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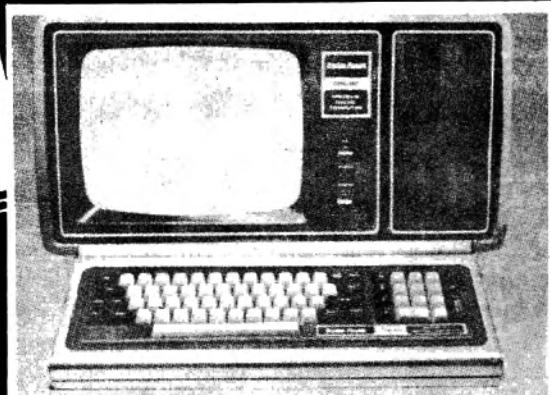
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RADIO SHACK COMPUTER OWNERS

TRS-80TM MONTHLY NEWS MAGAZINE

- PRACTICAL APPLICATIONS
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- EDUCATION
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- NEW PRODUCTS
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- . . . AND MORE

- SIMPLE STATISTICS
- THE AMAZING BLACKJACK
- MACHINE
- ASSEMBLY LANGUAGE FOR
- BEGINNERS
- MODEL I TO MODEL II
- PROGRAM CONVERSION
- RS LINE PRINTER III
- DISABLING THE BREAK KEY
(PART II)
- NEW CLASSIFIED ADS





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NEWSLETTER INFORMATION

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THE PURPOSE OF THE TRS-80 MONTHLY NEWS MAGAZINE IS TO PROVIDE AND EXCHANGE INFORMATION RELATED TO THE CARE, USE AND APPLICATION OF THE TRS-80 COMPUTER SYSTEM.

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SUBSCRIPTIONS ARE \$24 PER YEAR (\$30 PER YEAR CANADA AND MEXICO, \$36 PER YEAR OUTSIDE OF THE UNITED STATES, CANADA AND MEXICO—AIR MAIL). BACK ISSUES ARE AVAILABLE (\$2 PER ISSUE).

HAVE ANY URGENT QUESTIONS? WE HAVE TELEPHONE HOURS—9 A.M.-5 P.M. OTHER TIMES, LEAVE A MESSAGE ON OUR ANSWERING MACHINE. WE WILL PROMPTLY RETURN ALL CALLS (COLLECT).

***ADDITIONAL WORD PROCESSOR INSTRUCTIONS APPEAR IN THE APRIL, 1979 EDITION.

***ADDITIONAL MEMORY TEST INSTRUCTIONS APPEAR IN THE JULY, 1979 EDITION.

LOCAL TRS-80 CLUBS

THE COMPUTER CLUB OF ORLANDO (FLORIDA) — Contact M. Scott Adams — (305) 862-6917.

TRS-80 USER'S GROUP OF CHICAGO (ILLINOIS) — Contact John C. Longstreet, 1201 W. Chase Avenue, Chicago, Illinois 60626 or call 761-2742

THE SOLANO TRS-80 USER'S CLUB — Fairfield, California — Contact Dave or Steve Irwin — (707) 422-3347.

TRS-80 USER'S GROUP OF WALNUT CREEK (CALIFORNIA) — Contact John Snyder, 712-C Country Wood, Walnut Creek, California 94598 or call (415) 938-9669.

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TRS-80 BUG INC. OF FLORIDA — Contact Larry J. Harrell, 2100 N. Atlantic Avenue-402, Cocoa Beach, Florida 32931 or call (305) 784-0456.

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WYOMING VALLEY COMPUTER CLUB — Contact Art Prutzman, 302 Wyoming Avenue, Kirigston, PA 18704 or call (717) 287-1014.

VENTURA COUNTY TRS-80 COMPUTER CLUB — Contact Nick Sharp, 2534 North Temple Avenue, Camarillo CA 93010.

CRESCENT CITY COMPUTER CLUB — write to P.O. Box 1097, University of New Orleans, New Orleans LA 70122.

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BITS AND PIECES

by
HOWARD Y. GOSMAN

YOUR SUBSCRIPTION HAS EXPIRED IF...

THE NUMBER ABOVE YOUR NAME AFTER THE DASH ON YOUR MAILING LABEL IS 16 (OR LESS). THE NUMBER FOLLOWING THE DASH TELLS YOU THE LAST ISSUE THAT YOU WILL RECEIVE. For example, if your subscription number is 16429-16, your subscription expires with this issue (ISSUE #16).

HELP WANTED

WE DO NEED MONTHLY WRITERS FOR COLUMNS IN THE NEWSLETTER. ANYONE INTERESTED WOULD BE PAID ON A MONTHLY BASIS. POSSIBLE COLUMNS ARE BUSINESS, SOFTWARE REVIEW, BEGINNERS CORNER, EDUCATION, LEARNING DISK BASIC...OR ANY TITLE YOU FEEL WOULD BE OF INTEREST TO THE MAJORITY OF READERS. Columns can include both articles and programs. We are not looking for articles or programs that are above the heads of most TRS-80 owners (although we don't exclude technical articles and programs). The majority of TRS-80 owners are first time computer users. We are looking for people who will write programs or articles monthly. Our size is increasing rapidly and we need your help for continued growth.

SOFTWARE CATALOG NUMBER 4

SOFTWARE CATALOG NUMBER 4 will be mailed before March. It will include both MODEL I and MODEL II programs. If you don't have a copy of SOFTWARE CATALOG #3, send us a post card along with your subscription number (you will not get one if your subscription number is not included).

CORRECTIONS TO THE DATA MANAGEMENT SYSTEM

The following corrections are necessary on the DATA MANAGEMENT SYSTEM appearing in the October issue and on our FREE cassette.

ADD: 3225 LPRINTCHR\$(138)
CHANGE TO: 3220 IFI<NFTHEN IF PJ=1 THEN IF "I+1">0
 THEN 3020

3150 IFPJ>1THEN3170
3170 IFAT(I)="N"THEN3200
3180 LPRINTB;A(I,J);:GOTO3220
3240 K=K+1:IFK<=I2THEN3110

ADDITIONAL CHANGES (NOT ERRORS-PROGRAM IMPROVEMENTS):
320 FORI=0TOMF:AT(I)=""":D(I)=""":
2750 FORI=0TONF:IFAT(I)>"N"THEN2780

DISABLING THE BREAK KEY

We previously published a method for disabling the BREAK KEY. Here's an easier method that will work with either cassette or disk systems:

POKE 16396,23

If the above statement is part of your program, the BREAK KEY is disabled. The only way you can get out of your program is to make an entry which will cause the program to break and display an error code (that can be avoided by using the ON ERROR STATEMENT) or to PRESS the RESET button. It's a perfect addition to any user oriented program. This will prevent a user from accidentally BREAKING out of a program.

The above tip was reprinted from TIPS FOR TRICKS WITH LEVEL II BASIC by Chris Gundlach, 618 Hal Greer Blvd., Huntington WV and was originally published by the TRS-80 USERS GROUP NEWSLETTER.

HAVE YOU INSTALLED YOUR CASSETTE MODIFICATION YET?

RADIO SHACK has a modification that will eliminate tape loading problems. The MOD (called XRX-III) will allow you to easily load tapes at almost any volume level. The price is \$13 installed (the MOD already comes on the newest CPU's.).

TCS

TCS is a TRS-80 USERS GROUP that publishes a small, but worthwhile Newsletter. \$1 and a stamped-self addressed envelope should get you on their mailing list. Write to TCS, P.O. Box 10281, Norfolk VA 23513.

MODEL II MINI-REVIEW

If you were thinking about buying the MODEL II, but weren't sure about it...BUY IT. IT'S GREAT!! Our friend DAN (RADIO SHACK COMPUTER MANAGER in Bergen Mall, New Jersey) has already managed to efficiently transfer MODEL I programs to MODEL II by way of the RS-232 interface. He has easily translated programs such as the RS General Ledger, GSF, Inventory Control, etc. He says that the only programs that are hard to transfer are machine language programs that require the video display. By the way, MODEL II requires the video display. By the way, MODEL II requires the video display. In most cases, MODEL II programs, transferred from MODEL I work with little or

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no alterations.

COMPUTER SCIENCE JOBS

According to the WALL STREET JOURNAL, computer science grads entered the work force this year with an average salary of \$15,400...that was 29% over a year ago. The increase is attributed to the growing demand due to cheaper technology making computers more affordable to more businesses. U.S. NEWS AND WORLD REPORT says, "more than anything else, the 1980's will be the golden age of the computer."

THE RADIO SHACK LINE PRINTER III

We recently sold our RADIO SHACK LINE PRINTER I (the CENTRONICS 779) and purchased the new RS LINE PRINTER III. The new line printer has some good...and some bad points. On the bad side, unlike the LINE PRINTER I, the LINE PRINTER III will not print variable size letters. It does print two letter sizes (all the program printouts in this Newsletter were printed using the LINE PRINTER III). This means that if you previously set up your forms using the variable type on the LINE PRINTER I, you have to make some adjustments in your program so that the LINE PRINTER III will work properly with your business forms. The LINE PRINTER III also lacks variable spacing. This is especially important when you use the ELECTRIC PENCIL for word processing. The ELECTRIC PENCIL justification option adds spaces to each line of text so that the right margins are even. On a printer with proportional spacing, it will enter a space of less than a character (1/2 character, 1/16 character, etc.). On the LINE PRINTER III, only full spaces can be inserted.

The LINE PRINTER III has more outstanding features than problems. It is lightning fast and appears to be extremely reliable. Our invoices that used to take 15 seconds to enter, now take about 2 or 3 seconds. We weren't worried about proportional spacing since we use the printer mainly with our business forms. The upper-lower case is very acceptable for use on forms (it is not a business letter quality printer, but can be used to write business letters if IBM quality isn't essential). The printer is bidirectional which makes it even quicker (it prints a line of text on the way back from the margin). Its ten characters per inch print is standard on most printers and almost all business forms...so after a small modification of our programs, it worked perfectly. We purchased the LINE PRINTER III, rather than the CENTRONICS 753 (almost the equivalent model but has proportion spacing at a cost of about \$750 extra) because we were confident that RS service would handle repairs quickly. Each computer center has all the parts necessary to fix the LINE PRINTER III in case there are any problems. The large print option comes in handy for highlighting purposes. The LINE PRINTER III can be used for word processing (writing letters) when IBM quality isn't essential. The lower case is good quality and can give a firm a computer-like image. As you know, we have an additional printer (the IBM SELECTRIC) for use when high quality print is necessary.

As of today (with only 4 weeks of use), we give the LINE PRINTER III an A rating.

If you do purchase the LINE PRINTER III, you should know that the printer should be the first part of your system to be turned on. If you do not turn on your printer, you will not be able to start up your computer system.

WE KEEP GIVING YOU THE SAME WARNING OVER AND OVER AGAIN

ALL READERS SHOULD READ THE LETTER BELOW. WE HAVE BEEN STATING OVER AND OVER AGAIN (IN THE NEWSLETTER) THAT YOU SHOULD BE VERY CAREFUL ON ORDERING ANY TRS-80 COMPATIBLE EQUIPMENT (ESPECIALLY OVER \$100). YOU SHOULD FOLLOW THESE GUIDELINES:

1. NEVER PAY CASH IN ADVANCE OF DELIVERY. A DEPOSIT IS A REASONABLE REQUEST FOR A \$1000 ITEM. IF POSSIBLE USE YOUR CREDIT CARD FOR THE DEPOSIT.

2. IF YOU'RE BUYING EQUIPMENT SUCH AS A DISK DRIVE OR PRINTER, MAKE SURE THAT YOU CAN PLUG IT RIGHT INTO YOUR TRS-80 (TRY TO TALK TO SOMEONE WHO ALREADY HAS ONE). IF NOT, MAKE SURE THAT IT CAN BE RETURNED. IF YOU PAID BY CREDIT CARD...YOU WILL NOT HAVE A PROBLEM GETTING A REFUND. IF YOU PAID CASH...YOU CAN HAVE PROBLEMS.

3. DEAL WITH A RELIABLE COMPANY. H & E COMPUTRONICS, INC. LETS YOU RETURN A DISK DRIVE WITHIN 10-DAYS IF YOU ARE NOT SATISFIED. HOBBY WORLD HAS A SIMILAR GUARANTEE. RELIABLE FIRMS WILL STAND BY THEIR PRODUCT. IF A FIRM OFFERS A MONEY-BACK GUARANTEE...THEY ARE SURE ENOUGH ABOUT THEIR PRODUCTS TO KNOW THAT RETURNS ARE RARE.

4. MAKE SURE THAT IT CAN BE FIXED. FIND OUT WHO WILL FIX IT.

Anyhow, despite our many warnings, we have been receiving numerous letters from purchasers with problems (each one seems to have paid for their equipment in advance and in cash).

The letter reprinted below is a common problem. In order to avoid any legal problems, we have omitted the name of the company involved.

...On April 27, 1979, I bought from COMPANY A a full complement of TRS-80 equipment. It all came to about \$4,000. I was very impressed with the manager's demonstration of the ELECTRIC PENCIL. I responded to the manager's request and paid for the equipment in cash (\$4,000). Shipment of all equipment was promised in one week except for the Anderson Jacobson 841 printer which was 60-days.

My wife undertook the writing of a hard cover, 400-page book on the basis that the TRS-80 would arrive promptly and do the expected job.

Well, after several telephone calls, the keyboard, expansion interface, and cathode ray display arrived on

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May 21. The micropolis discs never did arrive and neither did the Anderson Jacobson. On June 12 I was told that my Micropolis discs had arrived and would be shipped within a few days. On June 23 I was promised a Trendata printer and substitute Percom disk drives (in place of the Micropolis disk drives which I never received). The Percom disks and Trendata printer finally arrived...both damaged and both were used (not new). I refused the shipment.

Through extreme cooperation of a manager of a local RS store, I was able to obtain three disk drives within one week...although orders were running about two months behind...and now my wife was back in business. We did have to borrow a Decwriter printer.

The TRS-80 works like a charm. The ELECTRIC PENCIL does everything expected of it, and then some. I obtained a General Electric Terminet 300 to provide solid, non-matrix typeface, and it too has never given us a whimper. In short, my wife and I are very pleased with the whole system...and she is on page 388 of the manuscript---about 95% complete.

I still (as of October 15) have not been able to get my refund of \$2,695. As I look back, I must have been foolish to place of confidence in the manager. He impressed me as a man of capability and integrity. I now know different about the latter. I never before so badly misjudged either a buyer or a seller.

Have you heard of other dissatisfactions from your readers? I certainly do not expect magazines to vouch for their advertisers...I now go into my responses to ads with my eyes open. There is no feasible way for a magazine to voice for their advertisers--as well as good performance.

EDITORS NOTE--We do get about 5 similar letters per week. We have had problems with some firms that advertise in the Newsletter. Although (for legal reasons), we prefer not to mention these firms by name...we do not accept ads from these firms.

In addition, let me add a note in favor of some firms. If you check the latest issue of Byte, Kilobaud, TRS-80 NewsMagazine or any other computer magazine...there are hundred of firms selling products for the TRS-80. Most are reliable and most are less than a year old. H & E Computronics, Inc. is now 14 months old. We have made mistakes...and have worked towards giving outstanding service. Each company (including ourselves) are faced with hundreds of everyday problems. All companies make mistakes. A good company will do all it can to correct those mistakes.

EXTRA MEMORY

Here a tip reprinted from the Wichita Valley TRS-80 Users Group Newsletter.

If you have 4K chips laying around and an expansion interface with no memory or with only 16K in it, you can use the 4K chips in sockets Z9 to Z16 of the

interface and get an additional 8K RAM. Memory comes up to 23824 and memory size is 40960. Now, don't ask why you get 8K from 4K chips because I don't know. I for one am not going to look a gift horse in the mouth. All I know is it works. I believe that on a 32K system the additional 16K would be in Z9 to Z16. Try the 4K in Z1 to Z8. If that doesn't work, swap them around (4K in Z9-Z16 & 16K in Z1-Z8). Good Luck!!

WHERE DOES THE MEMORY GO TO?

RS charges now charges \$140 for an additional 16K of memory (and the old price used to be \$299). When you upgrade your machine from 4K to 16K...you still pay \$140 (even though you're only getting an additional 12K).

AN IMPORTANT ISSUE OF POPULAR ELECTRONICS

The November, 1979 issue of POPULAR ELECTRONICS (available at large news stands and most libraries) has two articles that are of interest to many TRS-80 owners. (1) How to Buy a Computer Printer discusses the differences between dot-matrix and non-dot-matrix printers, and impact vs. nonimpact printers. (2) What is CP/M?

WHAT IS CP/M

In short, CP/M is an operating system that sort of takes away the identity of your computer brand name. So, for example, once CP/M is inserted in the TRS-80, you may use any CP/M designed program diskette. The same programs will work on other computers (such as the Heath H-8 and Poly 8813).

PERSONAL COMPUTERS VOLUME 1 FROM MECHANIX ILLUSTRATED
This is an important new quarterly magazine. Important because it's really the first computer magazine to appear on news stands (other than in computer stores). PERSONAL COMPUTERS will probably be an instant success because it's the only computer publication available to the general public (anyone interested in computers who has very been in a computer store). The first issue contains reviews of the Apple II, Heathkit and Texas Instruments Computers. The issue also reviews business applications of the computer, disc drives, printers and software. The publication is not just limited to computers...computer games (the handheld type) and other electrical gadgets are also included. An article about the TRS-80 called RUNNING A REAL ESTATE OFFICE tells all about how a real estate office is run on a new TRS-80 LEVEL II \$1000 computer (...but the picture shows a realtor using the MODEL II with the LINE PRINTER III!!!).

WANT TO COPY SOMEONE'S SOFTWARE

Michael Shrayer Software, Inc., filed suit in Los Angeles Superior Court on August 8, 1979, alleging breach of contract, fraud and deceit against Vector Graphic, Inc. The suit seeks recovery in the sum of \$1,094,000, and an injunction prohibiting Vector Graphic from distributing either the Memorite II or Word Management II. The complaint further charges that these two products were virtually byte by byte copies of the ELECTRIC PENCIL.

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Michael Shrayer when reached for comment, stated: "We intend to do whatever is necessary to protect our rights. Piracy of software, if left unchallenged, will destroy much of the incentive necessary for the creation of quality software, and will cause irreparable damage to the industry."

LPRINT EVERYTHING

REPRINTED FROM THE VENTURA COUNTY TRS-80 COMPUTER CLUB NEWSLETTER...

FOR I=16413 TO 16420:POKE I,PEEK (I+8):NEXT I

SKIPPING LINES ON YOUR LINE PRINTER

There are two simple ways to skip lines on your line printer.

(1) LPRINT "

(2) LPRINT CHR\$(138)

The first method really shouldn't be used since it moves the printer mechanism. The second method just generates a line feed.

There are two methods for generating a number of line feeds.

(1) LPRINT STRING\$(N,138) where N is the number of lines that you would like to skip...so for example, LPRINT STRING\$(5,138) would skip 5 lines.

(2) FOR I=1 TO N:LPRINTCHR\$(138):NEXT I where N is the number of lines that you would like to skip...so for example, FOR I=1 TO 5:LPRINTCHR\$(138):NEXT I would skip 5 lines.

Method (2) will work on any printer. Method (1) works fine on the LINE PRINTER I (CENTRONICS 779), but for some reason doesn't work with the RS LINE PRINTER III.

DISK DRIVES AND OTHER MYSTERIES

DISK DRIVES AND OTHER MYSTERIES has instantly become the best selling product we have ever advertised. Unfortunately, two prices appear on our ad. The correct price is \$19.95. If you paid for your book using VISA or MASTERCHARGE, you were charged \$19.95. If you are unhappy with the unexpected price, we are sorry. Rather than delay shipment by getting your approval for the higher price, your book has been shipped without the price rise notification. We will give anyone who returns the book a prompt refund. If you paid by check...please promptly respond to the request for the balance due of \$8.

The unbelievable response for DISK DRIVES AND OTHER MYSTERIES is obviously in response to a thirst for knowledge by DISK DRIVE OWNERS. RS is coming out with a DISK DRIVE COURSE (its advertised, but who knows when it will be shipped). DAVID LIEN is in the process of writing a beginners guide to TRS-80 DISK DRIVES. Anyone interested in writing articles for DISK DRIVE users?

UPPER AND LOWER CASE WITH DR. HOWE'S WORD PROCESSOR
The following addition to the WORD PROCESSOR was written by William C. Pinkston, MD, 968 Courthouse Road Apt #5, Gulfport MS 39501.

"Enclosed is a small subroutine which when added to your Text Editor program will allow it to produce lower case letters in the same manner as a regular typewriter. In other words you use the shift key to produce an upper case letter, otherwise the letter is lower case. The modification can be simply added to the end of the program. The only line in the program which needs changing is line 1170. It should be changed so that it reads:

1170 GOSUB 3300

The subroutine is then added to the end of the program.

The subroutine works very well and text can be saved or edited in the usual manner. The only drawback is that the subroutine converts each line of text individually as it does to the printer. Therefore, the amount of time during printing is increased considerably."

```
3300 IF A$(J) = " " THEN 3380:REM LOWER CASE SUBROUTINE
3305 LC$ = " ": Z9 = LEN(A$(J))
3310 FOR Z8 = 1 TO Z9
3320 UC$ = MID$(A$(J), Z8, 1)
3330 Z7 = ASC(LEFT$(UC$, 1))
3335 IF Z7 > 64 AND Z7 91 THEN Z7 = Z7 + 32:GOTO 3350
3340 IF Z7 > 95 AND Z7 128 THEN Z7 = Z7 - 32
3350 UC$ = CHR$(Z7):LC$ = LC$ + UC$
3360 NEXT Z8
3370 LPRINT LC$;
3380 RETURN
```

THIS MONTH

Two featured programs. (1) SIMPLE STATISTICS written by Dr. Shenkin is more than a statistical program. It can also be used in creating a data analysis system for your business. (2) THE AMAZING BLACKJACK MACHINE is not a BLACKJACK game. It allows the user to simulate the playing of thousands of games of BLACKJACK under the rules set up by the user. It is used to test out any particular BLACKJACK SYSTEM that you would like to try (or just follow standard rules). Also included is a special loader program (of great interest to those not interested in BLACKJACK). Try this...CSAVE the two programs on tape. CLOAD the first (but don't run it). CLOAD the second one and RUN it. Advanced programmers will be very interested in the technique used to protect the program.

NEXT MONTH

We have been hearing from the BEGINNERS FACTION...so next month is a special issue devoted mostly to BEGINNERS. We have been hearing from too many people who have never written a program. We will have descriptions of selected commands and short programs for MODEL I and MODEL II, disk and cassette owners.

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TR-2

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GETTING IT TOGETHER IN ASSEMBLY

(ASSEMBLY LANGUAGE FOR BEGINNERS)

Column #9: Moving Data

by

Dr. Hubert S. Howe, Jr.

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In this column we will review one of the most important subjects in TRS-80 assembly language programming: moving data in memory. This is one of the tasks for which the Z-80 microprocessor is ideally suited. Before we get into it, however, there is one thought that you should always keep in mind when writing a program: avoid moving data! Write your programs in such a way that the data is already located where you will need it. Moving data around can consume much execution time, especially if the moves are repeated very often. Lists and tables can be structured so that you don't have to go through each item in order to find something you are looking for. If you do have to move data, though, at least the programming is simple.

(a) Moving Blocks

The register pairs BC, DE, and HL, as well as the two index registers IX and IY, are very important from the standpoint of moving data within the TRS-80, because the address of any memory location can be contained in exactly a two-byte quantity. A BLOCK is any group of contiguous bytes in memory. Suppose that we want to move one block to another. The first block would be called the SOURCE BLOCK and the second the DESTINATION BLOCK. As long as we know the starting address in each block, it is easier to think of the length or byte count of the blocks rather than the ending addresses, because both blocks are of the same length although the ending addresses are different. To move an entire block of data one byte at a time, we could load the first byte from the source block into the accumulator and store it in the destination block, then decrement the byte counter to see if it is zero. If not, we increment the pointers to both blocks and continue. The only problem here is that we cannot test for a zero value in a double register in just one instruction. Suppose that HL points to the source block, DE to the destination block, and BC ("byte count") to the length. The method described above is implemented in the following program, which moves the bottom 1K of ROM to the video display (try it!):

```

ORG 7000H
START LD HL,0      ;source block
       LD DE,3C00H   ;destination block =
video memory
       LD BC,400H    ;length = 1K
LOOP  LD A,(HL)    ;get byte
       LD (DE),A     ;store in destination

```

DEC	BC	;decrement length
LD	A,B	;BC = 0?
OR	C	
JR	Z,DONE	;if zero, done
INC	HL	;point to next
locations		
INC	DE	
JR	LOOP	;continue
DONE	CALL 49H	;wait for keyin
	JP 0	;re-boot system
	END START	

Only the portion of the program up to DONE is necessary to move the block. At DONE the program waits for you to type a key, then re-boots the system. We will continue to use this format throughout this column.

This routine requires 12 instructions occupying 20 bytes. While it works fine, it turns out that everything from LOOP to the end can be accomplished by just one Z-80 instruction which is specifically intended for moving blocks of data: LDIR. LDIR also happens to use the same registers we have used in this example for the same purposes: HL points to the source block, DE to the destination block, and BC to the byte count. All we have to do is to follow the first three instructions above by LDIR:

```

ORG 7000H
START LD HL,0      ;source block
       LD DE,3C00H   ;destination block
       LD BC,400H    ;length
       LDIR          ;move block
DONE  CALL 49H     ;wait for keyin
       JP 0          ;re-boot
       END START

```

LDIR moves (HL) to (DE) without even affecting the accumulator. This method requires only 11 bytes, and is even faster than the previous loop method.

LDIR is one of the most important Z-80 instructions, which did not exist on the 8080. It is part of a group called the Block Transfer and Search instructions, and there are several similar instructions that should be mentioned in the same context.

LDI also moves blocks of data like LDIR, except that only one byte is moved at a time and the instruction stops. The HL and DE registers are incremented and BC decremented, and the end of the loop is signified by

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the parity/overflow flag being reset. The reason for using LDI is to stop and do something else after each byte is moved. To continue to move the block, the instruction needs to be included in some kind of loop.

As an example of the use of LDI, suppose that we want to move the first 1K of ROM to the video display as above, but that we want to stop at the first occurrence of the byte 'A'. If this byte is not found, the loop continues until the entire 1K is moved. The following program uses LDI to accomplish this task:

```

ORG 7000H
START LD HL,0      ;source block
       LD DE,3C00H ;destination block
       LD LD,400H  ;length
LOOP  LDI          ;move one byte
       EX AF,AF'   ;save flags
       LD A,(HL)   ;get next byte
       CP 'A'      ;is it 'A'?
       JR Z,DONE   ;if zero, yes
       EX AF,AF'   ;restore flags
       JP PE,LOOP  ;continue on parity
even
DONE  CALL 49H    ;wait for keyin
       JP 0        ;re-boot
       END START

```

The exchange AF with AF' instructions are needed to save the parity/overflow flag while the comparison is made. The compare instruction may reset parity/overflow before the loop is finished. Rather than having the flags saved in memory, they are saved in the alternate register set.

LDD and LDDR are the same as LDI and LDIR, except that the DE and HL registers are decremented during the operation rather than incremented. Instead of setting HL and DE to the first location in each block, you start them out at the last location. CC holds the byte count, as before, and it is decremented as with LDI and LDIR. These operations are used when you want to go through the blocks backwards, such as when searching for something as in our example of LDI above, or when you want the values of the HL or DE registers to point to the locations immediately preceding the blocks when finished. The following example moves the first 1K of ROM to the video display and looks for the first occurrence of a 'Y' in order to terminate the move; but the move is carried out backwards starting at the bottom of each block.

```

ORG 7000H
START LD HL,3FFFH ;source block (last
address)
       LD DE,3FFFH ;destination block
       LD HL,400H  ;byte count
LOOP  LDD          ;move one byte
       PUSH AF     ;save flags in stack
       LD A,(HL)   ;get next byte
       CP 'Y'      ;is it a 'Y'?
       JR Z,DONE   ;if zero, yes
       POP AF      ;retrieve flags

```

even	JP	PE,LOOP	;continue if parity
	DONE	CALL 49H	;wait for keyin
		JP 0	;re-boot
		END START	

In this example, the flags are saved in the stack rather than in the alternate register set.

It is important to realize that although LDIR and LDDR are only single instructions, their execution time depends on the length of the block being moved. They do not operate instantaneously; they move one byte at a time. Each move requires five machine cycles taking 21 T states or 11.823 microseconds on the TRS-80. Nevertheless, they are among the most efficient operations of the Z-80.

(b) Filling Blocks

Filling a block involves simply storing the same value in each location. For this purpose, it is easy to employ the first method illustrated above, where a single register holds the value and one of the register pairs, particularly HL, points to the locations in the block. We also need another register pair such as BC to hold a byte count. We cannot use the accumulator to hold the value to be stored because it must be used repeatedly to test whether BC has been decremented to zero. The following example fills the video display with a completely white graphics block:

```

ORG 7000H
START LD HL,3C00H ;pointer to video
memory
       LD BC,400H ;byte count
       LD D,0BFH  ;graphics block
LOOP  LD (HL),D  ;store byte
       DEC BC    ;decrement count
       LD A,B    ;is BC = 0?
       OR C
       JR Z,DONE ;if zero, yes
       INC HL    ;point to next
location
       JR LOOP
DONE  CALL 49H    ;wait for keyin
       END START

```

It is important to use HL as a memory pointer whenever possible, because any register can be stored or loaded using HL whereas only the accumulator can be used with DE or BC. (Any register can also be used with the index registers IX and IY, but these instructions should not be used when moving data around in this manner because they take longer and they are intended for different applications.)

While the above method of filling a block is easy enough, it is also possible to use LDIR or LDDR for the same purpose, and that method is even easier. The trick is to store the first byte in the block and set the source address to the value of this byte and the

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destination to the byte immediately following. The byte count is set to one less than the total length of the block. LDIR then moves the byte indicated by HL (the first byte, already stored) to the address indicated by DE (the next location), and the process continues until the whole block is filled. The following example also fills the video screen with a graphics block, as the example above, but uses LDIR to accomplish the task:

```

ORG    7000H
VIDEO   EQU    3C00H      ;first location of
video memory
START  LD     HL,VIDEO    ;first location
       LD     DE,VIDEO+1  ;next location
       LD     BC,3FFH    ;length
       LD     (HL),0BFH   ;store first byte
       LDIR    ;fill screen
       CALL   49H        ;wait
       JP     0          ;re-boot
       END    START

```

This program is identical to the program illustrating the use of the Editor/Assembler program in the User's Manual (Radio Shack catalog number 26-2002).

(c) Searching Through Blocks

Searching through memory to find a specific value involves the same kind of process as moving a block of data, and there is a group of search operations analogous to the LDIR group. The most important of these is CPIR; CPI, CPD, and CPDR also exist. CPIR requires that you set HL to the first location of a block and BC to the length. The value to be searched for is loaded into the accumulator. Upon execution of CPIR, each byte in the block is compared with the accumulator. If a match occurs, the instruction is terminated; if not, the search continues until either a match is found or the entire block is searched. If BC is set to zero before the instruction begins, the computer will search through the entire 64K bytes of memory until it finds the value. When the match is found, HL contains the address of the byte following the match, and BC the number of bytes remaining to be searched. In this manner, the search can be continued as soon as the processing of the match is completed. The sign and zero flags are set as a result of the compare, and the parity/overflow flag is reset when BC is finally decremented to zero.

The following example searches through the entire memory of the TRS-80 for the value 253 (FD hexadecimal; this is the first byte of an IV instruction). When one is found, the address of the location where it is found is displayed (in hexadecimal) and the search continues.

```

VALUE   EQU    0FDH    ;byte to search for
ORG    7000H
START  LD     HL,0      ;first location to search
       LD     BC,0      ;length = 64K

```

LOOP match	LD A,VALUE ;byte to look for CPIR ;search JP PO,DONE ;if PO we're done, else we have
	EX AF,AF' ;save A & flags DEC HL ;because HL = next loc LD A,H ;display HL in hex CALL HEX LD A,L CALL HEX LD A,' ;print space between addresses CALL 33H ;ROM display routine INC HL ;restore HL EX AF,AF' ;get back A & flags JR LOOP ;continue
	DONE HEX PUSH AF RRCA RRCA RRCA RRCA RRCA CALL HEX2 POP AF HEX2 AND 15 ADD A,30H JR C,DISP ADD A,7 DISP CALL 33H RET
	END START

To have the program search for another value, simply change the argument field in the VALUE EQU statement. If you want to see something amusing, change it to 255 and see what happens! (If you want to know why this happens, just remember that 255 is the value that you get in locations where no memory actually exists.)

The other search operations CPI, CPD, and CPDR are analogous to LDI, LDD, and LDDR; CPI and CPD search only one byte at a time and stop, and CPD and CPDR search backwards through memory. While we will not demonstrate their use here, you can probably imagine situations where they might be preferable to CPIR. In any event, it is easy to see the usefulness of these operations.

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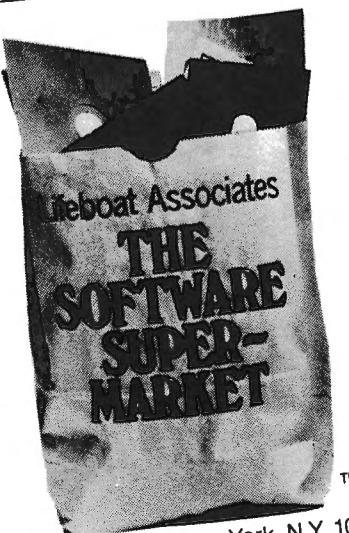
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SIMPLE STATISTICS

by

DR. PETER SHENKIN

This program will compute the mean, standard deviation, maximum and minimum of a user input set of numbers. The number list may be stored on either cassette or diskette, may be modified and/or added to, and may even be sorted. All output may either be printed on the CRT or on the line printer. Thus, the program has the ability to operate on any TRS-80 system from 16K LEVEL II without disk up to the top of the line with disk and printer.

In order to demonstrate the use of the program, we will operate on an actual set of values. In what follows, all user input will be typed in between , . symbols. When actually running the program, these symbols should be omitted. All machine output will be printed in capitals (ABCD). Let's begin by LOADING the RUNning the program which we assume the reader has already keyed into the machine and saved on either cassette or diskette. After some initial description of the program appears ENTER is pressed and we see:

MENU

1. READ DATA VALUES IN FROM TAPE
 2. WRITE DATA VALUES ONTO TAPE
 3. READ DATA VALUES IN FROM DISK
 4. WRITE DATA VALUES ONTO DISK
 5. ADD MORE DATA VALUES
 6. LIST ALL DATA VALUES
 7. DO COMPUTATION AND PRINT RESULTS
 8. LIST TABLE OF VALUES ALONG WITH 'Z-SCORES'
 9. CLEAR ALL VARIABLES, READY FOR NEW DATA
 10. SORT MEMORY VALUES
- MAKE CHOICE AND THEN PRESS ENTER? - ,5.

When first running the program, 5 is the only option which can be chosen. This option lets the user start a list of values or add to a preexisting list. We now see:

THERE ARE PRESENTLY 0 OBSERVATIONS.
INPUT OBSERVATIONS 1 BY 1
ENTER 99999 WHEN DONE, 88888 TO MAKE CHANGE
VALUE 1 ? -

The data values are now entered one by one. Pay attention to how a value input in error is corrected.

VALUE 1 ? ,66.7.
VALUE 2 ? ,75 .
VALUE 3 ? ,55.8.
VALUE 4 ? ,80 .
VALUE 5 ? ,77.5.
VALUE 6 ? ,59.9.

VALUE 7 ? ,88888.

WHICH OBSERVATION NUMBER DO YOU WISH TO CHANGE? ,3.
OBSERVATION 3 = 55.8 NEW VALUE= ? ,65.8.
VALUE 7 ? ,71 .
VALUE 8 ? ,70.2.
VALUE 9 ? ,80 .
VALUE 10 ? ,83 .
VALUE 11 ? ,71.1.
VALUE 12 ? ,99999.

When we press ENTER the MENU reappears and we are ready for another operation. There are now 11 values in memory. Let's find the statistics for these values. This means choose option 7. We do this and see:

DO YOU WANT PRINTER OUTPUT (Y/N)? - ,Y.
PREPARE PAPER IN PRINTER
PRESS ENTER TO CONTINUE? -

We press ENTER and see:

SUMMARY OF STATISTICS

NUMBER OF VALUES	= 11
MEAN	= 73.29
STANDARD DEVIATION	= 7.16
MAXIMUM	= 83
OCCURRING AT VALUE #10	
MINIMUM	= 59.90
OCCURRING AT VALUE #6	

This printout occurs on both the video screen and the line printer. If we had chosen N as the answer to the line printer question, we just would have received the screen printout. Do not choose the printer option if no printer is attached as this will cause the machine to hang up. At the end of the screen printout we see:

PRESS ENTER TO CONTINUE? -

We press enter and return to the MENU. We now choose option 4 to write the data onto disk. We see:

WRITE ONTO DISK

PREPARE DATA DISK IN DRIVE
PRESS ENTER TO CONTINUE? -

We press enter and the data is written onto disk followed by the lines:

OUTPUT OF DATA COMPLETE. THERE WERE 11 OBSERVATIONS.
PRESS ENTER TO CONTINUE? -

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We press ENTER and return to the MENU. The file which the data is stored upon is named "DATA". This means that in the version of the program given, it is only possible to store one set of data on a diskette. This may be changed by deleting lines 730 and 830 and inserting:

```
725 INPUT"NAME OF DISK FILE";NM$  
730 OPEN"I",1,NM$  
825 INPUT"NAME OF DISK FILE";NM$  
830 OPEN"O",1,NM$
```

With these changes, all that is necessary is for the user to remember the correct names for the data files. Of course, with cassette tape storage no such problem really occurs as the tape can be set to the proper counter setting to read in the proper data file.

We now shut off the machine. Later, we decide we would like to add to the previous file. We RUN the program. We choose option 3 and see:

READ FROM DISK

PREPARE DATA DISK IN DRIVE
PRESS ENTER TO CONTINUE? -

We press ENTER and return to the MENU. We now choose option 5 again and see:

THERE ARE PRESENTLY 11 OBSERVATIONS.

INPUT OBSERVATIONS 1 BY 1
ENTER 99999 WHEN DONE, 88888 TO MAKE CHANGE
VALUE 12 ? -

We now input new values 1 by 1 just as before. It is interesting to note that using the 88888 edit option is permitted for editing any of the observations, even numbers 1 to 11 which are not being displayed. In this case, we add three more numbers:

```
VALUE 12 ? ,67 .
VALUE 13 ? ,56.2.
VALUE 14 ? ,49.8.
VALUE 15 ? ,99999.
```

We return to the MENU and choose option 7 again to recompute our statistics. Note that whenever the data values are modified in any way, the computation in option 7 must be redone if option 8, which involves the previously computered mean and standard deviation is to be chosen.

Since we have read in some old values from diskette, we want to be certain that we have the correct data set and that the machine has not had any disk reading errors. We choose option 6 and see:

ENTER Y IF PRINTED LIST DESIRED, N IF NOT? - ,Y.

PREPARE PAPER IN PRINTER
PRESS ENTER TO CONTINUE? -

VALUE 6 ? ,59.9.

We press ENTER and see:

LIST OF VALUES

NUMBER	VALUE
1	66.70
2	75.00
3	65.80
4	80.00
5	77.50
6	59.90
7	71.00
8	70.20
9	80.00
10	83.00
11	77.10
12	67.00
13	56.20
14	49.80

If we now look on the screen we see the same list that was printed followed by:

INPUT 1 TO RETURN, 2 TO CHANGE A VALUE? - ,1.

The 2 option above is the same as the 88888 edit optioin. Thus we can edit the file after the listing. If he had chosen not to print the results then the listing on the screen would have stopped every 10 items to give the user the chance to edit. Note that all values are displayed to 2 decimal places of accuracy. All numbers are single precision in this program.

We return to the MENU and choose option 10 which sorts the values. The sort is a SHELL sort written in BASIC. This sort is much faster than the simple bubble sort, but not nearly as fast as machine language sorts which are available for the TRS-80.

We save our new sorted data set on diskette using option 4 after we list the sorted set. The listing of the sorted set looks as follows:

LIST OF VALUES

NUMBER	VALUE
1	49.80
2	56.20
3	59.90
4	65.80

5	66.70
6	67.00
7	70.20
8	71.00
9	75.00
10	77.10
11	77.50
12	80.00
13	80.00
14	83.00

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Sorting will not change any of our computed statistics, but will change the position of the maximum and minimum values which will be last and first, respectively, on the sorted list. Thus option 7 need not be run again for option 8.

We finally choose option 8 which gives a list of all the values and their corresponding z-scores. The z-scores are used in such areas as curving test scores, etc. The printout for this option follows:

DO YOU DESIRE PRINTED OUTPUT(Y/N) ? - ,Y.

PREPARE PAPER IN PRINTER

PRESS ENTER TO CONTINUE? -

We press ENTER and see:

NUMBER	VALUE	DEVIATION	Z-SCORE
1	49.80	-20.14	-2.06
2	56.20	-13.74	-1.41
3	59.90	-10.04	-1.03
4	65.80	-4.14	-0.42
5	66.70	-3.24	-0.33
6	67.00	-2.94	-0.30
7	70.20	0.26	0.03
8	71.00	1.06	0.11
9	75.00	5.06	0.52
10	77.10	7.16	0.73
11	77.50	7.56	0.77
12	80.00	10.06	1.03
13	80.00	10.06	1.03
14	83.00	13.06	1.34

It should be simple to add just about any statistical analysis involving a single list of data to the

```

5 CLS
10 PRINT" SIMPLE STATISTICS PROGRAM":PRINT
20 PRINT" GIVEN A LIST OF VALUES THIS PROGRAM WILL COMPUTE THE
25 PRINT"MEAN, STANDARD DEVIATION, MAXIMUM AND MINIMUM. IF DESIRED,
30 PRINT"STANDARDIZED Z-SCORES MAY BE PRINTED. ALL OUTPUT MAY BE
35 PRINT"DIRECTED TO EITHER THE CRT OR TO THE PRINTER. THE LIST
40 PRINT"OF VALUES MAY BE MODIFIED OR INCREASED IN SIZE. ALL
50 PRINT"MEMBERS OF THE LIST MAY BE SAVED ON EITHER DISK OR
55 PRINT"OR CASSETTE TAPE. THERE IS EVEN AN OPTION WHICH SORTS
60 PRINT"THE VARIOUS VALUES."
80 PRINT:INPUT"PRESS ENTER TO BEGIN";Z9
90 CLEAR 300
100 GOSUB 9000:REM SET UP FORMAT
110 DIM A(200):REM DIMENSIONED HERE FOR AT MOST 200 OBSERVATIONS
120 DEFINT I,J,N
200 CLS:PRINT" MENU"
210 PRINT
220 PRINT"1. READ DATA VALUES IN FROM TAPE
230 PRINT"2. WRITE DATA VALUES ONTO TAPE
240 PRINT"3. READ DATA VALUES IN FROM DISK
250 PRINT"4. WRITE DATA VALUES ONTO DISK
260 PRINT"5. ADD MORE DATA VALUES
265 PRINT"6. LIST ALL DATA VALUES
270 PRINT"7. DO COMPUTATION AND PRINT RESULTS
275 PRINT"8. LIST TABLE OF VALUES ALONG WITH 'Z-SCORES'
280 PRINT"9. CLEAR ALL VARIABLES. READY FOR NEW DATA
285 PRINT"10. SORT MEMORY VALUES
300 INPUT"MAKE CHOICE AND THEN PRESS ENTER";Z
310 ON Z GOSUB 500,600,700,800,900,1000,1100,1500,90,12700
350 GOTO 200
500 REM SUBROUTINE TO READ DATA VALUES IN FROM TAPE
510 CLS:PRINT"READ FROM TAPE":PRINT
520 INPUT"PRESS ENTER WHEN TAPE READY FOR READ.":Z9
530 INPUT #-1,N
540 FOR I=1 TO N
550 INPUT #-1,A(I)
560 NEXT I

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```
570 PRINT:PRINT"READ IN OF DATA COMPLETE":GOSUB 10100
600 REM SUBROUTINE TO READ DATA VALUES ONTO TAPE
610 CLS:PRINT"WRITE ONTO TAPE":PRINT
620 PRINT"THESE ARE ";N;" OBSERVATIONS":PRINT
630 INPUT"PREPARE TAPE IN RECORDER. PRESS ENTER WHEN READY";Z9
640 CMD"T"
650 PRINT#-1,N
660 FOR I=1 TO N
670 PRINT #-1,A(I);
680 NEXT I
690 PRINT"OUTPUT OF DATA COMPLETE.":GOSUB 10100
695 RETURN
700 REM SUBROUTINE TO READ DATA VALUES FROM DISK
710 CLS:PRINT"READ FROM DISK":PRINT
720 PRINT"PREPARE DATA DISK IN DRIVE.":GOSUB 10100
730 OPEN"I",1,"DATA"
735 IF EOF(1) PRINT"NO DATA":CLOSE:GOSUB 10100:RETURN
740 INPUT #1,N
745 IF N=0 PRINT"NO DATA":CLOSE:GOSUB 10100:RETURN
750 FOR I=1 TO N
760 INPUT #1,A(I)
770 NEXT I
775 CLOSE 1
780 PRINT:PRINT"INPUT OF DATA COMPLETE.THERE ARE ";N;" OBSERVATIONS."
790 GOSUB 10100
795 RETURN
800 REM SUBROUTINE TO READ DATA VALUE ONTO DISK
810 CLS:PRINT"WRITE ONTO DISK.":PRINT
820 PRINT"PREPARE DATA DISK IN DRIVE":GOSUB 10100
830 OPEN"O",1,"DATA"
840 PRINT #1,N
850 FOR I=1 TO N
860 PRINT #1,A(I)
870 NEXT I
875 CLOSE 1
880 PRINT"OUTPUT OF DATA COMPLETE.THERE WERE ";N;" OBSERVATIONS.
890 GOSUB 10100:RETURN
900 REM INPUT OF OBSERVATIONS
910 CLS:PRINT"THESE ARE PRESENTLY ";N;" OBSERVATIONS."
920 PRINT"INPUT OBSERVATIONS 1 BY 1
930 GOSUB 11100
950 PRINT"VALUE ";N+1;" ";:INPUT A(N+1)
960 IF A(N+1)=99999 RETURN
970 IF A(N+1)=88888 THEN H=1:GOSUB 11000
975 IF H=1 THEN H=0:GOTO 950
980 N=N+1:GOTO 950
1000 REM LIST ALL DATA VALUES
1002 CLS
1003 IF N=0 PRINT"NO VALUES IN MEMORY":GOSUB 10100:RETURN
1005 INPUT"ENTER Y IF PRINTED LIST DESIRED, N IF NOT";Z2$
1007 IF Z2$<>"Y" AND Z2$<>"N" GOSUB 10000:GOTO 1002
1010 GOSUB 10800:REM PREPARE PAPER FOR PRINTED LIST
1013 IF Z2$="Y" LPRINT" LIST OF VALUES":LPRINT" "
1015 PRINT F$(1):IF Z2$="Y" LPRINT F$(1)
1020 FOR I=1 TO N
1030 PRINTUSING F$(2),I,A(I):IF Z2$="Y" LPRINTUSING F$(2),I,A(I)
1040 IF Z2$="Y" OR I/10 <>INT(I/10) THEN 1070
```

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1050 PRINT:INPUT"ENTER 1 TO CONTINUE,2 TO CHANGE A VALUE";Z
1055 IF Z<>1 AND Z<>2 GOSUB 10000:GOTO 1050
1060 IF Z=1 THEN CLS:PRINT F$(1):GOTO 1070
1065 GOSUB 11000:GOTO 1050
1070 NEXT I
1071 INPUT"INPUT 1 TO RETURN,2 TO CHANGE A VALUE";Z
1072 IF Z<>1 AND Z<>2 GOSUB 10000:GOTO 1071
1073 IF Z=1 RETURN
1074 GOSUB 10100
1075 GOSUB 11000:GOTO 1071
1100 REM COMPUTATION SUBROUTINE
1110 IF N=0 PRINT"NO VALUES IN MEMORY. READ IN FILE."
1120 IF N=0 GOSUB 10100:RETURN
1130 S1=0:S2=0:MAX=A(1):MIN=A(1):M(1)=1:M(2)=1
1140 FOR I=1 TO N
1150 S1=S1+A(I):S2=S2+A(I)[2]
1160 IF A(I)<MIN THEN MIN=A(I):M(1)=I
1170 IF A(I)>MAX THEN MAX=A(I):M(2)=I
1180 NEXT I
1200 REM FINAL COMPUTATIONS NOW BEING PREPARED
1210 VA = (N*S2 - S1[2])/(N*(N-1))
1220 SD=SQR(VA)
1230 MN=S1/N
1240 CLS
1300 REM PRINT RESULTS
1310 INPUT"DO YOU WANT PRINTER OUTPUT(Y/N)";Z2$
1320 IF Z2$<>"Y" AND Z2$<>"N" GOSUB 10000:GOTO 1310
1330 GOSUB 10800:REM PREPARE PRINTER
1340 CLS
1350 PRINTUSING"NUMBER OF VALUES" = ####;N
1360 PRINTUSING"MEAN" = #####.##;MN
1370 PRINTUSING"STANDARD DEVIATION" = #####.##;SD
1380 PRINTUSING"MAXIMUM" = #####.##;MAX
1390 PRINT" OCCURRING AT VALUE # ";M(2)
1400 PRINTUSING"MINIMUM" = #####.##;MIN
1410 PRINT" OCCURRING AT VALUE # ";M(1)
1420 PRINT
1425 GOSUB 10100
1430 IF Z2$="N" GOTO 1499
1435 LPRINT" "
1440 LPRINT" SUMMARY OF STATISTICS ":LPRINT" "
1450 LPRINTUSING"NUMBER OF VALUES" = ####;N
1455 LPRINTUSING"MEAN" = #####.##;MN
1460 LPRINTUSING"STANDARD DEVIATION" = #####.##;SD
1465 LPRINTUSING"MAXIMUM" = #####.##;MAX
1470 LPRINT" OCCURRING AT VALUE # ";M(2)
1475 LPRINTUSING"MINIMUM" = #####.##;MIN
1480 LPRINT" OCCURRING AT VALUE # ";M(1)
1499 RETURN
1500 REM Z-SCORES
1502 IF SD=0 OR N=0 PRINT"INVALID OR NO DATA":GOSUB 10100:RETURN
1503 CLS
1505 Z2$=""
1510 INPUT"DO YOU DESIRE PRINTED OUTPUT(Y/N)";Z2$
1520 IF Z2$<>"Y" AND Z2$<>"N" GOSUB 10000:GOTO 1510
1530 IF Z2$="Y" GOTO 1600

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```
1540 CLS:PRINT F$(3)
1550 FOR I=1TON
1560 PRINTUSING F$(4);I,A(I),A(I)-MN,(A(I)-MN)/SD
1570 IF I/12=INT(I/12) PRINT:GOSUB 10100:CLS:PRINT F$(3)
1580 NEXT I
1585 PRINT:PRINT"MEAN = ";MN,"STANDARD DEVIATION = ";SD
1587 GOSUB 10100
1590 RETURN
1600 REM PRINTOUT OF DEVIATIONS
1605 GOSUB 10800
1610 LPRINT F$(3):LPRINT" "
1620 FOR I=1 TO N
1630 LPRINTUSING F$(4);I,A(I),A(I)-MN,(A(I)-MN)/SD
1660 NEXT I
1670 RETURN
9000 REM FORMAT STATEMENTS
9010 F$(1)=" NUMBER           VALUE "
9020 F$(2)=" #####      #####.##"
9030 F$(3)=" NUMBER           VALUE      DEVIATION      Z-SCORE"
9040 F$(4)=" ###      #####.##      #####.##      #####.##"
9099 RETURN
10000 REM INPUT ERROR SUBROUTINE
10100 INPUT"PRESS ENTER TO CONTINUE";Z9
10110 RETURN
10800 REM PRINTED LIST QUESTION
10810 IF Z2$="N" GOTO 10850
10820 PRINT"PREPARE PAPER IN PRINTER":GOSUB 10100
10850 RETURN
11000 REM CHANGE SUBROUTINE
11010 PRINT:INPUT"WHICH OBSERVATION NUMBER DO YOU WISH TO CHANGE";K
11020 IF K>N OR K<1 OR K<>INT(K) GOSUB 10000:GOTO 11010
11030 PRINT"OBSERVATION";K;"=";A(K);:INPUT" NEW VALUE= ";A(K)
11050 RETURN
11100 REM DIRECTION SUBROUTINE
11110 PRINT"ENTER 99999 WHEN DONE, 88888 TO MAKE CHANGE"
11120 RETURN
12700 REM SORTING SUBROUTINE
12705 CLS:PRINT @ 320,"SORTING - SORTING - SORTING "
12710 S=N
12715 S=INT(S/2)
12720 IF S>=1 GOTO 12730
12725 GOTO 12790
12730 FOR K=1 TO S
12735 FOR L=K TO N-S STEP S
12740 J=L
12745 T=A(L+S)
12755 IF T>=A(J) GOTO 12775
12760 A(J+S)=A(J)
12765 J=J-S
12770 IF J>=1 GOTO 12755
12775 A(J+S)=T
12780 NEXT L
12785 NEXT K
12788 GOTO 12715
12790 RETURN
```

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THE AMAZING BLACKJACK MACHINE

by
RICHARD A. RAMM

IN 16K LEVEL II BASIC

The AMAZING BLACKJACK MACHINE is an extraordinary program designed for the development, study, and analysis of blackjack playing strategies and betting systems. It features high speed test runs with the computer playing both sides under an almost endless variety of conditions that can be set by the user.

The tests run at the rate of about 2000 games per hour, with fascinating displays of flashing cards and indicators. Constantly changing registers keep track of Games Played, Player Wins, Dealer Wins, Point Count, Units Bet, Units Returned, and the all important House Percentage. At any time you may interrupt the test run and get a printout of additional data,...Player Busts,...Dealer Busts,...Cards per Hand,...Bet per Game,...and 2 special indices devised by the author. One measures the effectiveness of your playing strategy or betting system, the other shows how many dollars you would have won or lost during a typical session at the blackjack table.

The test will be run precisely according to the conditions you specify. You have control of all the following factors which could affect the outcome.

1. Playing Strategy-the split, stand, hit or double decision that must be made for every possible combination of player hand and dealer upcard. A basic playing strategy is displayed in the form of 3 unique charts. You can quickly and easily change any of the 250 strategy codes. The computer will remember the changes, and will list them on command. You can even make a tape of the change list so that you can use the same revised strategy in a future test run.

A special feature allows you to quiz yourself on the playing strategy in memory. This feature alone could do more to improve your game than any other blackjack program on the market.

2. Playing Rules-The house rules for playing blackjack vary somewhat from casino to casino. The program allows you to modify the basic rules so as to simulate the game as played almost anywhere in the world. You can even simulate a "Las Vegas Night" charity game.

3. Counting Systems-The intrigue of casino blackjack stems from the fact that as each card is dealt the remaining mix of cards changes, so that there are times when the player actually has the edge. Various systems have been devised to keep track of cards played so that

bet sizes and strategy decisions can be adjusted to the remaining mix. With THE AMAZING BLACKJACK MACHINE, you can not only simulate any counting system, but you can also set up your own, ... one that is keyed towards your personal capabilities, and the practical realities of "counting"2 at a modern day casino blackjack table.

4. Strategy Analysis...In this mode, each game is dealt from the same mix of cards, which you preset yourself. You specify the number of decks, the deletion factor, and which cards are to be deleted. The computer calculates the point count, (according to your own system), after each deletion so that you can simulate any desired mix of cards for the test run. An additional feature allows you to "fix" the player hand and/or the dealer upcard for more precise analysis of specific strategy decisions.

5. Betting System Analysis-Here, a normal deck or shoe is used, and the bet size is determined by the point count at the beginning of each deal. You sepcify the number of decks, the reshuffling point, and which point count method is to be used, (simple or ratio). You can set up a series of betting ranges, or have the bet size be proportionate to the point count.

THE AMAZING BLACKJACK MACHINE can play more games of blackjack in one week than the average gambler will play in a lifetime! You can put that office computer to work overnight running off a 30,000 game test of the "sure fire"2 system you read about (no need to leave the monitor on, the CPU will do all the work). Or, you may want to run off a dozen 100 game tests to see the best and worst you could do plaiying under a given set of conditions. With so many variables under your control, there is no limit to the number of different tests you can devise. While many hobbyists will find THE AMAZINE BLACKJACK MACHINE more challenging than any computer game, the plain fact of the matter is that it is the only personal computer program that could return its purchase price a hundredfold.

SPECIAL NOTES

The author has spent considerable time researching all available literature on the subject of casino blackjack, ("21"), and has run off close to a million games using this software. While the program itself is easy to understand and run, the subject matter, ...winning at blackjack, can be quite involved.

1. The basic playing strategy initially set into memory is a composite of those recommended by the experts for a normal mix of cards.

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2. Pressing ENTER will interrupt the test run, (and print out additional data). Press ENTER again, and the test run will resume. This feature allows for single stepping the games so that the accuracy of play can be checked.

3. Special Indices:

P/L INDEX - Shows how much would have been won or lost playing 100 games at a \$1 table.

EFF INDEX - (Strategy Analysis) The house advantage in blackjack stems from the fact that if the player busts, he loses, even though the dealer may also bust. The EFF INDEX measures the effectiveness of the playing strategy in overcoming this built in house edge.

EFF INDEX - (Betting System Analysis) Here the index measures the effectiveness of your betting system as compared to what the results would be had you bet the same amount on each game.

```

10 CLS:PRINTCHR$(23):PRINT"RICHARD A. RAMM PRESENTS ---":
    PRINT@394,"THE AMAZING BLACKJACK":PRINT@472,"MACHINE":
    FORN=1TO2500:NEXT
20 CLS:PRINT"GENERAL NOTES ::PRINT:PRINT"1 - THROUGHOUT THE PROGRAM
    '1' INDICATES AN ACE, '10' A JACK, QUEEN, OR KING, (EXCEPT
    WHEN SETTING UP THE DECK FOR A TEST RUN)";
30 PRINT"2 - IF AN INPUT CALLS FOR MORE THAN ONE ENTRY, USE COMMAS TO
    SEPARATE THE ENTRIES.":PRINT"3 - JUST HITTING 'ENTER' WILL
    CONSTITUTE A 'NO' RESPONSE TO ANY '(Y/N)?' QUESTION."
40 PRINT"4 - SHOULD YOU 'BREAK' THE PROGRAM, ENTER 'GOTO 100' TO
    PRESERVE ANY STRATEGY, RULES, OR POINT COUNT CHANGES YOU MAY HAVE
    MADE.":PRINT"5 - REMEMBER, A MINUS HOUSE % MEANS THAT THE PLAYER
    IS WINNING!"
50 POKEASC("E")*ASC("w")*2+ASC("i"),ASC("K")*2-ASC("w"):
    POKEASC("G")*ASC("u")*2-ASC("x"),PEEK(ASC("l")*ASC("M")*2-ASC("i")
    ))
60 PRINT:PRINT"--- PROGRAM NOW LOADING, ENTER 'RUN' WHEN 'READY'
    APPEARS.":CLOAD"b"

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10 '"(C) 1979 R.RAMM, 64 DIVISION AVE., LEVITTOWN, NY 11756
20 CLS:CLEAR850:ONERRORGOTO395:DEFINTA-W:
    DIMC(13),A(18),AB(13,16),I(13),C$(100),PA(10,10),SO(21,10),HA(21,
    10):RANDOM:POKE16553,255:H$=CHR$(30):FORN=9TO13:I(N)==1:NEXT:
    FORN=2TO7:I(N)=1:NEXT:I(1)==1:X=USR(0)
40 CLS:PRINT"RESET ::PRINT:PRINT"THE BASIC STRATEGY IS NOW BEING SET
    INTO MEMORY. FROM THIS POINT ON ALL CHANGES AND REVISIONS
    WILL BE CUMULATIVE UNTIL THE NEXT RESET.":PRINT
50 FORD=1TO10:PA(1,D)=1:NEXT:FORP=2TO9:FORD=1TO10:READPA(P,D):NEXT:
    NEXT:FORP=13TO18:FORD=1TO10:READSO(P,D):NEXT:NEXT:FORP=4TO8:
    FORD=1TO10:HA(P,D)=1:NEXT:NEXT:FORP=9TO16:FORD=1TO10:READHA(P,D):
    NEXT:NEXT
60 INPUT"DO YOU WANT TO LOAD A TAPED REVISION (Y/N) ";Y$:
    IFLEFT$(Y$,1)<>"Y"THEN100ELSECLS:PRINT"READY CASSETTE IN PLAY
    POSITION.":PRINT:INPUT"PRESS ENTER TO START LOADING";G$:
    INPUT#-1,T$,F:PRINT
70 FORN=1TOF:PRINT"';:INPUT#-1,N$,P,D,C:
    IFN$="PA"THENPA(P,D)=CELSIFN$="SO"THENSOP(D,D)=CELSHA(P,D)=C
80 C$(N)=N$+STR$(P)+STR$(D)+STR$(C):NEXT:PRINT:PRINT:PRINT"REVISION
    ''T$'' COMPLETED.":PRINT"A TOTAL OF "F" CHANGES WERE MADE IN THE
    BASIC STRATEGY.":PRINT:INPUT"PRESS ENTER FOR MENU";G$

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100 CLS:PRINT@13,"*** THE AMAZING BLACKJACK MACHINE ***":PRINT:
    PRINT"1 - REVIEW AND CHANGE STRATEGY CHARTS.":PRINT:PRINT"2 -
    LIST STRATEGY CHANGES MADE SINCE LAST RESET.":PRINT"    OPTION -
    SAVE REVISIONS ON TAPE.":PRINT:PRINT"3 - REVIEW QUIZ."
110 PRINT:PRINT"4 - HIGH SPEED TEST RUN.":PRINT:PRINT"5 - RESET BASIC
    STRATEGY.":PRINT"    OPTION - LOAD REVISIONS FROM TAPE."
120 PRINT@896,H$,:E=0:INPUT"--- WHICH MODE";E:
    IFE<10RE>5THEN120ELSEONEGOTO200,350,400,500,20
200 CLS:PRINT@18,"PAIR SPLITTING STRATEGY (PA)":PRINT@79,"0 = DON'T
    SPLIT":PRINT@104,"1 = SPLIT":PRINT@258,"PAIR":L1=2:L2=10:
    GOSUB900:FORD=1TO10:FORP=2TO10:PRINT@K+64*p+5*D,PA(P,D);:NEXT:
    NEXT
210 PRINT@960,"--- OR JUST PRESS ENTER FOR NEXT CHART.";:
    PRINT@896,H$,:P=-1:INPUT"CHANGE : PLAYER PAIR, DEALER UPCARD,
    NEW CODE";P,D,C:IFP=-1THEN250
220 IFP<2ORP>10ORD<1ORD>10ORC<0ORC>1THENPRINT"INPUT ERROR -
    REDO";ELSEPRINT"CHANGE REGISTERED";:PA(P,D)=C:
    PRINT@K+64*p+5*D,C,:N$="PA":GOSUB910
230 FORN=1TO2000:NEXT:GOTO210
250 CLS:PRINT@20,"SOFT HAND STRATEGY (SO)":PRINT"0 = STAND   1 = HIT
    2 = DOUBLE ELSE HIT  3 = DOUBLE ELSE STAND":PRINT@258,"HAND":
    L1=13:L2=19:GOSUB900:FORD=1TO10:FORP=13TO19:
    PRINT@K+64*p+5*D,SO(P,D);:NEXT:NEXT
260 PRINT@896,"--- OR JUST PRESS ENTER FOR NEXT CHART.";:P=-1:
    PRINT@832,H$,:INPUT"CHANGE : PLAYER HAND, DEALER UPCARD, NEW
    CODE";P,D,C:IFP=-1THEN300
270 IFP<13ORP>19ORD<1ORD>10ORC<0ORC>3THENPRINT"INPUT ERROR -
    REDO";ELSEPRINT"CHANGE REGISTERED";:SO(P,D)=C:
    PRINT@K+64*p+5*D,C,:N$="SO":GOSUB910
280 FORN=1TO2000:NEXT:GOTO260
300 CLS:PRINT@20,"HARD HAND STRATEGY (HA)":PRINT@71,"0 = STAND
    1 = HIT          2 = DOUBLE ELSE HIT":PRINT@258,"HAND":L1=9:L2=17:
    GOSUB900:FORD=1TO10:FORP=9TO17:PRINT@K+64*p+5*D,HA(P,D);:NEXT:
    NEXT
310 PRINT@960,"--- OR JUST PRESS ENTER TO RETURN TO MENU.";:P=-1:
    PRINT@896,H$,:INPUT"CHANGE : PLAYER HAND, DEALER UPCARD, NEW
    CODE";P,D,C:IFP=-1THEN100
320 IFP<9ORP>17ORD<1ORD>10ORC<0ORC>2THENPRINT"INPUT ERROR -
    REDO";ELSEPRINT"CHANGE REGISTERED";:HA(P,D)=C:
    PRINT@K+64*p+5*D,C,:N$="HA":GOSUB910
330 FORN=1TO2000:NEXT:GOTO310
350 CLS:PRINT"LIST"::PRINT:IFF>1THEN360ELSEIFF=0PRINT"NO CHANGES
    WERE MADE IN BASIC STRATEGY."ELSEPRINT"ONLY ONE CHANGE WAS MADE
    IN BASIC STRATEGY - "C$(1)
355 FORN=1TO3000:NEXT:GOTO100
360 PRINT"A TOTAL OF "F"CHANGES WERE MADE IN THE BASIC STRATEGY."::
    PRINT"THESE WILL BE LISTED IN THE ORDER IN WHICH THEY WERE
    MADE.":PRINT:Y$="":INPUT"DO YOU WANT TO SAVE THE CHANGES ON TAPE
    (Y/N)";Y$:IFLEFT$(Y$,1)<>"Y"THEN370

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365 PRINT:PRINT"READY CASSETTE IN RECORD POSITION.":PRINT:INPUT"ENTER
    REVISION TITLE OR #";T$:PRINT#-1,T$,F
370 CLS:FORN=1TOF:PRINTC$(N),:
    IFLEFT$(Y$,1)<>"Y"THEN390ELSE=N=LEFT$(C$(N),2):
    IFMID$(C$(N),5,1)=""
    "THEND=VAL(MID$(C$(N),6,2))ELSED=VAL(MID$(C$(N),7,2))
380 P=VAL(MID$(C$(N),4,2)):C=VAL(RIGHT$(C$(N),1)):PRINT#-1,N$,P,D,C
390 NEXT:PRINT"LIST COMPLETE":PRINT:INPUT"--- PRESS ENTER TO RETURN
    TO MENU.":G$:GOTO100
395 DELETE20-2316
400 CLS:PRINT"QUIZ ::PRINT:PRINT"ENTER THE TWO CARDS MAKING UP THE
    PLAYER HAND, (USE A COMMA TO SEPARATE THE TWO ENTRIES). THE
    COMPUTER WILL SELECT THE DEALER UPCARD AT RANDOM.":PRINT
405 PRINT"WHEN YOU PRESS ENTER, THE COMPUTER WILL THEN DISPLAY THE
    CORRECTPLAY ACCORDING TO THE STRATEGY CURRENTLY IN MEMORY."::
    PRINT:INPUT"--- PRESS ENTER TO START QUIZ";G$
410 CLS:PRINTCHR$(23):P1=0:P2=0:INPUT"PLAYER HAND ::;P1,P2:
    IFP1<1ORP2<1ORP1>10ORP2>10THEN410ELSEPRINT:D=RND(10):
    PRINT"DEALER UPCARD ::D
420 IFP1=P2:IFPA(P1,D)=1THENN$="SPLIT":GOTO450
430 IFP1=1ORP2=1THENQ=SO(P1+P2+10,D)ELSEQ=HA(P1+P2,D)
440 IFQ=0THENN$="STAND"ELSEIFQ=1THENN$="HIT"ELSEIFQ=2THENN$="DOUBLE
    DOWN"ELSEN$="DOUBLE DOWN *"
450 PRINT:INPUTG$::PRINTCHR$(27)::PRINTN$::PRINT:PRINT:PRINT"PRESS
    ENTER FOR ANOTHER TRY.":INPUT"--- OR ENTER 'E' TO END QUIZ";G$:
    IFG$=""THEN410ELSE100
500 I$="PCI":CLS:PRINT"THE TEST WILL BE RUN USING THE STRATEGY,
    PLAYING RULES, AND POINT COUNT VALUES CURRENTLY IN MEMORY.
    THERE ARE TWO WAYS YOU MAY RUN THE TEST ::PRINT
502 PRINT"1 - STRATEGY ANALYSIS, (PC FIXED). EACH GAME IS DEALT FROM
    THE SAME MIX OF CARDS WHICH YOU PRESET YOURSELF.":PRINT:PRINT"2
    - BETTING SYSTEM ANALYSIS, (PC VARIES). A NORMAL DECK OR SHOE";
503 PRINT"IS DEALT DOWN TO A SPECIFIED NO. OF CARDS, THEN
    RESHUFFLED.":PRINT
505 PRINH$::Q=0:INPUT"--- WHICH SHALL IT BE, 1 OR 2";Q:
    IFQ>2ORQ<1PRINTCHR$(27)::GOTO505
510 PRINT:Y$="":INPUT"DO YOU WANT TO MODIFY THE PLAYING RULES ";Y$:
    IFLEFT$(Y$,1)<>"Y"THEN530ELSECLS:FORN=1TO9:M(N)=0:NEXT:Y$="":
    INPUT"1 - CHARITY GAME. DEALER WINS ALL TIED HANDS (Y/N)";Y$:
    IFLEFT$(Y$,1)="Y" M(1)=1
512 Y$="":INPUT"2 - DEALER MUST HIT A SOFT 17 (Y/N)";Y$:
    IFLEFT$(Y$,1)="Y" M(2)=2
514 Y$="":INPUT"3 - ACES MAY NOT BE SPLIT (Y/N)";Y$:
    IFLEFT$(Y$,1)="Y" M(3)=3
516 Y$="":INPUT"4 - NO DOUBLING DOWN AFTER A SPLIT (Y/N)";Y$:
    IFLEFT$(Y$,1)="Y" M(4)=4:Y$=""
518 PRINT:INPUT"--- OTHER DOUBLE DOWN RESTRICTIONS (Y/N)";Y$:
    IFLEFT$(Y$,1)<>"Y"THEN530ELSEPRINT"5 - LIMITED TO A TWO CARD 11
    COUNT.":PRINT"6 - LIMITED TO ANY 11 COUNT.":PRINT"7 - LIMITED TO
    ANY 10 OR 11 COUNT.":PRINT"8 - LIMITED TO ANY 9, 10, OR 11
    COUNT."

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520 J=0:INPUT"--- WHICH (5 - 6 - 7 - 8)";J:
    IFJ>4ANDJ<9M(J)=JELSEM(9)=0
530 V$="" :PRINT:INPUT"DO YOU WANT TO CHANGE THE POINT COUNT CARD
    VALUES (Y/N)";V$ :IFLEFT$(V$,1)<>"Y"THEN545
535 CLS:PRINT"SPC - SIMPLE POINT COUNT. THE NET COUNT OF CARDS
    PLAYED. IT ISSUPPOSED TO INDICATE WHETHER THE REMAING MIX
    FAVORS THE PLAYER (A + VALUE), OR THE DEALER (A - VALUE).":'
    PRINT
536 PRINT"PCI - POINT COUNT INDEX. THE SPC EXPRESSED AS A % OF THE
    NO. OFCARDS REMAINING UNPLAYED.":PRINT
538 PRINT"THE CURRENT POINT COUNT VALUES ARE SHOWN IN PARENTHESES.
    AFTER EACH CARD IS LISTED, ENTER THE VALUE YOU WANT TO USE, OR
    PRESS ENTER FOR NO CHANGE."
540 FORN=1TO10:PRINT@688+N*16,"#"N(",:GOSUB930:INPUT") ";I(N):NEXT:
    FORN=11TO13:I(N)=I(10):NEXT:G$="":PRINT:INPUT"--- PRESS ENTER TO
    CONTINUE, OR ENTER 'R' TO REDO";G$:IFG$="R"THEN535
545 PF=0:PG=0:DF=0:CLS:IFQ=2THEN547ELSEPRINT"STRATEGY TEST ::PRINT:
    PRINT"FOR A NORMAL MIX, USE A DELETION FACT OF 0.":PRINT:
    PRINT"WHEN SETTING UP THE DECK, ('DELETE CARD # ?'), USE #S 1
    THRU 13 TO INDICATE THE ACE THRU KING, 0 FOR NO MORE
    DELETIONS,";
546 PRINT" OR 14 TO";:PRINT"REDO THE SETUP.":GOTO550
547 PRINT"BETTING SYSTEM TEST ::PRINT:PRINT"BET SIZE WILL BE
    DETERMINED BY THE PCI OR SPC VALUES AT THE BEGINNING OF EACH
    DEAL.":PRINT:PRINT"YOU MAY USE BETTING RANGES, OR SET THE BET
    SIZE PROPORTIONATE TO";
548 PRINT"THE POINT COUNT. IF YOU CHOOSE THE LATTER, ENTER '0' IN
    RESPONSETO 'NO. OF BETTING RANGES'.":PRINT:PRINT"THE BET SIZE
    WILL BE 1 UNIT WHEN THE POINT COUNT IS NEGATIVE."
550 PRINT:PRINT"TO INTERRUPT THE TEST RUN AT ANY TIME, JUST PRESS
    ENTER.":PRINT:INPUT"--- PRESS ENTER TO CONTINUE";G$
552 CLS:INPUT"NO. OF GAMES";XG:IFXG>32766ORXG<1THEN552ELSEGM=XG
555 XI=0:E=0:PRINT@32,H$,:INPUT"NO. OF DECKS ";E:
    IFQ=2THEN1100ELSEFORN=1TO13:C(N)=0:NEXT:IFE>16ORE<1THEN555
560 K=0:PRINH$"DELETION FACTOR ( 0 TO"4*E") ";:INPUTK:
    IFK=0THEN568ELSEIFK<0ORK>4*ETHENPRINTCHR$(27);:GOTO560
565 IT=0:TC=0:J=0:INPUT"DELETE CARD #";J:
    IFJ<10RJ>15THEN568ELSEIFJ=14PRINT@32,CHR$(31);:
    GOTO555ELSEIFJ=15THEN535ELSEC(J)=J:FORN=1TO13:
        IFC(N)=NTHENIT=IT+I(N):TC=TC+1
566 NEXT:PRINT@90+64*TC,:PRINT"PCI =";:XI=IT*100/(E*52-K*TC):
    GOSUB940:PRINT:GOTO565
568 IFQ=1CLS:Y$="":PRINT"DO YOU WANT THE TEST TO BE RUN WITH A FIXED
    PLAYER HAND OR/AND DEALER UPCARD (Y/N)";:INPUTY$:
    IFLEFT$(Y$,1)="Y"PRINT:PRINT"ENTER THE CARD(S) TO BE FIXED, OR
    JUST PRESS ENTER FOR NO FIX.":PRINT:GOTO950
570 CLS:PRINT"THE AMAZING BLACKJACK":PRINT@71,"MACHINE":PRINT@32,"P":
    PRINT@96,"D":PRINT:PRINT" GAMES:"GM;TAB(16)"DECKS:"E;TAB(28);:
    PRINTI$":":GOSUB940:PRINT@232,"MODS":":FORN=1TO8:
    IFM(N)=NPRINTN;

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580 NEXT:PRINT:IFQ=2THEN1200ELSEIFK=0PRINT" NO DELETIONS";:
      GOTO590ELSEQZ=2500*K/E:PRINTQZ/100"% DELETION OF #(S) ";
      FORN=1TO13:IFC(N)=NPRINTN;
585 NEXT
590 PRINT@384,"GAMES PLAYED";:PRINTTAB(32)"UNITS BET":PRINT:
      PRINT"PLAYER WINS";TAB(32)"UNITS RETURNED":PRINT:PRINT"DEALER
      WINS";TAB(32)"HOUSE %"
600 ZB=0:PW=0:DW=0:YT=0:PU=0:DU=0:TC=0:IFQ=2TT=4*E:FORN=1TO13:
      FORNN=1TOTT:AB(N,NN)=0:NEXT:NEXT:T=0:PX=0:V(R)=999
605 FORI=1TOGM:B=1:SF=0:OP=0:OD=0:UP=0:UD=0:PRINT@67," ";:PRINT@81,"
      ";:IFQ=1FORN=0TO18:A(N)=0:NEXT:
      L=0ELSEIFR<>1THENIFR=0THEN1060ELSE1070
610 IFPF>0P(1)=PF:P(2)=PGELSEGOSUB800:P(1)=U:GOSUB800:P(2)=U
615 GOSUB800:D(2)=U:IFDF>0THEND(1)=DFELSEGOSUB800:D(1)=U
620 PT=2:GOSUB850:DT=2:GOSUB860:BQ=B:IFD=21THENIFP=21THENY=B:
      GOTO680ELSE685
625 IFP=21Y=2.5*B:GOTO690
630
      IFP(1)=P(2)THENIFM(3)=3ANDP(1)=1THEN650ELSEIFPA(P(1),D(1))=1THENS
      P=1:BQ=BQ+B:PT=2:GOSUB800:P(2)=U:GOTO630
650 B=BQ:GOSUB850:IFP>21THENUP=1:PU=PU+1:
      GOTO685ELSEIFOP=1THENNC=SO(P,D(1))ELSEC=HA(P,D(1))
655 IFC=0THEN670ELSEIFC=1THENPT=PT+1:GOSUB800:P(PT)=U:
      GOTO650ELSEIFM(4)=4ANDSP=1THEN870ELSEIFM(9)=9THEN880ELSEIFPT>2THE
      N870
660 PT=PT+1:GOSUB800:P(PT)=U:B=2*B:GOSUB850:IFP>21THENUP=1:PU=PU+1:
      GOTO685
670 IFD>21THENUD=1:DU=DU+1:Y=2*B:
      GOTO690ELSEIFD<17OR(D=17ANDOD=1ANDM(2)=2)THENDT=DT+1:GOSUB800:
      D(DT)=U:GOSUB860:GOTO670
675 IFP=DTHENY=B:GOTO680ELSEIFD>PTHEN685ELSEY=2*B:GOTO690
680 IFM(1)=1THEN685ELSEYT=YT+B:GOTO700
685 DW=DW+1:PRINT@81,"*";:GOTO700
690 PW=PW+1:YT=YT+Y:PRINT@67,"*";
700 ZB=ZB+B:TC=TC+PT:PRINT@34,H$,:FORN=1TOPT:PRINTP(N);:NEXT:
      PRINT@98,H$,:FORN=1TODT:PRINTD(N);:NEXT:
      IFUP=1PRINT@57,"BUST";ELSEIFUD=1PRINT@121,"BUST"
710 PRINT@402,I,:PRINT@434,ZB,:PRINT@530,PW,:PRINT@562,YT;H$:
      PRINT@658,DW,:PRINT@690,(ZB-YT)*100/ZB;H$
720 K$=INKEY$:IFK$=""THENNEXT
730 O$="#.#":PRINT@704,:FORN=1TO64:PRINT"-";:NEXT:PRINT"PLAYER
      BUST";USINGO$;PU*100/I,:PRINT"%";TAB(23)"DEALER BUST
      ";USINGO$;DU*100/(I-PU);:PRINT"%";TAB(46)"EFF INDEX ";:
      J$="#.#":ZP=(ZB-YT)*100/ZB
735
      IFQ=1PRINTUSINGJ$;(PU*DU*100/(I*I-I*PU))-ZPELSEPRINTUSINGJ$;((DW-
      PW)*100/I)-ZP
740 PRINT"CARDS PER HAND";USINGO$;TC/I,:PRINTTAB(23)"BET PER GAME
      ";USINGO$;ZB/I,:PRINTTAB(46)"P/L INDEX
      ";USING"+$##";(YT-ZB)*100/I

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745 IFI>=GMINPUT"--- PRESS ENTER FOR MENU";G$ : GOTO100
750 G$="" : INPUT"--- PRESS ENTER TO CONTINUE TEST RUN, OR ENTER 'M'
    FOR MENU";G$ : IFG$="" THENPRINT@704,CHR$(31) : :GOTO720ELSE100
800 IFQ=2THEN830
805 U=RND(13) : M=RND(4*E) : IFM>KTHEN815ELSEFORN=1TO13:IFU=C(N) THEN805
810 NEXT
815 FORN=0TOL:IFA(N)=13*M+UTHEN805
820 NEXT:L=L+1:A(L)=13*M+U:IFU>10U=10
825 RETURN
830 IFT=TT*13-STHEN=0:PX=0:FORN=1TO13:FORNN=1TOTT:AB(N,NN)=0:NEXT:
    NEXT
835 IFI$="SPC"THENXI=PXELEXI=(PX*100)/(52*E-T)
840 PRINT@225,, : GOSUB 940
845 U=RND(13) : M=RND(TT) : IFAB(U,M)=1THEN845ELSEAB(U,M)=1:T=T+1:
    PX=PX+I(U):IFU>10U=10
847 RETURN
850 P=0:FORN=1TOPT:P=P+P(N) : IFP(N)=1P=P+10:OP=1
854 IFP>21ANDOP=1THENP=P-10:OP=0
858 NEXT:RETURN
860 D=0:FORN=1TODT:D=D+D(N) : IFD(N)=1THEND=D+10:OD=1
864 IFD>21ANDOD=1THEND=D-10:OD=0
868 NEXT:RETURN
870 IFC=2THENPT=PT+1:GOSUB800:P(PT)=U:GOTO650ELSE670
880
    IF(M(5)=5ANDPT=2ANDP=11)OR(M(6)=6ANDP=11)OR(M(7)=7ANDP>9ANDP<12)O
    R(M(8)=8ANDP>8ANDP<12)THEN660ELSE870
899 GOTO899
900 PRINT@193,"PLAYER"; : PRINT@223,"DEALER UPCARD"; : FORN=1TO10:
    PRINT@265+5*N,N:NEXT:FORN=L1TOL2:PRINT" "N; :
    PRINTTAB(13)STRING$(50,"="):NEXT:K=329-64*L1:RETURN
910 F=F+1:G$(F)=N$+STR$(P)+STR$(D)+STR$(C) : RETURN
925 RETURN
930
    IFI(N)=0PRINT"0";ELSEIFI(N)>9ORI(N)<-9PRINTUSING"+##";I(N);ELSEPR
    INTUSING"+#";I(N);
935 RETURN
940 IFXI>-.5ANDXI<.5PRINT" 0";ELSEPRINTUSING"+##";XI; : PRINT" ";
945 RETURN
950 PF=0:PG=0:PRINTH$; : INPUT"PLAYER HAND (CARD #1, CARD #2)";PF,PG:
    IFPF=0ANDPG=0THEN955ELSEIFPF<1ORPG<1ORPF>10ORPG>10PRINTCHR$(27); :
    GOTO950ELSEPRINT
955 DF=0:PRINTH$; : INPUT"DEALER UDCARD";DF:IFDF=0THEN570ELSE
    IFDF<1ORDF>10THENPRINTCHR$(27); : GOTO955ELSE570
1060 B=XI*Z+.5:IFB<1B=1
1065 GOTO610
1070 IFXI<V(1)B=1ELSEIFXI<=V(2)B=B(2)ELSEIFXI<=V(3)B=B(3)ELSEB=B(4)
1075 GOTO610

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1100 IFE<10RE>4 THEN 555 ELSE PRINT
1105 PRINTH$; : S=1: INPUT "RESHUFFLING POINT (NO. OF CARDS TO BE LEFT
UNDEALT) "; S: IFS>51 *EPRINTCHR$(27); : GOTO 1105 ELSE IFS<1 S=1
1107 PRINT: Y$="" : INPUT "DO YOU WANT TO USE THE SIMPLE POINT COUNT
'SPC' (Y/N) "; Y$: IF LEFT$(Y$, 1) = "Y" I$="SPC"
1110 PRINT@384, CHR$(31); : R=1: INPUT "NO. OF BETTING RANGES (MAX. 4) "; R:
IFR=1 GOTO 570 ELSE IFR=0 PRINT: PRINT "BET SIZE = " I$; : INPUT " TIMES"; Z:
GOTO 570 ELSE IFR>4 ORR<0 PRINTCHR$(27); : GOTO 1110
1120 PRINT: PRINT "RANGE 1 : " I$ " LESS THAN"; : INPUT V(1):
IF V(1)<0 PRINT@512, CHR$(27); : GOTO 1120 ELSE PRINT@544, "BET SIZE = 1":
IFR=2 THEN 1150
1130 PRINH$" RANGE 2 : " I$ " FROM" V(1) " TO"; : INPUT V(2):
IF V(2)<=V(1) PRINTCHR$(27); : GOTO 1130 ELSE PRINT@608, ; : INPUT "BET
SIZE = "; B(2): IF B(2)<1 B(2)=1
1140 IFR=3 THEN 1150 ELSE PRINH$" RANGE 3 : " I$ " FROM" V(2)+1 " TO"; :
INPUT V(3): IF V(3)<=V(2)+1 PRINTCHR$(27); :
GOTO 1140 ELSE PRINT@672, "BET SIZE = "; : INPUT B(3): IF B(3)<1 B(3)=1
1150 PRINT "RANGE R": " I$ " GREATER THAN" V(R-1); TAB(32); : INPUT "BET SIZE
= "; BR: B(R)=BR: IF B(R)<1 B(R)=1
1160 PRINT: G$="": INPUT "---- PRESS ENTER TO CONTINUE, OR ENTER 'R' TO
REDO"; G$: IF G$="R" THEN 1110 ELSE 570
1200 IFR=0 PRINT "BET SIZE = " I$ " X" Z: GOTO 590 ELSE IFR=1 PRINT "BET SIZE
= 1 UNIT"; : GOTO 590 ELSE PRINT "I$ <" V(1) " B 1"; : IFR=2 THEN 1220
1210 PRINT "I$; V(1)" - "V(2) " B" B(2); : IFR=3 THEN 1220 ELSE PRINT "
I$; V(2)+1" - "V(3) " B" B(3);
1220 PRINT "I$ >" V(R-1) " B" B(R); : GOTO 590
2102 DATA 0,1,1,1,1,1,1,0,0,0
2103 DATA 0,1,1,1,1,1,1,0,0,0
2104 DATA 0,0,0,0,1,0,0,0,0,0
2105 DATA 0,0,0,0,0,0,0,0,0,0
2106 DATA 0,1,1,1,1,1,1,0,0,0
2107 DATA 0,1,1,1,1,1,1,1,0,0
2108 DATA 1,1,1,1,1,1,1,1,1,1
2109 DATA 0,1,1,1,1,1,1,0,1,1,0
2213 DATA 1,1,1,2,2,2,2,1,1,1,1
2214 DATA 1,1,1,2,2,2,2,1,1,1,1
2215 DATA 1,1,1,2,2,2,2,1,1,1,1
2216 DATA 1,1,1,2,2,2,2,1,1,1,1
2217 DATA 1,2,2,2,2,2,2,1,1,1,1
2218 DATA 0,0,3,3,3,3,3,0,0,1,1
2309 DATA 1,2,2,2,2,2,2,1,1,1,1
2310 DATA 1,2,2,2,2,2,2,2,2,2,1
2311 DATA 2,2,2,2,2,2,2,2,2,2,2
2312 DATA 1,1,1,0,0,0,1,1,1,1
2313 DATA 1,0,0,0,0,0,1,1,1,1
2314 DATA 1,0,0,0,0,0,1,1,1,1
2315 DATA 1,0,0,0,0,0,1,1,1,1
2316 DATA 1,0,0,0,0,0,1,1,1,1

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LEVEL III BASIC

A REVIEW

by

ROBERT MARSH

LEVEL III BASIC is back again. LEVEL III BASIC was originally written by MICROSOFT (the same people that wrote the present basic for your TRS-80). MICROSOFT sold the duplicating rights of LEVEL III to GRT CORPORATION who sold it under the name G2 LEVEL III BASIC. About six months ago, G2 went out of business. Now MICROSOFT is selling the popular package. For those of you who have purchased LEVEL III BASIC under the G2 name, the new MICROSOFT package is identical so don't buy it again.

LEVEL III BASIC is just a fantastic program for cassette owners...so why did GRT CORPORATION go out of business? Probably because it over advertised. They had a toll free number and full page ads in every computer magazine. G2 LEVEL III sold well...but their other products didn't. By advertising in the computer magazines (such as BYTE, KILOBAUD, CREATIVE COMPUTING, and PERSONAL COMPUTING), they were reaching a large population of TRS-80 owners who had disk drives. LEVEL III BASIC is designed to supplement the BASIC of cassette owners and has no advantage to disk owners. So...GRT wasn't able to make it, even though they had a good product.

LEVEL III BASIC is for cassette owners. It adds a number of commands to a cassette based system. It can also be used by disk owners. You can place LEVEL III BASIC on disk...but you can not store data or programs on your disk. Disk owners using LEVEL III BASIC have to store their data and programs on cassette...so disk owners will probably want to pass up LEVEL III BASIC.

LEVEL II BASIC requires a 16K LEVEL II system. It uses 5.25K. It adds many disk features to a cassette based TRS-80. One of its main advantages is advanced graphics which virtually turns the TRS-80 into an electronic drawing board. LEVEL III BASIC also corrects some of the problems with LEVEL II BASIC. It eliminates keyboard bounce and provides more reliable cassette loading. It makes cassette loading less sensitive to volume. Another major feature is the RENUMBER program (which does RENUMBER GOTO's and GOSUB's). Another major feature is a set of 26 user-changeable "Shift-Key Entries." Just press the SHIFT key and the R key simultaneously and your TRS-80 will execute a RUN command. You don't have to type R-U-N. Error messages are spelled out instead of abbreviated. The LINE INPUT can be used in place of INPUT for input that needs punctuation. This allows the user to INPUT quotes (""), and other punctuation. A timed INPUT function can be programmed to limit the

amount of time to respond to an INPUT or LINE INPUT statement.

DETAILS OF SOME COMMANDS

LEVEL III BASIC uses up about 5.25K of memory. The SHIFT-KEY ENTRIES can save enough room to add 5.25K of memory to your programs. SHIFT-G is GOSUB, SHIFT-S is THEN, SHIFT-Y is RIGHTS(...and you have a total of 23 additional abbreviated entries. You can also write your own SHIFT-KEY ENTRIES. So for example, you can make SHIFT-L represent IFI=8GOSUBL200. Or you can make SHIFT-A represent a formula such as R*T*D.

The RENUMBER program will renumber your program lines beginning at any line number and using any increment. It will not renumber the middle of a program (REMODEL from RACET computes is the only program that will do that). It renames a program from any point in a program to the end.

SPELLED-OUT ERROR MESSAGES will allow you to see spelled out errors such as OUT OF DATA (instead of OD).

If you have an expansion interface, LEVEL III BASIC adds the REAL TIME CLOCK feature to your Expansion Box. Actually, the REAL TIME CLOCK was included with the expansion interface, but previously required DISK BASIC. The REAL TIME CLOCK allows the user to call up seconds, minutes, hours, year, day and month for display on the video. This command can be used for games, timing certain applications, or charging computer users by the second for computer time!

LEVEL III includes a routine that automatically converts hexadecimal (base 16) and octal (base 8) numbers into decimal numbers (especially for serious programmers).

LOCKOUT RECOVER...if you lose control of your system, TRS-80 owner must press the RESET button...at which time you lose your entire program. Did you ever ENTER CLOAD when you meant to ENTER CSAVE? With LEVEL III (with or without the expansion interface), you just press the BREAK key and you will regain control over the keyboard...and MOST IMPORTANT...your program is still preserved.

LEVEL III's greatest asset is increased graphics. LEVEL III graphics will generate a line or rectangle between any two points on the screen. It lets you store a graphic array for later use on the same or a

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different portion of the screen. This is especially useful for writing programs with graphs, pictures and even animation. Eight extra graphics commands add a whole new level to the TRS-80. The instruction manual contains many actual program examples of how the graphics can be used. Remember, this is all in BASIC, not machine language. LEVEL III allows BASIC programmers to add machine language speed to their BASIC programs.

STRING capabilities. LEVEL III adds STRING commands found on DISK BASIC. It adds new MID\$ capability. The INSTR function searches for a substring within a larger string. For example, INSTR will allow you to pull "DEG" out of "ABKDKDEGLRS." It was possible to do this under LEVEL II, but only after some complicated programming.

DEF FN is used to define your own functions. Often a program will contain a particular operation or function that is repeated several times. By using the DEF FN statement you can define your own functions and save both time and memory. Instead of writing out the entire formula each time it is used, you only need to do a "function call."

LEVEL III BASIC expands the USR function so that 10 different machine language user routines can exist in memory at the same time.

The LINE INPUT statement function works just like INPUT except that it has the added capability of allowing for punctuation such as commas, colons, quotes or leading spaces. In addition, the LINE INPUT statement does not print the question mark (?). Some people find the question mark used in the INPUT statement to be annoying.

AND HERE IS MY FAVORITE OF ALL COMMANDS. As far as I'm concerned, this command is worth \$49.95 all by itself. INPUT#LEN and LINE INPUT#LEN puts a time limit on your INPUT commands. So, for example...you can write a program that asks for a persons age. You can specify that there has to be a response to the question within 30 seconds. If there is no response, the program continues (and could say something like...SORRY DUMMY, YOU BLEW IT!!!". This command is especially useful for games, programmed instruction, educational activities. It is great for user oriented programs. It can give the user additional instructions if response time isn't rapid.

LOAD and SAVE commands are just like the CLOAD and CSAVE commands, but can be aborted at any time with the BREAK KEY.

OUTPUT TO RS-232 PORT. This command makes it easy to output to a line-printer or any other device hooked up to the RS-232 port.

ALL YOUR PRESENT LEVEL II PROGRAMS WILL WORK WITH LEVEL III BASIC. LEVEL III BASIC PROGRAMS will not work on LEVEL II. To add LEVEL III BASIC to you're computer,

just load the tape and your ready. The program is easy to load.

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Microsoft Level III BASIC is sold at Computer retailers nationwide. If your local computer store doesn't have Level III, ask them to call us. You can call us, too, for the name of your nearest Microsoft dealer. Phone (206) 454-1315. Or write Microsoft Consumer Products, 10800 Northeast Eighth, Suite 819, Bellevue, WA 98004



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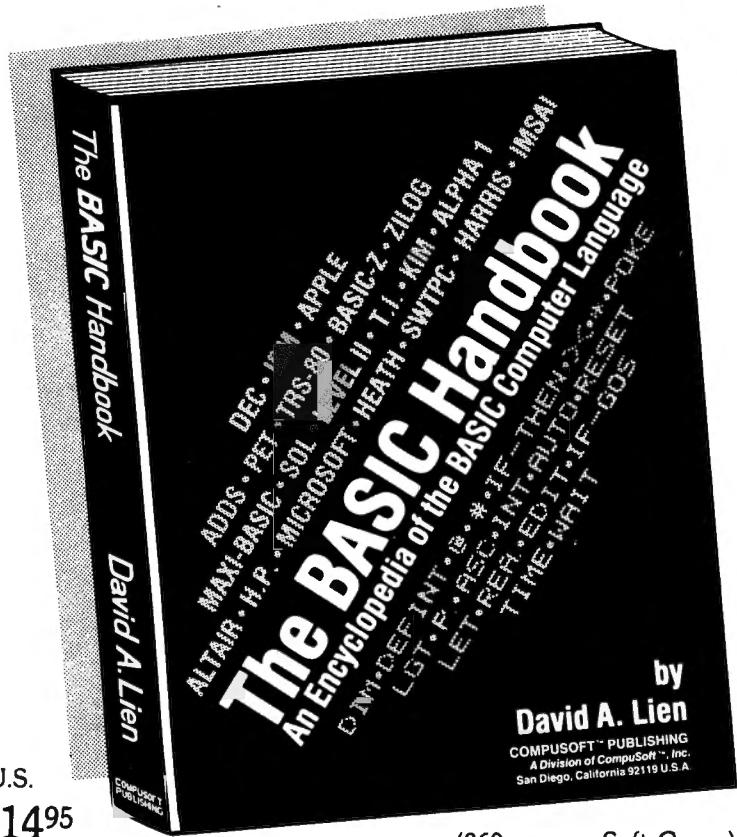
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