.

The formulas are set up so that balances past due are carried forward. When you first use the program, the December balance due (field 26) displays the total value of the lease. This value, as well as the values stored in the other monthly balances due, are reduced as each monthly payment is recorded. This can be useful for bookkeeping.

In setting up your report formats, include field 26 (December balance), and use the " = " field indicator (= 26). The report then automatically totals the tenants' December balances due, which is the amount all tenants still owe for the rest of that year. If everyone pays up, you'll be able to fix the plumbing. About time, too.

TIME MARCHES ON

At the end of each year, you will have to re-initialize the program for the following year. You have a number of options. You can copy all your formatting programs onto a fresh set of disks, keeping the originals as a permanent record, and start over again. But then you'd have to re-enter all data for each tenant, which is both tedious and time-consuming. To avoid this, you can let the math package do a sort of "global edit" for you.

First, you must temporarily rewrite your math formulas so that you can transfer the 1983 December balance due (field 26) to the 1984 open balance (field 2). The formula is 2 = 26. Once you have done this, the next step is to zero out payments 1 through 12 (fields 3, 5, 7 . . . 25): 3 = "0", 5 = "0", etc. Replace the original math formulas with these new formulas and mass recalculate. This leaves you with a blank slate, and any past balance due is stored in field 2. Now you are ready to rewrite your original math formulas and mass recalculate again. Presto! And Happy New Year.

NOTA BENE (Latin for "Read This Carefully")

The Profile III + math package does not support the sort of accumulation formulas that are allowed in BASIC, such as A = A + B. Using the rent program again as an example, you can not define the February balance due (field 6) as the original February balance due (field 6) plus the January past due balance (field 4): 6 = 6 + 4. It seems like a logical thing to do, and you may be tempted to try it. Don't. It won't work.

The reason it won't work is that the program scans the fields to the left of the equal sign on the math screen and sets them all equal to zero before it begins the calculation. This has two important consequences. The first of these is that in a self-referencing formula such as 6 = 6 + 4, because field 6 has been zeroed in preparation for the operation, all you are left with in the end is 6 = "0" + 4. The second consequence is that you can't write a formula that includes the result of an equation below it on the math screen. The value of the second formula would also be zero because the program has not solved it yet.

It is helpful to follow this general rule: In a math formula, you cannot use a field number to the right of the equal sign if you intend to use it to the left of the equal sign below it's position on the screen.

When you finish filling in all your math formulas, press CLEAR to record them. After asking if you want to password protect the formulas and if you want a hard copy of your formulas (a good idea), the computer will whirr and click as the program stores your formulas in a file it names "Userfile/MTH." It automatically calls this file when it needs to calculate your records, which is each time you enter or update information.

THEY KNEW NOT WHAT THEY WROUGHT

The Profile III + math package is even more powerful than it's advertised to be. By being clever,you can mimic "if-then" (conditional) equations. You can accomplish this by a judicious use of flags, the little on/off switches that determine whether an operation is to be performed or not.

Suppose our hypothetical landlord, anxious to encourage the timely flow of cash through his coffers, offers a five percent discount on the rent to all tenants who pay up by the first of the month.You need a way to note that the condition was met, plus a way to perform the appropriate calculation.

If you've studied BASIC, you know that conditional equations test the logical value (true/false) of the relevant expression—A = B, for example. If A does not equal B, the expression is false, and a value of 0 is generated. If A does equal B, the value generated is either 1 or −1, depending on the architecture of your particular system. This principle can be adapted for use by the Profile III + math package.

Set up twelve one-character numerical fields in a non-key data segment. Call them D1-D12 for "discount" month 1 through 12. For our purposes here, let's assume the field numbers are 50-61. On the inquiry screen, place the new fields next to the column in which you record monthly payments; label the column "Discount?" Remember that you have established that "Yes" = 1 and "No" = 0, and when you record each payment, type in 1 or 0 to flag it with yes or no.

Now you must modify your math formulas to deal with this new information. Five percent of the monthly rent is:

```
".05" * 1/"12"
or
1/"12" * ".05"
```

In this case the order won't affect the result. Since we will be subtracting this amount from the rent, prefix a minus sign:

```
-".05" * 1/"12"
```

then multiply it by the logical value you've assigned to this month's rent. Since the value for January is stored in field 50, the equation becomes:

```
-".05" * 1/"12" * 50
```

Finally, it has to be tacked on to the basic formula for January rent. Here's where you have to be careful. If you tack it on at the end, like this:

```
4=1/"12" + 2 - 3I - ".05" * 1/"12" * 50
```

it won't work at all because of the way the math package reads formulas. And if the discount doesn't apply (field 50 = "0"), it will zero out all the rent due. So tack the discount factor on at the beginning:

```
-".05" * 1/"12" * 50 + 1/"12" + 2 - 3I
```

and watch the money roll in.

PROFILE Editor's Note: This is Mr. Sygoda's fifth article in a series of 'how-to' PROFILE III + articles. Other articles in the series will be published over the next few issues in this column. We hope that you enjoy this feature, and we look forward to your comments and questions on PROFILE III + . Pentacle is a New York City-based non-profit service organization specializing in administrative services for performing art groups.

MATH AND PROFILE PLUS

Several customers have called in with questions about Profile Plus Math functions. Many have found that, when subtracting two fields that should be equal, they often get −0.00 as the answer. If you use this field to select records for a printed report, unpredictable results can occur. In other cases, the total shows 0.00, but if you try to select the record using that field equal to 0 as the criteria, the record is not selected.

The problem is familiar to BASIC users—a rounding problem is causing the inaccuracies. The solution is similar to the BASIC fix and can be explained with the following example.

With the math formulas defined as follows, field 3 is not rounded properly, causing −0.00 to print out:

```
2 = 1 * ".10"
3 = 1 + 2
5 = 1 + 2 - 4
```

To circumvent the problem, two additional fields must be defined for "overhead." The formula, written algebraically, reads:

```
X = INT (A * 100) /100
```

"X" is the value after rounding and "A" is the value to be rounded. In Profile Plus terms, the formulas are:

```
2 = 1 * "10"
3 = 1 + 2
5 = 7/"100"
6 = 1 + 2 - 4 * "100"
7 = I6
```

A Special Note: Send electronic mail via CompuServe stating specific criticisms or imaginative uses of Profile that you've discovered from working with the program, and we'll get back to you. Our CompuServe user identification number is: 70007,535.

microRESEARCH Problem #5

Richard V. Andree
microRESEARCH
P.O. Box 2910
Fort Worth, TX 76113-2910

Find two fractions $\frac{A}{B}$ and $\frac{C}{D}$ such that the sum of their cubes is six.

$$(\tfrac{A}{B})^3 + (\tfrac{C}{D})^3 = 6$$

where A, B, C, D are each integers (whole numbers).

To facilitate matters, please submit your solution programs according to the following guidelines:

Lines 1-9	REMarks identifying the problem
Lines 10-49	REMarks to identify the programmer with mailing address, phone number and equipment used.
Lines 50-99	REMarks concerning the method used to solve the problem.
Line 100	Start actual program here.

SOLUTIONS TO PROBLEM 1

Richard H. MacLeod of Wauseon, Ohio, sent the following information regarding problem 1.

The logic was correct on B. Elliott's solution to problem #1, but the Model II 64K TRS-80 returns incorrect answers (as will the Models I and III). If you will run the program, you will find the first number returned is 32686, 1068374592 which takes 2 minutes 11 seconds. The next number returned is 39654, 1572439680 which takes another 19 minutes, 48 seconds.

However, these are incorrect answers to the problem. The square of 32686 is 1068374596 (not . . . 4592). The square of 39654 is 1572439716 (not . . . 9680).

Dr. Andree's Note: The Trouble is that in 70 TEMP# = I*I the right number is in single precision and storing a single precision value which is 7 digits at the maximum in a double precision variable does not produce the necessary 10-digit precision.

This can be corrected by adding to your program a line 62 and modifying line 70:

```
62 X# = I
70 TEMP# = X# * X#
```

This will give the proper answers. There are 87 such numbers, and the run time to return all is 3 hours, 32 minutes, 46 seconds.

You can cut this run time by making the following changes.

1. Delete 100 and 110. (The square of all numbers between 31623 and 99999 are ten digits in length. Your FIRST is 31995, your LAST is 99380.)
2. Delete 90 and change the J loop 125 FOR J = 2 TO 11. (If you run this way, change 160 . . . J = 11.)
3. Delete 120 to 123, and add ERASE F to 160 and 190.
4. Delete 65 and 180, and change 160 to:
   160 IF F(K) > 1 THEN ERASE F: GOTO 999.
5. Condense the number of statements. (I know that for publication, we use a line for each operation. I was looking for time savings.)

The above will take the run time to 2 hours, 6 minutes, 39 seconds.

In the adjusted program lines below, PROB/1E is the program before condensing and PROB/1F is after condensing.

```
4 '
5 '                    PROB/1E
6 '
10 CLS
     : PRINT TIME$;TAB(160)
20 FIRST = SQR(1023456789)
30 FIRST = INT(FIRST)
40 LAST = SQR(9876543210)
50 LAST = INT(LAST)
60 FOR I = FIRST TO LAST
62 X# = I
70 TEMP# = X# * X#
80 TEMP$ = STR$(TEMP#)
125 FOR J = 2 TO 11
130 J$ = MID$(TEMP$,J,1)
140 K = VAL(J$)
150 F(K) = F(K) + 1
160 IF F(K) > 1 THEN ERASE F
     : GOTO 999
170 NEXT J
190 C = C + 1
     : ERASE F
     : PRINT C, I, TEMP#, TIME$
     : IF C = 5 THEN FOR L = 1 TO 5
     : LPRINT ""
     : NEXT L
     : SYSTEM "SCREEN"
     : SYSTEM "T"
     : END
999 NEXT I
```

```
1 '                  PROB/1F
2 CLS
     : PRINT TIME$;TAB(160)
3 FIRST = INT(SQR(1023456789))
     : LAST = INT(SQR(98765432l0))
     : FOR I = FIRST TO LAST
4 X# = I
     : T# = X# * X#
     : T$ = STR$(T#)
     : FOR J = 2 TO 11
5 J$ = MID$(T$,J,1))
     : K = VAL(J$)
     : F(K) = F(K)+1
     : IF F(K) > 1 THEN ERASE F
     : GOTO 8
6 NEXT J
     : C = C + 1
     : ERASE F
     : PRINT C,I,T#,TIME$
7 IF C = 5 THEN FOR L = 1 TO 5
     : LPRINT ""
     : NEXT L
     : SYSTEM "SCREEN"
     : SYSTEM "T"
     : END
8 NEXT I
```

A modification for the Model I for this problem was sent by Norman R.J. McMillen of Vancouver, British Columbia, Canada.

Since the program seemed to get fouled up on my Model I as to integer and double precision, I modified line 70 as follows:

```
70 TEMP# = 1# * I * I
```

That seemed to work fine although the first run took some six hours to produce the 87 qualifying numbers. This unseemly duration prompted me to try and set up a similar

program in compiler BASIC. This reduced the run time to a little less than one hour. I hereby present a listing of this program—still "brute force."

RSBASIC Version 2.3 SQUARER/BAS

```
5 R = Ø
     : DIM A$11
     : LAST = SQR(9876543210)
2Ø X = SQR(1Ø23456789)
     : X  = INT(X)-1
     : PRINT TAB(4Ø), TIME$:T$ = TIME$
3Ø X = X + 1
5Ø N = X * X: A$ = STR$(N, "##########")
6Ø FOR Y% = 2 TO 1Ø
     : XY$ = SEG$(A$,Y%,1)
     : XZ$ = SEG$(A$,Y% + 1)
7Ø IF POS(XZ$, XY$) > Ø THEN 3Ø
8Ø NEXT Y
     : R = R + 1
9Ø PRINT X, STR$(N, "##########"),R,TIME$
1ØØ IF X < LAST THEN 3Ø
```

Dr. Andree's Note: It is quite possible to further reduce the time sharply on either of these programs by using a little mathematical ingenuity which enables one to cut the number of values tried to about 1/3 of those originally. Watch my column next month.)

SOLUTIONS TO PROBLEM 3

This solution comes from Jack Atherley of Deep River, Ontario, Canada.

```
1 ' Micro-research Problem #3
2 '   TRS-8Ø Microcomputer News - 821Ø
3 ' Find all integers in which the sum of the cubes
    of the digits is equal to the integer.
4 ' By examination, there are no integers greater
5 ' than 2ØØØ which could be possible solutions.
6 ' Therefore, only integers less than 2ØØØ are
7 ' checked.
8 '
1Ø DEFINT A-Z
     : CMD"Z","ON"
2Ø PRINT
     : PRINT
     : PRINT
25 FOR I = Ø TO 9
     : C(I) = I * I * I
     : NEXT
3Ø COUNT = Ø
35 FOR I = 9 TO Ø STEP -1
     : NI = 1Ø * I
     : FOR J = 9 TO Ø STEP -1
     : NJ = 1Ø * (J + NI)
     : FOR K = 9 TO Ø STEP -1
4Ø COUNT = COUNT + 1
45 NUM = K + NJ
5Ø D = C(I) + C(J) + C(K) - NUM
55 IF (D<Ø) THEN 65 ELSE IF (D=Ø) THEN PRINT NUM ELSE
    IF (D=1ØØ1) THEN PRINT NUM + 1ØØ1 ELSE IF
    (D=1ØØØ) THEN PRINT NUM + 1ØØØ
6Ø NEXT K
65 NEXT J
7Ø NEXT I
75 PRINT
     : PRINT "NUMBER OF TRIALS = "; COUNT
     : CMD"Z","OFF"
8Ø END
```

The program below which uses string variables in solving mathematical problems was sent by Gary Himler of Granada Hills, California.

```
1Ø N = 1 'START WITH 1
2Ø N$ = STR$(N)  ' CONVERT TO STRING VARIABLE
21 IF LEN(N$) < 5 THEN N$ = "Ø" + N$
     : GOTO 21 'ADD LEADING ZEROES TO MAKE 5 DIGITS
22 N1$ = RIGHT$(N$,4)  ' USE ONLY THE RIGHT HAND FOUR
    DIGITS
25 M = VAL(LEFT$(N1$,1))  'FIND THE 'THOUSANDS' DIGIT
3Ø H = VAL(MID$(N1$,2,1)) 'FIND THE 'HUNDREDS' DIGIT
4Ø T = VAL(MID$(N1$,3,1)) 'FIND THE 'TENS' DIGIT
5Ø U = VAL(RIGHT$(N1$,1)  'FIND THE 'UNITS' DIGIT
6Ø S = M[3 + H[3 + T[3 + U[3 'GET THE SUM OF THE
    CUBES OF THE DIGITS
7Ø IF INT(S) = INT(N) THEN LPRINT "ONE ANSWER IS "N
8Ø N = N + 1  'INCREMENT THE NUMBER BY 1
9Ø IF N > 2916 THEN END ELSE 2Ø  'REPEAT UNTIL N =
    2916
1ØØ 'THE HIGHTEST 4-DIGIT NUMBER IF 9999, AND THE SUM
    OF ITS CUBES IS 2916 THEREFORE, THERE IS NO
11Ø 'POINT IN GOING FURTHER. THE HIGHEST 5-DIGIT
12Ø 'NUMBER IS 99999, AND THE SUM OF ITS CUBES IS
13Ø '3645 SINCE THIS IS ONLY A 4-DIGIT NUMBER IT IS
14Ø 'IMPOSSIBLE FOR THE SUM OF THE CUBES TO EQUAL
15Ø 'THE NUMBER.
```

Another solution to problem 3 came from M.N. Dailey of Port Orchard, Washington, who says that he had first attempted to utilize the up arrow exponent function but found that that function returns a single precision number and will not recognize the whole number value of variables. His program takes approximately 47 seconds to run.

Dr. Andree's Note: Actually the ↑ function is seldom used by experienced programmers working on integer (whole number) problems since N↑E is computed as EXP (E*LOG(N)) which is both wasteful of computing time and inaccurate since both EXP( ) and LOG( ) involve approximations. The result of N↑E may not be an integer even if both N and E are integers.

```
1Ø CLS
     : A = 1
     : B = Ø
     : C = Ø
2Ø IF (A*A*A) + (B*B*B) + (C*C*C) = A * 1ØØ + B * 1Ø
   + C THEN PRINT A;B;C;
3Ø C = C +1
4Ø IF C = 1Ø THEN GOSUB 1ØØ
5Ø IF B = 1Ø THEN GOSUB 2ØØ
6Ø IF A = 1Ø THEN END ELSE GOTO 2Ø
1ØØ C = Ø
     : B = B + 1
     : RETURN
2ØØ B = Ø
     : A = A + 1
     : RETURN
```

The end result would look like this:

```
153          37Ø          371          4Ø7
```

Dr. Andree's Note: Several solvers limited their search to the 3-digit integers, which is a good start. However, a true microRESEARCH problem buff would have expanded the search to show that 0, 1, 153, 370, 371, 407 are the only integers $N \geq 0$ such that the sum of the cubes of the digits of N equals N no matter how many digits N may have.

CompuServe Offers Financial Products and Business Services

Editor's Note: The CompuServe Information Service is one of the largest information and entertainment services available to owners of personal computers and computer terminals. With each issue of TRS-80 Microcomputer News, various features of CompuServe will be discussed. The CompuServe Information Service is sold at Radio Shack stores nationwide and in Canada.

WE'VE GOT IT ALL FOR YOU!

To serve all spheres of its subscriber base, CompuServe provides a broad range of business services as well as entertainment services. This range includes stock and commodity news, organizational news disseminated through press releases and research and historical reports.

Some of the financial offerings through the CompuServe network include MicroQuote, Quick Quote, Standard and Poor's General Information File, Value Line Data Base II, Money Market Services, Archer Commodities, Small Business Report, Investment News and Views, Investor Protection Report, and Assets/Liabilities program.

In addition to the financial services CompuServe offers, there are business information features which can help you run your business or learn how someone else is running theirs. Services such as this include the Business Information Wire, FEDWATCH, the AP Viewdata Wire, and the Business Wire.

MICROQUOTE

MicroQuote provides trading statistics and descriptive information on over 40,000 stocks, bonds, and options. MicroQuote is updated daily with historical prices, volumes, and dividends available back to 1-1-74.

When selecting MicroQuote, you have the option of accessing a demonstration program, ordering a MicroQuote manual, or accessing the MicroQuote database. There are no fees other than the connect time used to list out the detailed instructions or to access the demonstration program. Use of the MicroQuote database, however, does have transaction charges associated with it.

There are several programs available in MicroQuote which can be accessed through the prompt, PROGRAM:. The program CUSIP finds a ticker symbol or cusip number (Committee on Uniform Security Identification Procedures) for a security. PRICE lists daily, weekly, and monthly trading statistics or dividends for an issue. All prices include the date, volume, high, low, and cusip number. QUOTES provides pricing information for a group of securities for a single date. MQDATA transfers data to your own microcomputer.

EXAMIN lists descriptive data about an issue such as pricing and dividend history, maturity date, or bond rate. MQUREP creates reports of stocks which pass through 19 predefined screens detecting abnormal price or volume movement. STATS gives descriptive statistics on an issue over a specific time period and QPORT provides a quick means of preparing your own portfolio valuation reports.

QUICK QUOTE

MicroQuote's cousin, Quick Quote, provides high, low, closing, volume, and net change figures on over 9,000 securities traded on the New York, American, and over-the-counter stock exchanges. The material is updated periodically during each trading day. CompuServe does not edit the material included in Quick Quote and is not responsible for its completeness or timeliness.

STANDARD AND POOR'S GENERAL INFORMATION FILE

The Standard and Poor's General Information File provides descriptive and financial information on over 9,000 securities. This service provides a Business Summary which includes the corporate address, telephone number, list of directors, principal officers, and stock transfer agents. The financial information includes the latest figures on net sales and income, three years of earnings-per-share historical data, a five-year earnings-per-share growth rate, and also the current year's estimates when available.

Included in the service is a Product/Service Line Breakdown of what percentage of the total profits or sales is derived from certain products or services. There's also the Important Business Developments section noting activity such as recent contracts awarded to a company or new product developments. Information in Standard and Poor's can be obtained by entering the company name, ticker symbol, or industry code.

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CompuServe offers the Value Line Data Base II which provides current and historical data dating back to 1969. Value Line allows the user to analyze the performance of more than 1,600 major industrial, transportation, utility, retail, banking, and insurance companies.

Information from the Value Line can be retrieved through either the VLREP program or the VLDATA program. The VLREP program prints out condensed financial reports including balance sheets, income statements, sources and uses of funds, key ratios, and forecasts. No prior authorization is required to use VLREP. The VLDATA program provides access to each of 416 accounts. You can obtain earnings estimates, target price forecasts, BETA, sales and earnings

by business line, and precomputed, commonly-used ratios and per share figures.

Users of this service are required to sign an agreement with the product's manufacturer, Arnold Bernhard & Co.

MONEY MARKET SERVICES

This is a multi-national corporation specializing in financial and economic research. Founded in 1974, the company has grown to become the largest supplier of on-line financial forecasting with over 700 institutional clients around the world.

The company's reputation has been distinguished by its expertise in monetary theory and by its forecasts of central banking policies and operations.

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Publications, commodity calendar, announcements, market reports etc.

SMALL BUSINESS REPORTS

Mark Stevens is a nationally syndicated columnist. His column, SMALL BUSINESS, can be found in many major daily newspapers around the country.

INVESTMENT NEWS AND VIEWS

INV is a compendium of advice and information about investment and trading opportunities, particularly, but not always, in the stock market. The services selected are mostly newsletters written by one person and thus reflect the outlook of that person.

INVESTOR PROTECTION REPORT

The INVESTOR PROTECTION REPORT is a biweekly newsletter on the safety of your investments. Investing your money in the multitude of innovative investment options available today takes study and continuous effort. One of the primary factors to consider when making investment decisions is the relative safety of a potential investment. Safety is often the forgotten component of most investment decisions. There is very little information available about safety considerations that affect investments. In an era when financial institutions are failing almost daily, when brokerage firms are going under at a record rate, and when personal bankruptcies are at an all time high, there is an obvious need for this type of information. The INVESTOR PROTECTION REPORT is directed at that need.

ASSETS/LIABILITIES PROGRAM

The Assets/Liabilities program asks you to input answers to questions regarding your personal assets and debts, records this data, and then determines your net worth.

BUSINESS INFORMATION WIRE

Stories are transmitted to the BIW subscribers simultaneously with their transmission to the Canadian Press news wire. Since 1975, the BIW has provided Canadian business and government leaders with up-to-the-minute news and information from across Canada and around the world.

Stories are edited by CP staff with the particular information requirements of the subscribers in mind. The BIW is available electronically through CompuServe or as a hard-copy printer service from Press News, an associate company of CP.

FEDWATCH

This is a unique news bulletin we have recently introduced to the CompuServe marketplace. It is written each Friday afternoon after relevant Federal Reserve data is released. The information and forecasts presented focus on interest rate trends and are therefore crucial to all markets, stocks and commodities as well as bonds. By accessing this information through CompuServe, subscribers are able to read FEDWATCH fully four days in advance of many recipients who receive their copy by mail.

AP VIEWDATA WIRE

The Viewdata Wire is the Associated Press's answer to providing the most up-to-the-minute news to viewdata network. The Viewdata Wire is designed especially for videotex, providing stories tailored to be read on a screen.

Stories focus on national, political and business news, as well as entertainment, feature stories, historical reviews, Washington news, and world news. Over 250 stories are generated during a 24-hour period and include hourly updates.

THE BUSINESS WIRE

Throughout the day the Business Wire provides information from the world of business in the form of press releases, news articles, and other features. Information on hundreds of different companies is transmitted daily to Business Wire subscribers.

Questions and comments about the CompuServe Information Service can be sent to Richard A. Baker, editorial director, or Jacqueline A. Farthing, assistant editorial director, CompuServe Information Service, 5000 Arlington Centre Boulevard, P. O. Box 20212, Columbus, Ohio 43220 or through Feedback, main menu item 5, CompuServe User Information.

Variable Swapping

Steven Kaiser
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Morris Plains, NJ 07950

I would like to submit a short and simple (but practical) program for swapping variables (A for B, C for V, etc.).

```
10 INPUT"VARIABLES TO BE SWAPPED";A,B
20 C=A
30 D=B
40 A=D
50 B=C
60 PRINT"THE VARIABLES HAVE BEEN SWAPPED"
70 END
```

By changing and/or modifying some of the lines, you can put this program to work for many applications. It can work on any TRS-80 tape computer, but will require slight modification to work on the pocket computer (10: INPUT . . .).

Microsoft's™ Multiplan™

Like other electronic worksheets, Multiplan™ replaces the old-fashioned, midnight-oil method of figuring worksheets: pencil and eraser, ledger paper, calculator, and patience, patience, patience. (The Model II/12 version of MultiPlan is catalog number 26-4580 and the Model 16 version is catalog number 26-6480.)

With Multiplan, you set up the worksheet on the computer in rows and columns, just the way you want. You enter the formulas you ordinarily use, such as profit equals SALES – COSTS, in much the same way as you think of them. Then enter the data, such as sales figures and expenses. After that, you do the brainwork, and the computer does the tedious calculations. What if sales rise by 20%? What if inflation boosts the cost of materials by 12%? You can ask yourself these questions, change the critical numbers, and watch the video display as the computer automatically recalculates the worksheet. If you need the results for a report or presentation, the computer can print them out, quickly and neatly.

Multiplan will give you fast access to the information you need to make decisions and will allow you to explore the possibilities of that information. This enables you to take into consideration many possible courses of action. You'll save time and frustration in planning and management—at the office, at home, even in technical and industrial computation.

EASY TO USE

With Multiplan, your worksheet can be as large as 63 columns wide by 255 rows long; you can link it to automatically accept data from or feed information into other worksheets. You can vary the width of the columns to accommodate long words or numbers in one column, shorter ones in the next. And, unlike some similar systems, Multiplan doesn't mind if you type lines of text (such as titles) across several columns.

Some of the work you'll be doing to set up the worksheet will be repetitive, and Multiplan was designed with that in mind. For instance, if you use the COPY command, Multiplan will propose that you do the same thing again. If you want to, you don't have to ask twice; if you don't want to do it again, simply key in what you want. This is a real timesaver.

With Multiplan, you can assign a name to an entry or an area of the worksheet, then refer to that name when entering formulas. On the line you've labeled "PROFIT," for instance, you can enter the formula "SALES – COSTS."

When you have all your data and formulas entered, you can lock the critical formulas and numbers in place, so that they can't be accidentally erased or altered. Then you can ask all the tough questions—you'll get the answers in minutes, not hours. And if other people use your worksheets, the essential parts are protected.

In most cases, your worksheets will be too large to fit on the usual video screen. Your screen is really a "window" on the worksheet, and you can move the window around on top of the page to display different parts. Multiplan lets you open up to eight windows in different parts of the sheet, so you can enter or change data in one part of the worksheet and watch the results in other parts as the sheet is recalculated.

MODELING AND PRESENTATION CAPABILITIES

You can link information in different worksheets. This is an extremely useful capacity. It allows you to instruct the computer to make adjustments automatically on related worksheets when changes are made to a primary sheet. For instance, you can link regional sales forecasts, stored on separate sheets, with the company forecast on a summary sheet. If you change the growth rate in Region One, the company forecast will automatically reflect the change the next time you look at it.

You can sort entries alphabetically or numerically. This can be a powerful way of presenting results, or of contrasting different possibilities. For instance, you can rank all your salespeople according to the amount they've sold that month.

You can present the results of a formula as either numbers or letters. This capability is unique to Multiplan, and it yields some very interesting possibilities for the presentation of your calculations. It can be used to emphasize or clarify the results of, for instance, a regional sales analysis: you could specify that if the sales for Region Four rise above $200,000, the computer will print a message: "Sales in Region Four are spectacular! Give Pat Stockman a bonus." Using Multiplan's conditional (IF-THEN) capability, complex relationships can be analyzed by the computer, and relevant sentences can be chosen and displayed automatically.

You can produce professional-quality printed reports. Multiplan has special formatting, alignment, and printing options that enable you to print out elegant finished reports. Multiplan can automatically break a worksheet into pages, even if it is wider and longer than a page; you just specify the margins you want.

ASSISTANCE FOR A WIDE VARIETY OF PROJECTS

Multiplan is a multipurpose tool, capable of handling a very wide variety of jobs. You can use Multiplan to build a series of worksheets that will do the jobs you have to do: personal or professional financial modeling, forecasting, calculation of engineering or scientific formulas, and much more.

Multiplan allows you to tailor the worksheet to the use you have for it. In a way, it's like programming the computer, but you don't need to know computer languages or programming in order to do it. What you do need to know is your own business and the problems you want to solve. The more you know, the more you'll be able to do with Multiplan—and yet, it's easy to use, even if you've never used a computer before.

BUSINESS ANALYSIS AND FORECASTING

If you're managing a business, small or large, you'll find that Multiplan puts an amazing amount of computer power at your disposal. You can set up a variety of different models or scenarios: simulate decisions and see the effects right away. Even if you have access to a large in-house timeshared system, you'll be impressed by how Multiplan gives immediate answers to tough questions.

Multiplan has built-in mathematical and logical functions that enable it to perform sophisticated calculations and analyses. In addition to the usual math, it will look up values in tables and will calculate NET PRESENT VALUE—the amount of money required now to produce a specified cash flow in the future.

Multiplan will handle:
Cash flow analysis and forecasting
Pricing analysis
Profitability analysis
Purchase/leaseback analysis
Income statements and balance sheet projections
Budget planning and consolidation
Acquisition and merger analysis
Material and labor requirements planning
Manpower assignments
Resource allocation
Vehicle operating costs
and much more

TECHNICAL AND ENGINEERING PROJECTIONS

Multiplan can be used for many kinds of engineering tabulations and data analysis. Multiplan has the math capability to handle some tough jobs. It calculates the usual and not-so-usual functions of SUM, AVERAGE, LOGARITHM (natural and base 10), SQUARE ROOT, STANDARD DEVIATION, and trigonometric functions. It figures Pi to 13 decimal places. And it will handle conditionals—IF-THEN-ELSE, TRUE, FALSE, AND, OR, NOT.

It is expected that Multiplan's technical and scientific applications will increase dramatically, as new users discover its possibilities. For instance, you can set up worksheets for:

Formula analysis
Statistical research
Materials flow analysis
Structural design analysis
Stability and tonnage calculations
Electrical engineering projects such as
linearity analysis

HOUSEHOLD AND PERSONAL FINANCES

Multiplan can easily handle all aspects of household finances. With just a few hours of practice, you'll be able to plan weekly, monthly, and yearly budgets, and see how a few changes in spending affect your total financial picture.

Use Multiplan for:
Comparative mortgage analysis
Personal stock portfolio analysis
Tax and financial planning
Home investment

Notes on Previous Newsletters

APRIL 1982

Linefeed with a Carriage Return

Ed Hamilton
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I enjoy receiving my copy of Microcomputer News each month and feel that it is interesting enough to continue a paid subscription. Accordingly, I would like to contribute a few comments that I feel will increase its value to me and other readers.

In my program "Linefeed with a Carriage Return" for the Color Computer, line 112 was incorrectly printed as "112 MT = MT – 19 + 12"; it should be this: "112 MT = MT – 19 + 2". I had many letters and phone calls from people all over the country asking why their computers would lock up or do all sorts of odd things when they ran it. The "+12" caused the machine-language portion to load beyond the end of memory, so there was garbage at the correct starting location (the "+2" was intended to make things a little clearer about where the code was going).

This problem brings out my first comment. As I mentioned, I got a lot of letters about this article. Every one of them needed a reply, but very few of them included a self-addressed stamped envelope. It would be a great courtesy to other authors if you included a prominent note somewhere in each issue to prospective correspondents to include a SASE (Self Addressed Stamped Envelope) if they contact an author and expect a reply.

Enough for now—thanks for reading this and maybe doing something about my concerns. I'll keep a watch out.

Client Activity Information Array

Arthur J. Avery
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The "Client Activity Information Array", by Kenneth E. Robinson, that was published in the TRS-80 Microcomputer News, April 1982, appeared to be very useful so I adapted it to our Model II and enhanced the program to print the complete matrix along with the "clients" number.

The following procedure is required if the matrix is to be printed using a Model II:

Periods must be entered to make all names the same length.
Line 1206 must state this length.
Every item in the matrix must contain data.
Symbols other than Y or N may be used and will print out as entered.
However, the main program only recognizes Y or Yes, all other characters being identified as NO.

My thanks again to Kenneth E. Robinson for a great program and thanks to my co-worker Alan Arbesman for his help in debugging.

JULY/AUGUST 1982

Color Scripsit Program Pak and the LP VIII

Garrett E. McGowan
3207 Evergreen Avenue
Hopewell, VA 23860

On March 25th I wrote you concerning making the Line Printer VIII work with the Color SCRIPSIT Program Pak. You were kind enough to publish my letter in the July/August 1982 issue. Since that time I have learned an easier way:

1. With the computer ON and the Pak OUT, POKE 65314,54. Then PRINT#-2,CHR$(27);CHR$(NN).

2. Insert the Program Pak, then POKE 65314,55. NOTE: NN selects whichever of the 3 types desired. Make sure to redo Standards, Option 6 at the Main Menu.

On October 8, 1982, I purchased a Color Disk SCRIPSIT and a Color Disk Spectaculator. I must say I'm very well pleased with the SCRIPSIT except for an annoying activation of Drive #1 during RUN"DOS," which sometimes upsets Drive #1 from Loading or Saving. This problem was solved by running DIR1 before running "DOS."

The Disk Spectaculator is an improvement over the Program Pak in that exponentiation permits a much greater number of possibilities. The assignment of variable is also a great help. What is disconcerting is the inability to change the printing width beyond 80 characters, when the LP VIII has the capability for 132 characters. For those wishing to speed up the Printing Process, since adjusting BAUD is not provided for on the DISK, just POKE 150,41 before running "DOS." A PRINT #-2,CHR$(27);CHR$(56) before the RUN "DOS" will get 8 lines to the inch, if desired. Make sure DIP SWITCH #2 on the LP VIII is UP. This will save wearing out the switch when switching from Color Disk SCRIPSIT to Color Disk Spectaculator.

Text Editor

Frederick Boyd
307 Wedgewood Terrace
Dewitt, NY 13214

Thanks for the great word processing programs in the July/August issue. I particularly enjoyed the TEXT EDITOR program for the Color Computer.

After using it for quite a while, I began to become irritated because it chopped off exactly at the specified right margin regardless of whether or not it was in the middle of a word or not. I inserted the following program line to avoid the problem:

```
625 IF LEN(B$)>LW-1Ø AND A1=32 THEN 64Ø
```

When A1 is converted to an ASCII code it becomes the code for the space bar. If the space bar occurs within the last 10 characters of the line, the line is printed and the carriage returned.

I hope you will continue to publish more business type programs for the Color Computer.

NOVEMBER 82

Line Printer Set Up

Gregory A. Drake
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I found "Line Printer Set Up," by William Allen (November, 1982) to be a very useful program. It was written for Line Printers II, IV, and VII, but I modified it for my Line Printer VIII. The program is especially helpful in conjunction with "SCRIPSIT," so I saved it on my "SCRIPSIT" diskette. This allows quick access to the program whenever you want to change letter types in a word processing text. The modified program was written to run in Model III Disk BASIC. However, it can be altered to run on computers without disk BASIC, by changing line 160 from CMD "S" to END. The CMD "S" allows the user to re-enter the SCRIPSIT mode more quickly.

```
2Ø CLS
    : PRINT"LINE PRINTER SET-UP OPTIONS"
3Ø PRINT"   FOR LINE PRINTER VIII"
    : PRINT
4Ø PRINT"     START UNDERLINE.............1"
5Ø PRINT"     END UNDERLINE...............2"
6Ø PRINT"     PROPORTIONAL SPACING........3"
7Ø PRINT"     START ELONGATION............4"
8Ø PRINT"     END ELONGATION..............5"
9Ø PRINT"     PROPORTIONAL CHARACTER......6"
1ØØ PRINT"     ORDINARY CHARACTER..........7"
11Ø PRINT"     CONDENSED CHARACTER.........8"
12Ø INPUT "ENTER NUMBER OF YOUR CHOICE";A
13Ø ON A GOSUB 21Ø, 22Ø, 23Ø, 24Ø, 25Ø, 26Ø, 27Ø, 28Ø
14Ø CLS
    : INPUT "DO YOU WANT ANOTHER SELECTION (Y OR
    N)"; A$
15Ø IF A$ = "Y" CLS
    : GOTO 4Ø
16Ø CMD "S"
21Ø LPRINT CHR$(15)
    : RETURN
22Ø LPRINT CHR$(14)
    : RETURN
23Ø LPRINT CHR$(27)
    : RETURN
24Ø LPRINT CHR$(27);CHR$(14)
    : RETURN
25Ø LPRINT CHR$(27);CHR$(15)
    : RETURN
26Ø LPRINT CHR$(27);CHR$(17)
    : RETURN
27Ø LPRINT CHR$(27);CHR$(19)
    : RETURN
28Ø LPRINT CHR$(27);CHR$(2Ø)
    : RETURN
```

Bugs, Errors, and Fixes

NOTE TO USERS:

The following changes and corrections are provided for your information. If you have an applications program which is working correctly, you should probably NOT make any changes to it, unless we specifically direct you to by mail. All Customer Service Bulletins (outlined in the "Software Maintenance" article in this issue) will contain the phrase "This is a Required Modification" or "This is an Optional Modification". It is up to you to decide whether or not to apply an optional modification, however, you should always implement a required modification regardless of your past experience with a package. The error it prevents may be just around the corner, and the modification could save you many hours of frustration.

If you feel that changes should be made, but you do not feel qualified to make the change yourself, please contact your local Radio Shack Computer Center or Expanded Computer Department for assistance. If you do not have access to one of these stores, then you may want to call Computer Customer Service in Fort Worth for assistance.

PATCHES

PATCHes are entered from TRSDOS READY and are used to make corrections to files stored on the disk.

1. Before making a PATCH, back up the diskette that requires modification and make the PATCHES to the backup copy of the diskette.
2. Apply PATCHES according to the information given in your TRSDOS manual.

Color Computer

COLOR X-PAD (26-1196) Version 1.0

Several lines of the program on pages 49-51 require changes.

THE FOLLOWING LINE CHANGES ARE REQUIRED!

Open your Color X-Pad manual to page 49, Appendix E/Template/Menu Demonstration Program.

Delete Line 430, replacing it with the following two lines.

Line:

```
430 If "A">A$ or "Z"<A$ THEN 350
```

Line:

```
440 DRAW AZ$(ASC(A$)-65)
```

Recommended change to Line 380:

Line:

```
380  ON S GOSUB 2900,2900,530,780,2900,2900,2900,
     2900,2900,2900,2900,890,2900,2900,2900,2900
```

Turn to page 50 in your manual. Make the following changes.

Line:

```
1560 IF X<=0 THEN 1600
```

Line:

```
1600 IF Y<=0 THEN 1640
```

COLOR X-PAD MANUAL (26-1196) Version 1.0

The program on page 22 of Owner's Manual (Area Routine) is not coming up with consistent answers.

THE FOLLOWING LINE CHANGES ARE REQUIRED!

Make the following line changes in your Color X-Pad Manual.

Line:

```
100 AT=AT+A1:GOTO60
```

Line:

```
150 A2=INT(A2*100)/100
```

Model I/III

ACCOUNTS PAYABLE (26-1554) Version 3.1

After setting up with no password, an attempt to re-enter setup will cause an illegal function call to occur.

THE FOLLOWING LINE CHANGE IS REQUIRED!

The problem is corrected by following the steps listed below.

1. Backup the diskette(s) and make the changes on the Backup copy of the program.
2. In BASIC load the program by typing LOAD"SETUP".
3. Make the following corrections:

Line:

```
96 NEXT:IFP$>""AND P$<"A"THEN91ELSEFP$="1"
    :GOSUB80:GOSUB81
```

4. Type SAVE"SETUP" to save the changes in the program.
5. At TRSDOS READY, make a backup copy of the corrected diskette.

SURVEYING (26-1577) Version 1.0

The area calculation is inaccurate in the lot area program.

THESE LINE CHANGES ARE REQUIRED!

The problem is corrected by following the steps listed below.

1. In BASIC, load the program by typing CLOAD.
2. Make the following corrections:

Line:

```
11210 IFS+.1>RANDS-.1<RTHENAT=AT-A2ELSE11240
```

Line:

```
11240 AT=AT+A2
```

4. Type CSAVE"A" to save the changes in the program to a new tape.
5. Make a backup copy of the corrected tape.

Pocket Computer 1

AVIATION (26-3513) Version 1.0

The wind direction is calculated incorrectly.

THE FOLLOWING LINE CHANGES ARE REQUIRED!

The problem is corrected by following the steps listed below.

1. In BASIC, load the program by typing CLOAD"AVPACKI".
2. Make the following corrections:

NOTE: Replace incorrect equations in lines 24 and 25. Change line 25 FIRST to release enough memory for changes to line 24.

Line:

```
25 J=J+18Ø+18Ø*(B<Ø)+X
```

Line:

```
24 W=O-X:B=U*COS W-Z:G=U*SIN W:I= √(BB+GG)
   :J=Ø:IFB<>ØLETJ=ATN(G/B)
```

4. Type CSAVE"AVPACKI" to save the changes in the program to a new tape.
5. Make a backup copy of the corrected tape.

STATISTICAL ANALYSIS (26-3522) Version 1.0

The sum of squares of data is calculated incorrectly. The program is actually calculating the sum of the squares of the differences between the data and the mean.

THE FOLLOWING LINE CHANGES ARE REQUIRED!

The problem is corrected by following the steps listed below.

1. Load the program by typing CLOAD"DS".
2. Make the following corrections:

Line:

```
6 "H"GOSUB15:PRINTC:END
```

Line:

```
15 C=GG:FORD=8TOA:C=C+A(D)*A(D):NEXTD:RETURN
```

4. Type CSAVE"DS" to save the changes in the program.

ENGINEERING MATH III (26-3527) Version 1.0

A syntax error occurs when polynomials are evaluated at negative numbers.

THE FOLLOWING LINE CHANGES ARE REQUIRED!

The problem is corrected by following the steps listed below.

1. In BASIC, load the program by typing CLOAD"PCALC".
2. Make the following corrections:

Line:

```
21Ø M=A(1):FORZ=2TO1Ø:R=1:S=R:IFV<ØLETS=-1:IF(Z-1)/2
   <>INT((Z-1)/2)LETR=-1
```

4. Type CSAVE"PCALC" to save the changes in the program to a new tape.
5. Make a backup copy of the corrected tape.

Model II

TRSDOS-II (26-4150) Version 4.1

Correction 1.

The "I" command does not work correctly. This problem occurs when swapping diskettes.

THESE PATCHES ARE REQUIRED.

The following "PATCH" sequence will remedy this situation.

```
PATCH SYSRES/SYS R=15 B=88 F=2Ø3BC5
                           C=C52Ø39
PATCH SYSRES/SYS R=15 B=99 F=29
                           C=2A
PATCH SYSRES/SYS R=15 B=1Ø8 F=Ø911198ØE
                            C=Ø3C3981D
PATCH SYSRES/SYS R=3Ø B=37 F=ØØØØØØØØØØØØØØØØ
                           C=D51198ØEEDAØEDA8
PATCH SYSRES/SYS R=3Ø B=45 F=ØØØØØØØØØØØØØØ
                           C=4E23462BC37AØE
PATCH SYSRES/SYS R=15 B=116 F=1814EDAØEDA8
                            C=4E23462BD5ØØ
PATCH SYSRES/SYS R=15 B=141 F=E5
                            C=D1
PATCH SYSRES/SYS R=15 B=145 F=36FFE1
                            C=C3A71D
PATCH SYSRES/SYS R=3Ø B=52 F=ØØØØØØØØØØØØØØ
                           C=36FF6Ø69C38AØE
PATCH SYSRES/SYS R=15 B=148 F=C1545D7E23666F
                            C=545D7E23666FC1
```

Correction 2.

The distribution version of the SAVE utility on TRSDOS 4.1 does not properly handle diskettes with flawed sectors. When a flawed sector is encountered, the program performs an infinite number of attempts to write to that sector.

The following patch corrects the situation to allow the SAVE utility to handle flawed diskettes.

THE FOLLOWING PATCH IS REQUIRED!

1. At TRSDOS Ready, apply the following patch.

```
PATCH SAVE R=18 B=119 F=CDCF39DD36Ø1Ø2C5
                      C=C5CDCF39DD36Ø1Ø2
```

2. Make a backup copy of the corrected diskette.

Correction 3.

BACKUP will make a floppy disk unusable when a single drive backup is done. This is accomplished by, BACKUP 0 0 or similar method. The correct error messages are given, but the disk is modified anyway.

The patches below will still give the correct error messages but will prevent the disk from being modified.

THE FOLLOWING PATCHES ARE REQUIRED!

1. At TRSDOS Ready, apply the following patches to correct the problem.

```
PATCH BACKUP R=1 B=65 F=41 C=4D
PATCH BACKUP R=1 B=71 F=41 C=4D
PATCH BACKUP R=1 B=77 F=41 C=4D
PATCH BACKUP R=2 B=113 F=217F3218Ø3217Ø32CD672C21
                       C=216733Ø1ØØØ1CDAA2CCD952B
PATCH BACKUP R=2 B=125 F=6733Ø1ØØØ1CDAA2CCD952B
                       C=217F3218Ø3217Ø32CD672C
```

2. Make a backup copy of the patched diskette.

Correction 4.

Unexpected results are encountered with TERMINAL when going "on-line" with Dow Jones and CompuServe.

THESE PATCHES ARE OPTIONAL!

1. Patch one is used to eliminate Terminal flagging parity errors.

```
PATCH TERMINAL R=6 B=54 F=2ØØC C=ØØØØ
```

2. Patch two should be applied to terminal to eliminate the screening of special control characters. To install this, execute the following at the TRSDOS READY prompt.

```
PATCH TERMINAL R=8 B=35 F=7F C=ØØ
```

3. Patch three is optional. Currently, Terminal uses a table to determine if a character should or should not be filtered. Below is a reproduction of the filter table.

```
R= 8

B= 244          1B, Ø1, Ø2, Ø3, Ø4, Ø5, Ø6
B= 251          Ø7, ØB, ØC, ØE, ØF, 1Ø

R= 9

B= 1            11, 12, 13, 14, 15, 16, FF
B= 8            FF, 1E, 1F, FF, FF, FF, FF
B= 15           FF
```

If the user wished to filter or avoid filtering a character, he should patch the above table. Any value other than FFH indicates that the character indicated in that location is to be filtered. A value of FFH is just a place holder for values to be added.

For example:

```
PATCH TERMINAL R=8 B=244 F=1B C=FF
```

tells Terminal not to filter a 1BH (1BH clears the screen and homes the cursor). To restore the filtering of 1BH, the following patch should be applied.

```
PATCH TERMINAL F=8 B=244 F=FF C=1B
```

Correction 5.

Using the ATTRIB command from TRSDOS-II, the message Access Privilege appears. The word "privilege" is misspelled. The following patch will correct the problem.

THE FOLLOWING PATCH IS OPTIONAL!

At TRSDOS Ready, apply the following patch.

```
PATCH SYSTEM/SYS R=15 B=187 F=65 C=69
```

GENERAL LEDGER (26-4501) Version 2.0

The number of print lines on TRANSACTION DETAIL REPORT varies if "NO ACTIVITY ACCOUNTS" are included on the report. (Please note that it is valid for number of print lines per page to vary from 1-3 lines for other reasons.)

THE FOLLOWING LINE CHANGE IS OPTIONAL!

The problem is corrected by following the steps listed below.

1. Backup the diskette(s) and make the changes on the Backup copy of the program.
2. In BASIC load the program by typing LOAD"Txreport".
3. Make the following corrections:

Line:

```
125Ø IFCVI(Y$(7))=ØTHENLPRINT" ":L=L-1:ELSELPRINTTAB
     (56)"TOTAL"TAB(62);:IN#=TL#:GOSUB51ØØ:LPRINT" "
```

4. Type SAVE"Txreport" to save the changes in the program.
5. At TRSDOS READY, make a backup copy of the corrected diskette.

ACCOUNTS PAYABLE (26-4505) Version 1.0/2.0

The print check module incorrectly handles the first approval of checks and the decision regarding the need of a second printing.

THE FOLLOWING LINE CHANGES ARE REQUIRED!

The problem is corrected by following the steps listed below.

1. Backup the diskette(s) and make the changes on the Backup copy of the program.
2. In BASIC load the program by typing LOAD"APCHECKS/BAS".
3. Make the following corrections:

Line:

```
4Ø1Ø W7=1:CF=Ø:WD=Ø:FORW9=1TOGT:G#(W9)=Ø:NEXT
```

4. Type SAVE"APCHECKS/BAS" to save the changes in the program.
5. At TRSDOS Ready, make a backup copy of the corrected diskette.

VERSAFILE (26-4510) Version 2.0.4

A BS (Subscript out of range) Error occurs in 1420. In addition to correcting the BS error, these line changes will allow multiple key word searches.

THE FOLLOWING LINE CHANGES ARE REQUIRED!

The addition of lines 1372-1376 will allow multiple key word searches by using '+' instead of a space, as in 'BONANZA+OF+MONTH', which will be treated as a single match of 'BONANZA OF MONTH' for the search.

Addition of line 1407 will cause searches which generate over 350 matches to display the first 350 and continue.

The problem is corrected by following the steps listed below.

1. Backup the diskette(s) and make the changes on the Backup copy of the program.
2. In BASIC load the program by typing LOAD"VERSA/BAS".
3. Add the following lines:

Line:

```
1372 FORY=1TOZ-1
```

Line:

```
1374 YY=INSTR(K(Y),"+"):IFYY>ØTHENMID$(K(Y),YY)="
     ":GOTO1374
```

Line:

```
1376 NEXT
```

Line:

```
14Ø7 IFZ=35ØTHENGOSUB165Ø:Z=1:FORYY=1TO35Ø:E(YY)=""
     :Y(YY)=Ø:NEXT:E(1)=" "
```

4. Type SAVE"VERSA/BAS" to save the changes in the program.
5. At TRSDOS READY, make a backup copy of the corrected diskette.

PROFILE PLUS (26-4515) Version 1.0

When expanding a data base, you may encounter a DISK FULL condition. IF you subsequently provide new disk space and try to expand the data base again, you may lose data.

THIS PATCH IS REQUIRED!

At TRSDOS READY apply the following patch to your PROFILE PLUS diskette.

```
PATCH EXPAND/EFC A=3A97 F=FEFFCA C=CB7FC2
```

1. If you have NOT applied the incorrect patch stated in CSB 4515-04, then apply the correct patch stated above.
2. If you HAVE applied the incorrect patch stated in CSB 4515-04, then perform the following procedure.
   a. Apply the following patch:

```
PATCH EXPAND/EFC A=3A98 F=CF C=7F
```

b. Enter the Profile main menu (from TRSDOS READY) by typing
M ⟨ENTER⟩
c. Expand your existing data bases (one at a time) by typing
6 ⟨ENTER⟩
Respond to the data base name prompt with the name of your data base, then type ⟨ENTER⟩
In response to the prompt requesting How Many Additional Records, type ⟨ENTER⟩
d. Repeat step c as many times as necessary to expand your remaining data bases.

ACCOUNTS/RECEIVABLE SERIES I (26-4554) Version 1.2

When adding a new customer, the default value displayed for DATE OF LAST DR and DATE OF LAST CR is incorrect.

THE FOLLOWING LINE CHANGES ARE REQUIRED!

The problem is corrected by following the steps listed below.

1. Backup the diskette(s) and make the changes on the Backup copy of the program.
2. In BASIC load the program by typing LOAD"AR/BAS".
3. Make the following corrections:

Line:
```
445 MO$=MID$(STR$(MO),2)
```
Line:
```
446 IF LEN(MO$)<>2 THEN MO$="Ø"+MO$
```
4. Type SAVE"AR/BAS" to save the changes in the program.
5. In BASIC load the program by typing LOAD"ARCF/BAS".
6. Make the following corrections:

Line:
```
1Ø3Ø DD#=Ø:GOSUB5Ø24Ø:T$=MKI$(-NN):GOSUB5Ø2Ø5
     :LSETA$(Ø)=KE$:LSETA$(1)=""
```
Line:
```
12Ø8Ø GOSUB 514ØØ:II$=R$: GOSUB 5Ø225: LSET A$(I)=
     MKI$(NN): RETURN    'DATE
```
Line:
```
5Ø225 YR=VAL(RIGHT$(II$,2)): MO=VAL(LEFT$(II$,2)):
     DA=VAL(MID$(II$,4,2)): NN=INT(YR*365.25+.75)
     +MO(MO)+DA-18263:IF (YR MOD 4)<>Ø AND MO>2 THEN
     NN=NN-1
```
7. Type SAVE"ARCF/BAS" to save the changes in the program.
8. At TRSDOS READY, make a backup copy of the corrected diskette.

Model 16/Enhanced II

COBOL DEVELOPMENT SYSTEM (26-6100) Version 1.0

The following two patches need to be applied to 26-6100 prior to your attempting to use it.

Model 16 and Enhanced Model II: Apply these patches to the single-sided diskette labeled COBOL DEVELOPMENT SYSTEM.

THESE PATCHES ARE REQUIRED!

STEPS TO FOLLOW

1. Backup the diskette to be patched.
2. At TRSDOS-II Ready, type:
```
PATCH RUNCOBOL/SYS R=2 B=199 F=Ø1 C=Ø2
```
3. Check the patch on the screen with the patch above for the first patch and with the patch in step 6 for the second patch. Backspace and make corrections if necessary.
4. Press ⟨ENTER⟩.
5. The screen should display PATCH COMPLETE and then TRSDOS-II Ready.
6. At TRSDOS-II Ready, type:
```
PATCH RUNCOBOL/SYS R=23 B=22Ø F=44 C=45
```
7. Repeat steps 3-5 for patch number two.
8. Backup the patched diskette.

COBOL RUNTIME (26-6101) Version 1.0

The following two patches need to be applied to 26-6101 prior to your attempting to use it.

Model 16 and Enhanced Model II: Apply these patches to the single-sided diskette labeled COBOL RUNTIME.

THESE PATCHES ARE REQUIRED!

STEPS TO FOLLOW

1. Backup the diskette to be patched.
2. At TRSDOS-II Ready, type:
```
PATCH RUNCOBOL/SYS R=2 B=199 F=Ø1 C=Ø2
```
3. Check the patch on the screen with the patch above for the first patch and with the patch in step 6 for the second patch.
Backspace and make corrections if necessary.
4. Press ⟨ENTER⟩.
5. The screen should display PATCH COMPLETE and then TRSDOS-II Ready.
6. At TRSDOS-II Ready, type:
```
PATCH RUNCOBOL/SYS R=23 B=22Ø F=44 C=45
```
7. Repeat steps 3-5 for patch number two.
8. Backup the patched diskette.

GENERAL LEDGER (26-6201) Version 1.0

The following two patches need to be applied to 26-6201 prior to your attempting to use it.

Model 16: Apply these patches to the double-sided diskette labeled PROGRAMS.

Enhanced Model II: Apply these patches to the single-sided diskettes labeled PROGRAMS #1, PROGRAMS #2, and PROGRAMS #3.

THESE PATCHES ARE REQUIRED!

STEPS TO FOLLOW

1. Backup the diskette to be patched.
2. At TRSDOS-II Ready, type:
```
PATCH RUNCOBOL/SYS R=2 B=199 F=Ø1 C=Ø2
```
3. Check the patch on the screen with the patch above for the first patch or with the patch in step 6 for the second patch.
Backspace and make corrections if necessary.
4. Press ⟨ENTER⟩.
5. The screen should display PATCH COMPLETE and then TRSDOS-II Ready.
6. At TRSDOS-II Ready, type:
```
PATCH RUNCOBOL/SYS R=23 B=22Ø F=44 C=45
```

7.Repeat steps 3-5 for patch number two.
8. Backup the patched diskette.

ACCOUNTS RECEIVABLE (26-6204) Version 1.0

The following two patches need to be applied to 26-6204 prior to your attempting to use it.

Model 16: Apply these patches to the double-sided diskette labeled PROGRAMS.
Enhanced Model II: Apply these patches to the single-sided diskettes labeled PROGRAMS #1, PROGRAMS #2, and PROGRAMS #3.
THESE PATCHES ARE REQUIRED!
STEPS TO FOLLOW

1. Backup the diskette to be patched.
2. At TRSDOS-II Ready, type:

```
PATCH RUNCOBOL/SYS R=2 B=199 F=Ø1 C=Ø2
```

3. Check the patch on the screen with the patch above for the first patch or with the patch in step 6 for the second patch.
   Backspace and make corrections if necessary.
4. Press ⟨ENTER⟩.
5. The screen should display PATCH COMPLETE and then TRSDOS-II Ready.
6. At TRSDOS-II Ready, type:

```
PATCH RUNCOBOL/SYS R=23 B=22Ø F=44 C=45
```

7. Repeat steps 3-5 for patch number two.
8. Backup the patched diskette.

ACCOUNTS PAYABLE (26-6205) Version 1.0

The following two patches need to be applied to 26-6205 prior to your attempting to use it.

Model 16: Apply these patches to the double-sided diskette labeled PROGRAMS.
Enhanced Model II: Apply these patches to the single-sided diskettes labeled PROGRAMS #1, PROGRAMS #2, and PROGRAMS #3.
THESE PATCHES ARE REQUIRED!
STEPS TO FOLLOW

1. Backup the diskette to be patched.
2. At TRSDOS-II Ready, type:

```
PATCH RUNCOBOL/SYS R=2 B=199 F=Ø1 C=Ø2
```

3. Check the patch on the screen with the patch above for the first patch or with the patch in step 6 for the second patch.
   Backspace and make corrections if necessary.
4. Press ⟨ENTER⟩.
5. The screen should display PATCH COMPLETE and then TRSDOS-II Ready.
6. At TRSDOS-II Ready, type:

```
PATCH RUNCOBOL/SYS R=23 B=22Ø F=44 C=45
```

7. Repeat steps 3-5 for patch number two.
8. Backup the patched diskette.

ORDER ENTRY (26-6207) Version 1.0

The following two patches need to be applied to 26-6207 prior to your attempting to use it.

Model 16 & Enhanced Model II: Apply these patches to the single-sided diskettes labeled PROGRAMS #1, PROGRAMS #2, and PROGRAMS #3.
THESE PATCHES ARE REQUIRED!
STEPS TO FOLLOW

1. Backup the diskette to be patched.
2. At TRSDOS-II Ready, type:

```
PATCH RUNCOBOL/SYS R=2 B=199 F=Ø1 C=Ø2
```

3. Check the patch on the screen with the patch above for the first patch or with the patch in step 6 for the second patch.
   Backspace and make corrections if necessary.
4. Press ⟨ENTER⟩.
5. The screen should display PATCH COMPLETE and then TRSDOS-II Ready.
6. At TRSDOS-II Ready, type:

```
PATCH RUNCOBOL/SYS R=23 B=22Ø F=44 C=45
```

7. Repeat steps 3-5 for patch number two.
8. Backup the patched diskette.

SALES ANALYSIS (26-6208) Version 1.0

The following two patches need to be applied to 26-6208 prior to your attempting to use it.

Model 16 & Enhanced Model II: Apply these patches to the single-sided diskette labeled PROGRAMS #1.
THESE PATCHES ARE REQUIRED!
STEPS TO FOLLOW

1. Backup the diskette to be patched.
2. At TRSDOS-II Ready, type:

```
PATCH RUNCOBOL/SYS R=2 B=199 F=Ø1 C=Ø2
```

3. Check the patch on the screen with the patch above for the first patch or with the patch in step 6 for the second patch.
   Backspace and make corrections if necessary.
4. Press ⟨ENTER⟩.
5. The screen should display patch complete and then TRSDOS-II Ready.
6. At TRSDOS-II Ready, type:

```
PATCH RUNCOBOL/SYS R=23 B=22Ø F=44 C=45
```

7. Repeat steps 3-5 for patch number two.
8. Backup the patched diskette.

JOB COSTING (26-6209) Version 1.0

The following two patches need to be applied to 26-6209 prior to your attempting to use it.

Model 16 and Enhanced Model II: Apply these patches to the single-sided diskette labeled PROGRAMS #1.
THESE PATCHES ARE REQUIRED!
STEPS TO FOLLOW

1. Backup the diskette to be patched.
2. At TRSDOS-II Ready, type:

```
PATCH RUNCOBOL/SYS R=2 B=199 F=Ø1 C=Ø2
```

3. Check the patch on the screen with the patch above for the first patch or with the patch in step 6 for the second patch.
   Backspace and make corrections if necessary.
4. Press ⟨ENTER⟩.
5. The screen should display PATCH COMPLETE and then TRSDOS-II Ready.
6. At TRSDOS-II Ready, type:

```
PATCH RUNCOBOL/SYS R=23 B=22Ø F=44 C=45
```

7. Repeat steps 3-5 for patch number two.
8. Backup the patched diskette.

Robot Battle

Adventures in Programming

Article by Bruce W. Elliott

Robot Battle, a new Program Pak™ for TRS-80 Color Computers with at least 16K RAM, may be one of those programs you buy as an educational tool and give to your kids as a game. Here is the program overview from the Robot Battle manual:

> Color Robot Battle is an enjoyable introduction to the concepts and procedures of programming. The fun of video games and the thrill of discovery combine to make this program unique and rewarding.
>
> Two robots are at your command. Tell them how and where to move, how to react to situations around them, when to fire lasers and missiles, when to stay and fight and when to run! You can even program them to dance!
>
> The preferred approach to this program would be for two people to program one robot each, then challenge the other person's program in battle. Enjoy the challenges of computer programming while playing an exciting game with a friend, or by yourself.
>
> Program offensive and defensive robots. Improve on your programs as you learn. However you play, with Color Robot Battle you'll finish a winner!

The basic idea behind Color Robot Battle is that two robots live in Robot Land. Each of the robots begins life with two things: a limited amount of energy and a program which determines how the robot will live its life.

Your part in robot land is two fold: to provide the program for one of the robots to live (or die) by, and then to sit back and watch as the robots execute their programs.

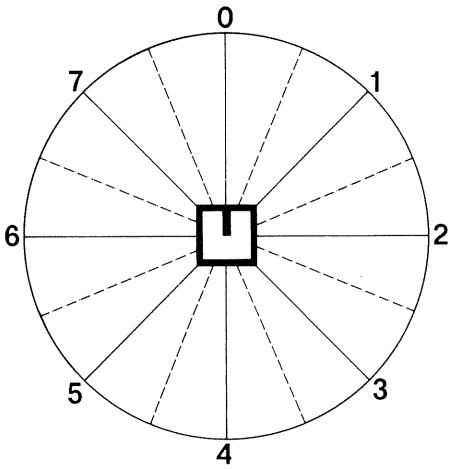

Figure 1. *In this figure, the robot is facing straight up (octant zero). If you programmed it to turn two octants clockwise (T2), it would turn twice and stop at octant 2. If, while facing zero, you programmed T-2, the robot would turn two octants counterclockwise and stop at octant 6. If you programmed the robot to face a specific direction (D2, for example), it would turn to octant 2 by way of the shortest route.*

One of the things that I find particularly fascinating about this program is that once you have programmed the robots they can receive no further instructions from you.

This means that you have to create a program which can help your robot survive anything the other robot might do. Each of the robots operates independently and under the control of its own program. Not only do you learn the rudiments of programming, you also begin to learn how to build programs which can "take care of themselves." The term my computer instructors used was "defensive" programming. All of this in a fun atmosphere of moving robots, crazy sounds, and dwindling energy reserves.

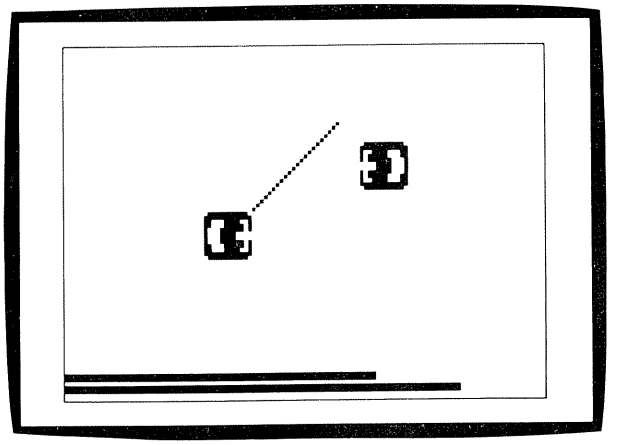

Figure 2. *Robots in battle with varying energy levels.*

SOME BACKGROUND

Robot Battle assumes that Robot Land is a battlefield on which the two robots fight to the death of one. In the beginning each robot is supplied with 62 units of energy. Here is a table which shows how energy is consumed:

When a Robot:	The Cost in Energy Units is:
Is hit by a missile	2.00
Is hit by a laser	0.20
Runs into a wall	0.33
Runs into a robot	0.40
Shoots a missile	0.33
Shoots a laser	0.10

Ultimately, one robot will run out of energy altogether. The screen will change color; the winning robot springs into a "victory dance," fires lasers in all directions and spins in circles.

GLOSSARY OF ROBOT COMMANDS

Commands on the same line must be separated

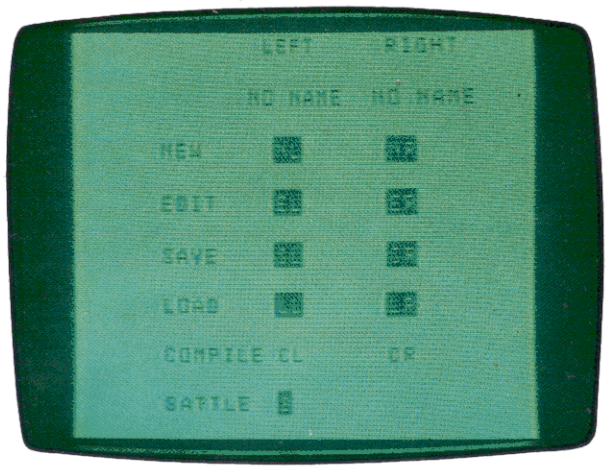

Photo 1. *Robot Battle Menu*

by a colon. Example—F2:R8.

= True.

= (conditional) Continue processing this line if the conditional is true.

=? or #? Randomly evaluates a condition to be true (=?) or not true (#?) and carries out the command approximately half of the time. Neither the programmer nor the opponent knows when the condition will be true or false.

=M If there is a missile in this octant . . .

=R If there is a robot in this octant . . .

=S Is anything out there?

=W If there is a wall within sensory range . . .

Not true.

(conditional) Continue processing this line if the conditional is false.

#M If there is not a missile in this octant . . .

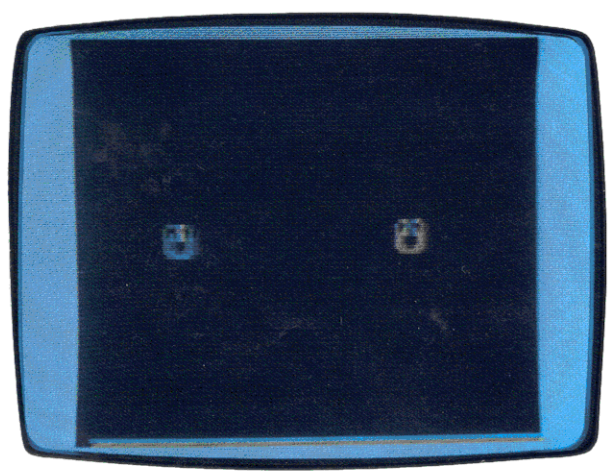

Photo 2. *Two Robots in battle*

#R If there is not a robot in this octant . . .

#W If there is not a wall in sensory range . . .

B(n) Backward n steps (Robots may take from one to eight steps in one move.) Example—B2

C Call a line. Example—CLINE.

D(0-7) Face direction (octant) 0 through 7. Example—D6.

F(n) Forward n steps. Example—F2.

G Go to a line. Example—GLINE.

H(n) Halt n "clicks" (robot time units.) Example—H8.

L(n) Left n steps. Example—L3.

M Missile

R Robot

R(n) Right n steps. Example—R8.

S Sensory mechanism scans in all directions.

START〉 Unique label which always marks the beginning point of a program using labels.

T(n) Turn clockwise n octants. Example—T2.

T(-n) Turn counterclockwise n octants. Example—T-2.

W Wall

XL Fire a laser.

XM Fire a missile.

ROBOT BATTLE TOOLS

To assist the Robot Battle programmer, the program provides you with an editor, compiler, the ability to save

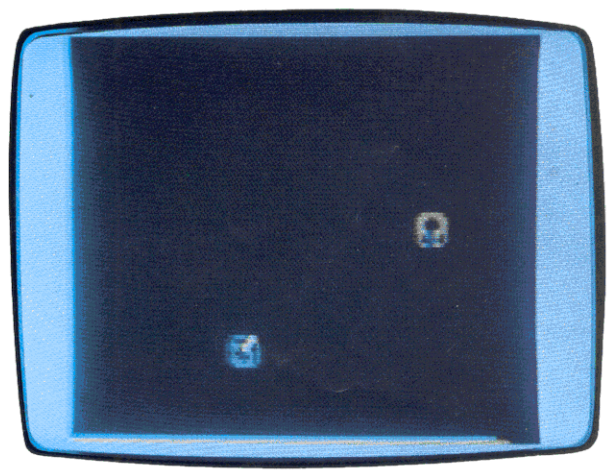

Photo 3. *Missile fired*

programs to and load programs from tape. You can comment your programs (as all good programmers do) and print them on a Color Computer compatible printer such as the DMP-100. And, just to personalize things a bit, you can name your robots.

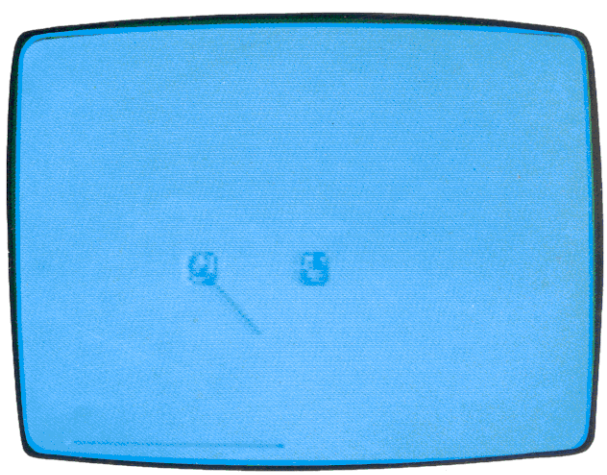

Photo 4. *Robot Victory Dance*

Radio Shack Computer Center Addresses and Telephone Numbers

ALABAMA

BIRMINGHAM 2426 Green Springs Hwy., (205) 945-0792
HUNTSVILLE 1400 N. Memorial Pkwy., (205) 536-1581
MOBILE 405 Bel-Air Blvd., (205) 471-1617
MONTGOMERY #24 Union Square S/C, (205) 271-1500

ARIZONA

PHOENIX 10233 Metro Pkwy E., (602) 861-1124; 4301 N. 7th Ave., (602) 277-3031
SCOTTSDALE 2525 N. Scottsdale Rd., (602) 990-2241
TEMPE 83 E. Broadway, (602) 894-2065
TUCSON 5622 E. Broadway, (602) 748-0101; Campbell Plaza, 2830 N. Campbell Ave., (602) 881-8003

ARKANSAS

LITTLE ROCK Town & Country S/C, University & Asher, (501) 568-5694

CALIFORNIA

ANAHEIM 509 Katella, (714) 776-9540
BAKERSFIELD 2018 Chester Ave., (805) 323-8074
BERKELEY 1922 Grove St., (415) 848-9170
BEVERLY HILLS 8500 Wilshire Blvd., (213) 659-8870
BREA Imperial Shopping Center, 391 South State College, (714) 671-1681
CANOGA PARK 8371 Topanga Canyon, (213) 347-9800
CARMICHAEL 6305 Fairoaks Blvd., (916) 484-6815
CHICO 1834 Mangrove Ave., (916) 894-0101
CHULA VISTA 1201 3rd Ave., (714) 420-3810
CITRUS HEIGHTS 7405 Green Back Ln. at San Juan, (916) 723-5183, 969-8752
DOWNEY 8031 Florence Ave., (213) 927-7882
ESCONDIDO 347 W. Mission Ave., (714) 741-6032
FREMONT Fremont Hub, 39114 Fremont, (415) 790-1112
FRESNO Princeton S/C, 2721 N. Blackstone Ave., (209) 225-5551
GARDEN GROVE 12821 Knott St., (714) 891-1160
GLENDALE 226 N. Brand Blvd., (213) 246-9310
HAYWARD 24784 Hesperian Blvd., (415) 887-6420
HOLLYWOOD 6922 Hollywood Blvd., (213) 466-8681
LAKEWOOD 5830 Lakewood Blvd., (213) 920-9671
LA MESA 5346 Jackson Dr., (714) 460-3610
LONG BEACH 2119 Bellflower Blvd., (213) 597-3377
LOS ANGELES 740 S. Olive St., (213) 629-2455
MODESTO 221 McHenry Ave., (209) 521-1011
MONTCLAIR 5237 Arrow Hwy., (714) 625-1541
MONTEREY 484 Washington St., (408) 375-8430
MOUNTAIN VIEW 1933 El Camino Real W., (415) 961-0542
OAKLAND 1733 Broadway, (415) 763-3183
PASADENA 575 S. Lake Ave., (213) 449-5424
PLEASANT HILL 508 G. Contra Costa Blvd., (415) 676-9866
RIVERSIDE 3844 La Sierra Ave., (714) 689-0340
SACRAMENTO 4749 J. St., (916) 454-3287
SAN BERNARDINO 764 Inland Center Dr., (714) 884-6871
SAN DIEGO 3062 Clairemont Dr., (714) 276-6050; 3902 El Cajon Blvd., (714) 280-0227
SAN FRANCISCO One Market Place, (415) 777-9810; 2920 Geary Blvd., (415) 221-8716
SAN JOSE 1228 S. Bascom Ave., (408) 297-2603
SAN MATEO 3180 Campus Dr., (415) 573-8607
SANTA ANA 2320 S. Fairview St. (at Warner), (714) 966-2787
SANTA BARBARA 4141 State St. A-1, (805) 967-4538
SANTA FE SPRINGS 14138 East Firestone Blvd., (213) 921-0702
SANTA MONICA 511 Wilshire Blvd., (213) 458-1802
SANTA ROSA 823 4th St., (707) 542-0402
SHERMAN OAKS 14936 Ventura Blvd., (213) 788-2639
STOCKTON College Sq. S/C, 963 West March Lane, (209) 957-3676
TARZANA 18545 Ventura Blvd., (213) 343-1696
TORRANCE 3840 Sepulveda at Hawthorne, (213) 373-0306
VENTURA 4005 E. Main St., (805) 654-0196
WEST COVINA 2516 E. Workman St., (213) 915-5791

COLORADO

BOULDER Arapahoe Plaza, 3550 Arapahoe, (303) 443-7142
COLORADO SPRINGS 4341 N. Academy, (303) 593-7500
DENVER 8000 E. Quincy, (303) 770-1362; Green Briar Plaza, 7075 Pecos, (303) 428-6787
LAKEWOOD 2099 Wadsworth Blvd., (303) 232-6277

CONNECTICUT

EAST HAVEN 51 Frontage Rd., (203) 467-8864
FAIRFIELD 1196 Kings Hwy. & Rt. 1, (203) 255-6099
HARTFORD The Richardson Bldg., 942 Main St., (203) 549-5717
MANCHESTER 228 Spencer St., (203) 649-8210
NORWALK Rt. 7-345 Main Ave., (203) 846-3418
ORANGE Woolco S/C, 538 Boston Post Rd., (203) 795-1291
WATERBURY 105 Bank St., (203) 573-8800
WATERFORD 122 Boston Port Rd., (203) 443-0716
WEST HARTFORD 39 S. Main St., (203) 523-4283

DELAWARE

DOVER Edgehill Shop. Ctr., Rt. #13, (302) 734-5223
WILMINGTON 3847 Kirkwood Hwy., (302) 999-0193

DISTRICT OF COLUMBIA

WASHINGTON 1800 M St. NW., (202) 822-3933

FLORIDA

ALTAMONTE SPRINGS 766 B. East Altamonte Dr., (305) 339-1313
BOCA RATON 1662 N. Federal Hwy., (305) 391-3308
CLEARWATER 2460-D US 19 North, (813) 797-3223
DAYTONA BEACH Volusia Plaza, (904) 255-5909
FT. LAUDERDALE 4368 N. Federal Hwy., (305) 772-6797
FORT MYERS Edison Mall, (813) 939-3454
FORT PIERCE Center West Shopping Center, U.S. Hwy 1, (305) 466-2200
GAINESVILLE 3315 Archer Rd., (904) 375-7063
HOLLYWOOD 429 S. State Rd. #7, (305) 966-4382
JACKSONVILLE 8252 Arlington Expnwy., (904) 725-2594; Roosevelt Mall, Roosevelt Blvd., (904) 388-6611
LAUDERDALE LAKES 4317-25 N. State Rd. 7, (305) 486-2240
MIAMI 9459 S. Dixie Hwy., (305) 667-2316; 1601 Biscayne Blvd., (305) 374-6433, 15 SE. 2nd Ave., (305) 374-7310; 20761 S. Dixie Hwy., (305) 238-2518
N. MIAMI BEACH The Promenade, 1777 N.E. 163rd St., (305) 940-6867
ORLANDO 1238 E. Colonial Dr., (305) 894-0570
ST. PETERSBURG 3451 66th St. N., (813) 381-2366
SARASOTA 5251 S. Tamiami Tr. (Hwy 41), (813) 923-4721
TALLAHASSEE 2529 S. Adams, (904) 222-4440
TAMPA 4555 W. Kennedy, (813) 879-7470; 1825 E. Fowler Ave., (813) 971-1130
W. PALM BEACH 2271-A Palm Beach Lakes Blvd., (305) 683-3100

GEORGIA

AUGUSTA 3435 Wrightsboro Rd., (404) 738-5998
ATLANTA 2108 Henderson Mill, (404) 939-9888; 49 W. Paces Ferry, (404) 231-9604; Akers Mill S/C, 2937 Cobb Parkway NW., (404) 955-5235; 113 Peachtree St., (404) 223-5904
COLLEGE PARK 5309 Old National Hwy., (404) 761-3055
COLUMBUS Columbus Square Mall, 3050 Macon Rd., (404) 568-7200
DORAVILLE 5697 Buford Hwy., (404) 458-2891
SAVANNAH Chatham Plaza, 7805 Abercorn St., (912) 355-6074

IDAHO

BOISE 691 S. Capitol Blvd., (208) 344-5450

ILLINOIS

AURORA 890 North Lake St., (312) 844-2224
CHICAGO 4355 S. Archer Ave., (312) 376-7617; CNA Plaza, 309 S. Wabash, (312) 922-0536; 72 West Adams, (312) 236-7262; 524 N. Michigan Ave., (312) 822-0533; 101 W. Washington St. at Clark, (312) 782-7207
ELMWOOD PARK 7212 W. Grand Ave., (312) 452-7500
FAIRVIEW HEIGHTS #4 Market Place, (618) 398-6410
HOMEWOOD/GLENWOOD 329 Glenwood Lansing, (312) 758-0440
JOLIET 2415 W. Jefferson St., (815) 744-7080
LaGRANGE One S. LaGrange Rd., (312) 482-3484
LIBERTYVILLE 1350 S. Milwaukee Ave., (312) 367-8230
LOMBARD 4 Yorktown Center, (312) 629-5350
NILES 8349 Golf Rd., (312) 470-0670
OAK LAWN 4815 W. 95th St., (312) 425-9130
PEORIA 4125 N. Sheridan Rd., (309) 685-7056
ROCKFORD North Town S/C, 3600 N. Main St., (815) 282-1001
SCHAUMBURG 651 Mall Dr., (312) 884-8600
SPRINGFIELD Sherwood Plaza, 2478 Wabash, (217) 787-3066

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EVANSVILLE 431 Diamond Ave., (812) 426-1715
FT. WAYNE 747 Northcrest S/C, (219) 482-9547
GRIFFITH 208 W. Ridge Rd., (219) 838-3000
INDIANAPOLIS 6242 E. 82nd St., Castleton Plz., (317) 849-6896; Speedway Plaza, 6129 B Crawfordsville, (317) 244-2221; 10013 E. Washington St., (317) 898-4887; Two W. Washington St., (317) 236-9991
TERRE HAUTE 3460 U.S. Hwy. 41 S., (812) 234-3212

IOWA

CEDAR RAPIDS 111 First Ave., S.E. (Downtown), (319) 362-7399
DAVENPORT 616 E. Kimberly Rd., (319) 386-3457
DES MOINES 7660 Hickman Rd., Sherwood Forest S/M, (515) 270-0193

KANSAS

OVERLAND PARK 8619 W. 95th, (913) 642-1301
TOPEKA White Lakes Plaza, West Tower, 3715 Plaza Dr., (913) 267-6420
WICHITA 2732 Blvd. Plaza S/C, (316) 681-1212

KENTUCKY

FLORENCE 7727 Mall Rd., (606) 371-2811
LEXINGTON 2909 Richmond Rd., (606) 269-7321
LOUISVILLE 2900 Taylorsville Rd., (502) 459-9901; Louisville Galleria, (502) 589-1013

LOUISIANA

BATON ROUGE 7007 Florida Blvd., (504) 928-5260
HOUMA 2348 W. Park Ave. (Hwy. 24), (504) 873-7713
LAFAYETTE University Square at Congress Blvd., (318) 235-6177
METAIRIE 3750 Veterans Hwy., (504) 454-3681
NEW ORLEANS 327 St. Charles Ave., (504) 523-6408
SHREVEPORT 1545 Line Ave., (318) 221-5125

MAINE

BANGOR Maine Square, (207) 945-6491

MARYLAND

BALTIMORE 7942 Belair Rd., Putty Hill Plaza, (301) 882-9583; 115 N. Charles St. at Lexington, (301) 539-7251
BETHESDA 7900 Wisconsin Ave., (301) 656-0892
CATONSVILLE One Mile West S/C, 6600 B Balt. Nat'l. Pike, (301) 788-3277
FREDERICK Shoppers World, Rt. 40W, (301) 695-8440
NEW CARROLLTON-LANHAM 7949 Annapolis Rd., (301) 459-8030
PASADENA 8120 Ritchie Hwy., (301) 544-2352
ROCKVILLE Congressional Plaza, 1673 Rockville Pike, (301) 984-0424
SALISBURY Shoppers World S/C, Rt. 50, (301) 546-9223
TEMPLE HILLS 4520 St. Barnabas Rd., (301) 899-0740
TOWSON-LUTHERVILLE Yorktown S/C York Rd. at Ridgley Rd., (301) 561-2001

MASSACHUSETTS

BOSTON 730 Commonwealth Ave., (617) 739-1704, 111 Summer St., (617) 542-0361
BRAINTREE South Shore Plaza, 250 Granite St., (617) 848-9290
BROCKTON 675 Belmont, (617) 583-2270
BURLINGTON Crossroads Plaza, Rt. 3 S., (617) 229-2850
CAMBRIDGE Harvard Square, 28 Boylston St., (617) 354-7694
CHESTNUT HILL 200 Boylston St., (617) 969-2031
NATICK 1400 Worcester Rd., (617) 875-8721
SAUGUS 343 Broadway, (617) 233-4985
SPRINGFIELD 1985 Main St., Northgate Plz., (413) 732-4745
WORCESTER Lincoln Plaza, (617) 852-8844

MICHIGAN

ANN ARBOR 2515 Jackson Rd., (313) 761-6266
BIRMINGHAM 3620 W. Maple Rd., (313) 647-2151
DEARBORN Westborn Shop. Ctr., 23161 Michigan Ave., (313) 274-6161
DETROIT DWNTN 1559 Woodward Ave., (313) 961-8855
FLINT 63298 Miller Rd., Yorkshire Plaza, (313) 732-2530
GRAND RAPIDS 3142 28th St. SE., (616) 957-2040
KALAMAZOO 25 Kalamazoo Center, (616) 343-0780
LANSING 2519 S. Cedar St., (517) 372-1120
PLAINFIELD North Kent Mall, (616) 364-7558
LIVONIA 33470 W. 7 Mile Rd., (313) 476-6800
ROSEVILLE 31873 Gratiot Ave., (313) 296-6210
SOUTHFIELD 17651 West 12 Mile Rd., (313) 569-1027
TROY Oakland Plaza, 322 John R. Rd., (313) 585-3900

MINNESOTA

BLOOMINGTON 10566 France Ave. S., (612) 884-1641
GOLDEN VALLEY Golden Valley S/C, 8016 Olson Memorial Hwy., (612) 542-8471
ST. PAUL 6th & Wabasha, (612) 291-7230

MISSISSIPPI

JACKSON 979 Ellis Ave., (601) 352-5001

MISSOURI

DES-PERES 11960 Manchester Rd., (314) 965-5911
FLORISSANT 47 Florissant Oaks S/C, (314) 921-7722
INDEPENDENCE 1325 S. Noland Rd., (816) 254-3701
KANSAS CITY 4025 N. Oak Trafficway, (816) 455-3381
ST. ANN 10472 St. Charles Rock Rd., (314) 428-1400
SPRINGFIELD 2684 S. Glenstone, (417) 883-4320

NEBRASKA

OMAHA 3006 Dodge St., (402) 346-4003

NEVADA

LAS VEGAS Commercial Center, 953 E. Sahara #31-B, (702) 731-3956
RENO 3328 Kietzke Lane, (702) 826-6327

NEW HAMPSHIRE

MANCHESTER Hampshire Plaza, 1000 Elm St., (603) 625-4040
NASHUA 429 Amherst St., Rt. 101A, (603) 881-8588

NEW JERSEY

BRIDGEWATER 1472 U.S. Highway 22 East, (201) 469-3232
E. BRUNSWICK 595 A Rt. 18, (201) 238-7142
E. HANOVER Rt. 10, Hanover Plaza, (201) 884-1200
LAWRENCEVILLE Rt. 1 & Texas Ave., (609) 771-8113
NEWARK 595 Broad, (201) 622-1339
NORTHFIELD 322-24 Tilton Rd., (609) 645-7676
PARAMUS 175 Rt. 17 S., (201) 262-1920
SPRINGFIELD Rt. #22 Center Isle, (201) 467-9827
VOORHEES 35 Eagle Plaza, (609) 346-0600

NEW MEXICO

ALBUQUERQUE 2108 San Mateo NE., (505) 265-9587

NEW YORK

ALBANY Shoppers Pk., Wolf Rd., (518) 459-5527
BAYSHORE 1751 Sunrise Hwy., (516) 666-1800
BETHPAGE 422 N. Wantagh Ave., (516) 822-6403
BROOKLYN 531 86th St., (212) 238-3576
BUFFALO 839 Niagara Falls Blvd., (716) 837-2590
FRESH MEADOWS 187-12 Horace Harding Exp., (212) 454-1075
GARDEN CITY 960 Franklin Ave., (516) 294-3350
JOHNSON CITY Giant Shopping Center, Harry L. Drive, (607) 729-6312
KINGSTON Kings Mall, Rt. 9W, (914) 336-6262
MELVILLE TSS Mall, Rt. 110, (516) 673-4646
NEWBURGH Zayre Plaza, Rt. #17K, (914) 561-2960
NEW ROCHELLE 242 North Ave., (914) 636-0700
NEW YORK 385 Fifth Ave., (212) 889-1345; 139 E. 42nd St., (212) 953-6053; 19 W. 23rd St., (212) 691-1861; 347 Madison Ave., (212) 867-8650; 270 Park Ave. South, (212) 533-0470; 1282 Broadway, (212) 279-9260; 9 Broadway, (212) 482-8200
NIAGARA FALLS Pine Plaza, 8351 Niagara Falls Blvd., (716) 283-2041
REGO PARK 97-77 Queens Blvd., (212) 897-5200
ROCHESTER 3000 Winton Rd., (716) 244-5400
SCARSDALE 365 Central Park Ave., (914) 472-2520
SPRING VALLEY White House Center, 88 W. Rt. 59, (914) 425-2828
STATEN ISLAND 2409 Richmond Ave., (212) 698-3100
SYRACUSE 2544 Erie Blvd., (315) 446-3017; Hotel Syracuse, 510 S. Warren St., (315) 471-6663
UTICA Riverside Mall, (315) 735-1933
VALLEY STREAM Green Acres Shop. Ctr., (516) 872-6460

NORTH CAROLINA

CHARLOTTE 3732 Independence Blvd., (704) 535-6320; Tyvola Mall, 5401 South Blvd., (704) 527-3373
DURHAM South Square Mall, (919) 493-4025
FAYETTEVILLE Eutaw Shopping Center, 815 Elm St., (919) 483-2418
GREENSBORO 3718 High Point Rd., (919) 294-5529
RALEIGH Townridge Sq., Hwy. 70 W., (919) 781-9380
WINSTON-SALEM 629 Peters Creek Pkwy., (919) 722-0030

OHIO

AKRON Fairlawn Plaza, 2727 W. Market St., (216) 836-9303
BEDFORD HEIGHTS 5217 Northfield Rd., (216) 662-2477
CANTON 5248 Dressler Rd. NW., (216) 494-7230; Mellet Plaza, 3826 W. Tuscarawas, (216) 478-1878
CENTERVILLE 2026 Miamisburg-Centerville Rd., (513) 435-5167
CINCINNATI 9725 Montgomery, (513) 793-8688; 16-18 Convention Way (on Skywalk), (513) 381-4664
CLEVELAND 419 Euclid (Dwntwn), (216) 575-0800; 27561 Euclid Ave., (216) 289-6823
COLUMBUS 862 S. Hamilton, Great Eastern S/C, (614) 864-2806; The Patio Shop. Ctr., 4661 Karl Rd., (614) 436-4666; 400 N. High St., (614) 464-2781
DAYTON Northwest Plaza, 3279 West Siebenthaler, (513) 277-6500
FAIRFIELD 7255 Dixie Hwy. (1/4 Mi. North of I-275), (513) 874-5994
NORTH OLMSTED Great Northern S/C, (216) 734-2255
PARMA 7551 W. Ridgewood Dr., (216) 842-4030
TOLEDO 5844 W. Central Ave., (419) 531-5797
YOUNGSTOWN Union Square Plaza, 2543 Belmont Ave., (216) 744-4541

OKLAHOMA

OKLAHOMA CITY 4732 SE 29th St., (405) 670-4561; Springdale S/C, 4469 NW 50th, (405) 943-8712; 1101 SW 59th St., (405) 634-2406
TULSA 7218 & 7220 E. 41st St., (918) 663-2190

OREGON

EUGENE 390 Coburg Rd., (503) 687-0082
PORTLAND 7463 SW Barbur Blvd., (503) 246-1157; 9131 SE Powell, (503) 777-2223, 3rd and Washington Sts. (Downtown), (503) 241-7024
SALEM Salem Plaza, 403 Center, (503) 588-7095

PENNSYLVANIA

ALLENTOWN Crest Plaza S/C, Cedar Crest Blvd. US 22, (215) 395-7155
BALA CYNWYD 67 E. City Line Ave., (215) 668-9950
EASTON 25th St. Shopping Center, (215) 250-0160
ERIE 5755 Peach St., (814) 868-5541
HARRISBURG Union Deposit Mall, Union Deposit Rd. #17, (717) 564-6753
LANCASTER Park City Plaza, US 30, (717) 393-5817
MONROEVILLE 3828 Wm. Penn Hwy., (412) 823-3400
MONTGOMERYVILLE Airport Sq., Rt. 309, (215) 362-1200
PHILADELPHIA 7542 Castor Ave., (215) 342-2217; 1002 Chestnut St., (215) 923-3080; 1801 Market St., 10 Penn Center, (215) 568-0901
PITTSBURGH 5775 Baptist Rd., Hills Plaza, (412) 831-9694; 303 Smithfield St., (412) 391-3150; 4643 Baum Blvd., (412) 681-4000; 4768 McKnight Rd., (412) 364-4342
SCRANTON 206 Meadow Ave., (717) 348-1801
WYOMISSING Berkshire Mall West, 1101 Woodland Rd., (215) 372-8610

PUERTO RICO

HATO REY 243 Franklin D. Roosevelt Ave., (809) 759-8248

RHODE ISLAND

E. PROVIDENCE 850 Waterman Ave., (401) 438-2860
PROVIDENCE 177 Union St., (401) 831-0320

SOUTH CAROLINA

COLUMBIA Old Sears Bldg., 1001 Harden St., (803) 799-2065
GREENVILLE N. Hills S/C, (803) 292-1835
N. CHARLESTON 5900 Rivers Ave., (803) 747-5580

TENNESSEE

CHATTANOOGA 636 Northgate Mall, (615) 870-1366
JOHNSON CITY Peerless Center, (615) 282-6829
KNOXVILLE Cedar Bluff S/C, 9123 Executive Park Dr., (615) 690-0520
MEMPHIS 4665 American Way, (901) 795-4963; 1997 Union Ave., (901) 278-7935
NASHVILLE 2115 Franklin Pike, (615) 298-5484; Rivergate Plaza, (615) 859-3414

TEXAS

AMARILLO Wellington Sq. S/C, 1619 S. Kentucky, (806) 358-4567
ARLINGTON 2500 E. Randol Mill, Suite 113, (817)
AUSTIN 8764 E. Research Blvd., (512) 459-4238; South Mall, 1501 Ben White Blvd., (512) 447-0371
BROWNSVILLE 1639 Price Rd. (Hwy. 77), (512) 544-6800
BEAUMONT 5330 Eastex Frwy., (713) 898-7000
COLLEGE STATION 2414 Texas Ave., South, (713) 764-8171
CORPUS CHRISTI 1711 S. Staple St., (512) 887-8901
DALLAS 15340 Dallas Pkwy., Suite 1100, (214) 934-0275; 2930 W. Northwest Hwy., (214) 350-4144; 1517 Main St., (214) 760-8601; 2588 Royal Ln., (214) 484-9947
EL PASO 9515 Gateway West, (915) 594-8211
FT. WORTH 231 One Tandy Center, (817) 335-7198; 2801 Alta Mere, (817) 738-0251
HARLINGEN 1514 S. Hwy 77, Sunshine Strip, (512) 425-8890
HOUSTON 2110 FM 1960, (713) 444-7006; 10543 Gulf Fwy., (713) 943-9310; 5900 North Fwy., (713) 699-1932; 6813 SW Fwy., (713) 777-7907; 809 Dallas St., (713) 651-3002; Holland Square Center, 10920 East Freeway, (713) 453-0600; Champion Forest Plaza, Champion Forest Dr. and F.M. 1960 West, (713) 580-1404; 1018 Gessner, (713) 984-9600
HURST Northeast Mall, (817) 284-1518
LAREDO 102 East Calton Rd., (512) 727-4768
LUBBOCK 3625 34th St., (806) 793-1467
ODESSA 1613 "A" East 8th Street, (915) 334-8355
RICHARDSON Fleetwood Sq. S/C, 202 W. Campbell Rd., (214) 669-1494
SAN ANTONIO 6018 West Ave., (512) 344-8792; 4249 Centergate, (512) 657-3958; Riverbend Parking Garage, 211 E. Market St. at Presa, (512) 225-0345

UTAH

OGDEN K-Mart Shopping Center, 3672 Wall Ave., (801) 394-1666
MURRAY 6051 S. State Ave., (801) 268-8978
SALT LAKE CITY 301 South State St., (801) 322-5526

VIRGINIA

ALEXANDRIA 3425 King St. at Quaker Ln., (703) 820-2600
ARLINGTON Crystal City, 2301 So. Jefferson Davis Hwy., (703) 521-7479
FAIRFAX Westfair Center, 11027 Lee Hwy., (703) 273-6500
LYNCHBURG Hill's Plaza, Ward's Rd., (804) 237-1664
NEWPORT NEWS Newmarket South Shop. Ctr., (804) 245-8203
NORFOLK 5731 Poplar Hall Dr., (804) 461-0798; Wards Corner, 122 E. Little Creek Rd., (804) 588-7548
RICHMOND Willow Lawn S/C, 1617 Willow Lawn Dr., (804) 282-3453; 7728 Midlothian Turnpike, (804) 272-8803
ROANOKE Franklin Bldg., 3561 Franklin Rd. S.W., (703) 342-6335
ROSSLYN 1911 N. Ft. Myer Dr. at Rt. 29, (703) 243-5955

WASHINGTON

BELLEVUE Crossroads Mall, North East 8th & 156 St., (206) 644-1804
BELLINGHAM 1111 Cornwall Ave., Suite B & C, (206) 676-0811
FEDERAL WAY 33505 Pacific Hwy. South, (206) 838-6830
OLYMPIA 106 N. Wilson, (206) 754-6111
SEATTLE 18405 Aurora Ave. N., (206) 542-6184; 1521 3rd Ave., (206) 447-1959; 5030 Roosevelt Way NE, (206) 527-1019
SPOKANE 7702 N. Division, (509) 484-7000; E. 12412 Spr., (509) 922-2800
TACOMA 7030 S. Sprague, (206) 473-7333
TUKWILA 15425 53rd Ave. S., (206) 248-3710
YAKIMA 1111 N. First St., (509) 248-9667

WEST VIRGINIA

HUNTINGTON 2701½ 5th Ave., (304) 523-3527

WISCONSIN

APPLETON 2310 West College Ave., (414) 731-6424
MADISON 57 West Towne Mall, (608) 833-6130
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