# THE ORIGINAL MAGAZINE FOR TRS-80™* OWNERS

H&E COMPUTRONICS INC.

*TRS-80™ IS A TRADEMARK OF TANDY CORPORATION

- PRACTICAL APPLICATIONS
- BUSINESS
- GAMBLING • GAMES
- EDUCATION
- PERSONAL FINANCE
- BEGINNER'S CORNER
- NEW PRODUCTS
- SOFTWARE EXCHANGE
- MARKET PLACE
- QUESTIONS AND ANSWERS
- PROGRAM PRINTOUTS
  . . . . AND MORE
- END OF THE TRS-80®
- DATA SEPARATOR
- CP/M
- CRYPTEXT
- ASSEMBLY LANGUAGE FOR BEGINNERS
- BREAKEVEN ANALYSIS
- CLEANUP
- HISTOGRAM
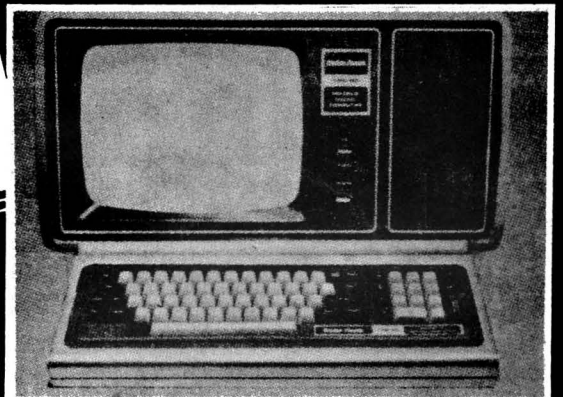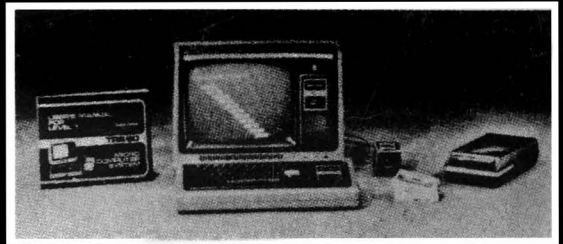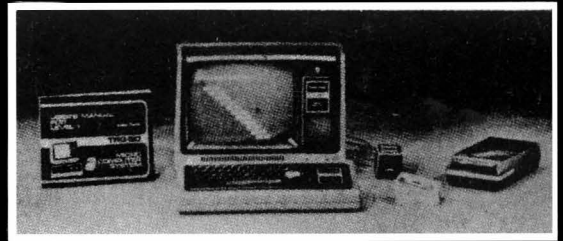
H&E COMPUTRONICS INC.

MATHEMATICAL APPLICATIONS SERVICE™

NEWSLETTER INFORMATION

THE **H&E COMPUTRONICS INC. MONTHLY NEWS MAGAZINE** IS PUBLISHED BY H & E COMPUTRONICS INC.

THE **H&E COMPUTRONICS INC. MONTHLY NEWS MAGAZINE** IS NOT SPONSORED, NOR IN ANY WAY OFFICIALLY SANCTIONED BY RADIO SHACK.

THE PURPOSE OF THE **H&E COMPUTRONICS INC. MONTHLY NEWS MAGAZINE** IS TO PROVIDE AND EXCHANGE INFORMATION RELATED TO THE CARE, USE AND APPLICATION OF THE TRS-80 COMPUTER SYSTEM.

H & E COMPUTRONICS INC. DOES NOT TAKE FINANCIAL RESPONSIBILITY FOR ERRORS IN PUBLISHED PROGRAMS, USERS ARE ADVISED TO CAREFULLY EDIT VITAL PROGRAMS.

THE **H&E COMPUTRONICS INC. MONTHLY NEWS MAGAZINE** ENCOURAGES COMMENTS, QUESTIONS AND SUGGESTIONS. WE PUBLISH ARTICLES AND PROGRAMS WRITTEN BY OUR READERS. COMPUTRONICS, INC. WILL PAY CONTRIBUTORS FOR ARTICLES AND PROGRAMS PUBLISHED IN THE NEWS MAGAZINE.

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.

INLAND COMPUTER SOCIETY — Contact Sandy Sparks, 3359 Second Street, Riverside, California 92501 or call (714) 256-5319 or (714) 784-3499

TRS-80 USER'S GROUP OF SANTA ANA — Contact Arnold Vags, 3713 S. Parton Street, Santa Ana, California 92707 or call (714) 784-0456.

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

MONTEREY BAY USERS' GROUP FOR TRS-80 USERS — Contact William S. Pitt, P.O. Box GH, Pacific Grove, CA 93950.

ALABAMA TRS-80 USERS' GROUP — Contact Errol Kyzer, Phone 281-2107.

WYOMING VALLEY COMPUTER CLUB — Contact Art Prutzman, 302 Wyoming Avenue, Kingston, 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.

WITCHITA VALLEY TRS-80 USERS GROUP, P.O. Box 1384, Witchita Falls TX 76307.

ADVERTISING RATES

BITS AND PIECES

by
Andrew Hofer

YOUR SUBSCRIPTION HAS EXPIRED IF . . .

THE NUMBER ABOVE YOUR NAME AFTER THE DASH ON THE MAILING LABEL IS 20 (OR LESS). THE NUMBER FOLLOWING THE DASH TELLS YOU THE LAST ISSUE THAT YOU WILL RECEIVE. For example, if your subscription number is 16429—20, your subscription expires with this issue (Issue #20).

KNOW YOUR SUBSCRIPTION NUMBER

When renewing your subscription or changing your address (or asking for information about your subscription), please include your subscription number.

H & E COMPUTRONICS HAS MOVED

H & E COMPUTRONICS, INC., has moved to a new office-warehouse complex. The public is invited between the hours of 9:00 and 5:00, Monday through Saturday. Phone orders are accepted 24 hours per day. Our telephone rings at more than one location.

Our new offices have allowed us to get orders out even faster than in the past. Some of our orders were delayed at the end of January due to the problems associated with moving (right at the height of our busy season). ALL ORDERS WILL BE PROCESSED WITHIN 24 HOURS. If an item is not in stock, notification will be sent immediately, along with our estimated shipment date. Please do remember that our estimated shipment date is only as good as the date that we are given by the original supplier. In any event . . . if an order is not shipped within 30 days, the buyer will be given the opportunity to cancel the order.

DIRECTIONS to our new offices

PALISADES PARKWAY to EXIT 10. Make a LEFT at the end of the exit ramp. Make a LEFT at the light (you will be on MIDDLETOWN ROAD). Take MIDDLETOWN ROAD to SMITH ROAD. Make a RIGHT turn onto SMITH ROAD. Take SMITH ROAD to its end. Make another RIGHT onto PASCACK ROAD. Make a final RIGHT turn at the WARRINER SMITH UTILITIES sign.

PLEASE CALL BEFORE YOU COME. We do welcome visitors.

OUR TELEPHONE NUMBER REMAINS THE SAME—OUR MAILING ADDRESS REMAINS THE SAME.

Packages shipped to our normal mailing address (P. O. Box 149) will be delivered by U.P.S. They do have our box number on file. Also note . . . our mailing address is NOT New York City. It is NEW CITY. Our telephone number is listed in the directory under 'H'—for H & E Computronics, Inc. (not 'C'). (We mention this because several people didn't believe we really exist because they couldn't find our address in the local directory.) Just for the record—our full office address is: H & E COMPUTRONICS, INC., 50 NORTH PASCACK ROAD, SPRING VALLEY, NEW YORK, 10977.

NOTES ON LOADING "MEM" MEMORY TEST

A few people have experienced problems loading the Memory Test from our free sample tape ("MEM" is the second of three programs on the tape). The following is from a letter received at H&E Computronics:

"The free tape you supply contains a Memory Test. This test was failing to load. The cause of my problem was attempting to load "MEM" from the beginning of the tape. When loading "MEM" from the beginning of the tape, a stop occurs around 31 on the tape counter, as if the program had loaded. The reply of "/28672" results in "MEMORY SIZE?" Once I positioned the tape beyond the first program on the tape (about 61 on the index), and then loaded "MEM," everything worked fine."

FOR MODEL II OWNERS— STOCK PORTFOLIO MODIFICATIONS

The Stock Portfolio Program which was published on page 426 of the November 1979 issue will not work on the TRS-80 Model II as written. The reason for this is that the Model II generates an End-Of-File condition and an error message when you attempt to read from a non-existant record. The Model I will simply read the necessary fields in as blanks or zeroes. In order to add new records at all, the following changes must be made for Model II:

```
50  PRINT "2. CHANGE ITEMS."
65  PRINT "4. ADD ITEMS"
80  ON X GOTO 100, 300, 500, 300
304 IF X = 4 THEN 310
```

If this is done, the program will not attempt to read a non-existant record while in the add mode. Model I users will not need to make the changes (If they don't make the changes, they receive the added benefit of verifying that the record space into which they attempt to write is really unoccupied).

DATA SEPARATOR FOR DISK OWNERS

(The following letter comes from Delbert Jones, President of The Bottom Shelf, Inc.)

"Rarely does a new product come along that we can recommend so thoroughly as a product called the DATA SEPARATOR. WE RECOMMEND IT SO COMPLETELY THAT WE DO NOT FEEL A BUSINESS APPLICATION SHOULD BE RUN WITHOUT ONE BEING INSTALLED. TBS did a thorough test of the DATA SEPARATOR. The result was staggering. We ran a test on a TRS-80 without a Data Separator and got a result of 50 soft errors per thousand attempted reads on track 34 of the disk drive. With the Data Separator, we ran the same test on the same disk drive and diskette. WE RAN 12,000 TESTS ON TRACK 34 WITHOUT A SINGLE ERROR. THAT, FOLKS, IS A STAGGERING IMPROVEMENT IN RELIABILITY.

In fact, Western Digital, the makers of the Controller Chip, made this statement on page 17 of their data sheet:

NOTE: Internal data separation may work for some applications. However, for applications requiring high data recovery reliability, WDC recommends external data separation be used.

Why didn't Radio Shack install a Data Separator in the TRS-80? We don't know. The manufacturer of the Controller Chip used in the TRS-80 recommends that data separation be used whenever reliability is important—apparently Radio Shack did not read the recommendations, or wanted to save a few dollars.

Now you can achieve reliability for the low price of $29.95. The Data Separator can be installed by a complete novice in less than five minutes. All you do is open the expansion interface, remove the Controller Chip (the largest chip on the board), plug the Data Separator into the Controller Chip socket, insert the Controller Chip into the socket provided on the Data Separator board, and reassemble the expansion interface case. Anyone can do it.

The information and programming that you store on diskettes is important to you. You have spent at least $2000 on your computer with disk drive. Isn't it worth another $29.95 to double the reliability of your disk input/output? If so, please contact your nearest TBS dealer, or if one is not convenient to you, contact us directly. The DATA SEPARATOR is a must for any important computer application."

(H&E Computronics is a TBS Dealer).

COMPUTER SECURITY

With every month that passes, more is heard about the problem of protecting software and data. In a story published by Westchester-Rockland Newspapers on January 6th, a case of computer-sabotage was described. In April of last year, employees of a Los Angeles time-sharing and text-editing firm, Proprietary Computer Systems, started work one morning only to discover—to their horror—that someone had accessed their system during the night and wiped out 158 essential customer codes. This was a terrible blow to PCS, as they had to work to get their system back in service and at the same time deal with customers whose jobs would suffer long delays. It was later revealed that not only the operations of PCS were compromised, but that 42 hours of computer time and much confidential information had been stolen.

With help from the telephone company and the FBI, PCS was finally able to track down a suspect—and in November a federal grand jury indicted a vice president of a rival New York computer firm, Bowne Information System, Inc. This executive was charged with attempting to defraud PCS by disrupting their operation, and stealing confidential data (perhaps harming the reputation of PCS with some of its customers), all for the purpose of gaining a competitive advantage.

No one knows how often this type of crime occurs, but the interest in computer security is certainly on the rise. (Just try to picture what an educated terrorist might do to a government computer system—perhaps no one could damage a vital defense system, but if anyone were able to tamper with, for instance, the Social Security Administration's system, the havoc created might well be unimaginable.) A study performed by the Stanford Research Institute showed that out of 65 computer crimes studied, the average loss in revenue came to $1,392,000 per incident. In certain cases, however, reported losses have been up to $50 million.

With more public and private operations using and becoming dependent on computers every day, Congress is finally considering proposals for tougher and more well-defined laws to deal with computer crime. In 1979, Senator Abraham Ribicoff introduced a bill to address this problem. If passed, the bill would make it a criminal act to defraud or damage a computer of the government or a government contractor. Also, the systems of FDIC banks and other computers engaged in interstate trade would be covered by the proposed bill. The penalties for computer crime under the proposed legislation could range from five years in prison to a fine of $50,000 or up to twice the amount involved in the fraud.

FURTHER NOTES ON PROTECTING SOFTWARE

(The following information was adapted from a column appearing in Interface Age Magazine).

One of the most tragic effects of software piracy is that many new firms selling innovative software may be put out of business before they can make their best contributions to the industry. This will hurt computer users as much as the companies that go bankrupt.

There seems to be no foolproof way of making software that cannot be copied by someone with the proper expertise. One way which might work would be to put a progam on a single-chip microcomputer that lacks memory test logic—however, to date, no such one-chip microcomputer exists. (Since all one-chip microcomputers contain self-testing logic, you can always read out the chip's contents as data). If some semiconductor company were to manufacture a one-chip microcomputer in which the memory test logic could be destroyed after serving its purpose, then a solution to this problem would be much closer—as the only way of reading such a chip's contents would be to break it open and examine it under a microscope. Until that time, it seems that no airtight technique of software protection will come into being, and unless pending legislation (mentioned in the previous section) should be passed, the odds will be stacked against the victim in United States Courts. As things stand now, the enormous Court costs of pursuing a software piracy case, perhaps for years, added to the revenue losses from more and more pirated copies of programs appearing, will very likely drive most software companies out of business.

The columnist for Interface Age believes that only three types of software companies are likely to survive:

1. System software vendors such as Digital Research (the developers of CP/M). These companies will survive because a lot of their income comes from sales to manufacturers, who are honest.
2. Those who have given up trying to make money on software; who give you the software and sell you the manual.
3. Custom software companies who sell the services of programmers rather than software products. This has always been a losing business for any group larger than a few partners.

Despite this gloomy outlook for the software industry, many new software companies show great promise and creativity, and with recent emphasis on security, it is hoped that concrete solutions will soon be offered to this problem. (For one possible development, see the New Products section in this issue).

DON'T BE AFRAID OF CP/M

H & E Computronics, Inc., is now selling a series of high priced business (and other) software available for the CP/M operating system. What does this mean?

If you own a disk drive, you received the RADIO SHACK Disk Operating System along with the drive. Actually, the diskette you received contained both the RS operating system and MICROSOFT BASIC. BASIC is the language that most RS programs are written in. That's how the user communicates with the computer. The operating system is the language that your computer uses to communicate with your disk drives. That operating system (DOS) tells your computer how to store the information that you have programmed on the computer.

CP/M is just another operating system that lets your computer talk to the disk drives and store information. One of the advantages of CP/M is that it is more universal. To give you an example—let's say you buy a RS Payroll System from a RADIO SHACK store. This program will only work on a RADIO SHACK computer. Now, suppose you buy a GRAHAM-DORIAN payroll program. This program works on any computer that is using a CP/M operating system. You will be able to use the same diskette on a TRS-80 and other computers using the CP/M operating system (and same size diskette).

What does this mean to business users? There is a large amount of fully tested software available for CP/M owners. These programs are fully tested and have been functioning for a number of years. These programs are available to TRS-80 owners who own CP/M. There is one more catch. CP/M is only the operating system—you also need a method of interacting with your computer (similar to BASIC). Any BASIC programmer can learn to program under C-BASIC in minutes.

Does this mean that we can just buy a CP/M-CBASIC program and run it while knowing nothing about CP/M? No . . . not quite. A good BASIC programmer can read the CP/M and CBASIC manual and learn how to transfer CP/M and CBASIC to their program diskettes. Let's go back one step. When you buy a Payroll program, for example, that works under CBASIC and CP/M, it does not come with CBASIC and CP/M on the Payroll diskette. You must follow the instructions in the CP/M and CBASIC manual so that you can transfer the programs onto a diskette that is ready to run. For those of you who prefer not to do any ready-to-run . . . and for those who want a TURN-KEY system, H & E Computronics, Inc., will do all the work for you. All you will have to do is turn on your system, the diskette will AUTO load everything and you will be ready to use the program.

CRYSTAL BALL DEPARTMENT
(NEW PRODUCTS FROM RADIO SHACK)

WARNING . . . THE INFORMATION FOUND IN OUR CRYSTAL BALL DEPARTMENT DOES NOT REPRESENT VERIFIABLE FACT. WHAT FOLLOWS ARE RUMORS FROM WHAT WE CONSIDER TO BE RELIABLE SOURCES (unless otherwise stated).

1. This rumor may sound a little far out . . . but we are almost willing to bet on it. As of June 1, 1980, production of the TRS-80 MODEL I will cease. RS will announce their new color computer around that time. Programs will probably not be compatible. Several RS Computer Managers were asked if they could confirm the rumor. The RS managers thought that the rumor was out of the question. Our source was willing to bet $1000 that the rumor was, in fact, true (within at least 90 days of June 1). Since most of our other rumors were pretty accurate—we're willing to believe our source.

Why should RADIO SHACK stop manufacturing the TRS-80 MODEL I? There are several reasons why it may be to the best advantage of RS to discontinue the MODEL I.

RADIO SHACK business will not suffer with the introduction of a new computer. Those who were thinking about buying the TRS-80 MODEL I will surely be willing to pay about the same price for a comparable color computer. The new computer will sell for about $400 (not including a video). The computer can be plugged right into a standard color TV . . . so the actual price for getting into computing is less than that of the TRS-80 MODEL I.

Several Japanese companies are about to announce the introduction of similar computers. With customers given a choice between a $600 black and white RS computer and a $400 color PANASONIC computer—RS would be into hard times. By announcing their new computer prior to the introduction of the Japanese computers, RS will offset most of the new competition.

The MODEL II is not selling as well as RS would like to sell. One problem is that the MODEL II seems to be pretty similar to the MODEL I (although I would disagree). The new computer will not emphasize the business aspects of computing that were emphasized on the MODEL I. That means that there will seemingly be a wider spread between the MODEL II and the new lower priced computer (although the new computer will probably be equal to the old MODEL I—at least in capability and capacity).
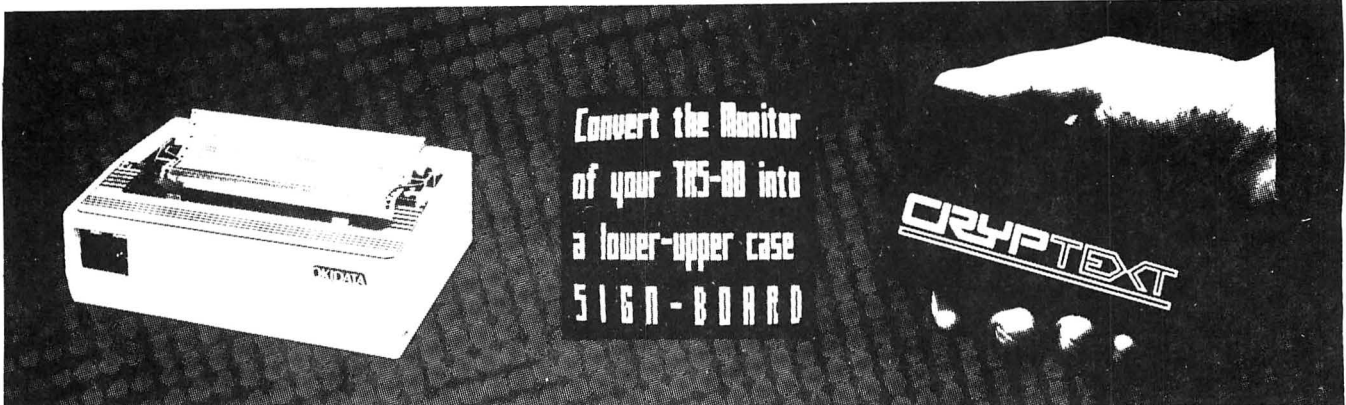
There is no doubt that many MODEL I owners will sell their MODEL I's and get the new computer just to get the added color. This will add to initial sales of the color computer.

SEARS is now selling the ATARI. Now RS will be selling a computer equal to (or better than) the ATARI and the APPLE for half the price.

It is not so outrageous to think that RS will scrap the MODEL I knowing that they can replace it with an equal or better computer. Sure, many TRS-80 MODEL I owners will be somewhat unhappy to see their computer replaced by a better one, but that won't hurt RS sales. After all, progress is coming out with something better. The RS computer is certainly the most cost-effective around.

2. New software for the TRS-80 MODEL II will be in COBOL. RS is working on a completely integrated business system that will be in COBOL. Availability date is unknown. .

NEW PRODUCTS

IMPORTANT NOTICE

CRYPTEXT DATA AND SOFTWARE SCRAMBLER

Cryptext Corporation has introduced a Hardware Encryption Device which claims to be the ultimate in data and program protection designed for the TRS-80. CRYPTEXT connects directly to the back of the TRS-80, or to the Bus Expansion Card Edge on the expansion interface.

In using CRYPTEXT, an 80-Bit "Key" Code is selected, which determines how the data will be encoded. Each 80-Bit Key produces a distinct version of the encoded data, yielding a choice of 2^{80} different code sequences—and a "Code Branch" feature is said to increase the number of possibilities to "well over 2^{350}" (greater than 1 googol).

Data is encoded at over 15,000 characters per second, and can be transmitted by phone modem or carried on tape or disk to another CRYPTEXT-equipped machine, to be decoded by using the same Key Code.

CRYPTEXT is said to be capable of defeating the efforts of experienced code-breakers, making passwords and other protection methods obsolete (they compare CRYPTEXT with a government/IBM developed Encryption Algorithm, which provides for a Key only 56 bits long). It can't even be broken open to study its interior—it is encased in a solid block of epoxy.

A complete CRYPTEXT package for the TRS-80 costs $389 and includes the CRYPTEXT unit, User's Manual, Extension and Power Cables, and a taped Demo Program. The User's Manual may be purchased separately, with the price ($4.95) credited to a subsequent purchase of CRYPTEXT.

CODEFILE is a Disk-Based Assembly Language File Encryption Program for use with CRYPTEXT, and is sold separately for $29.95.

The people at Cryptext Corporation seem quite confident that their product does all that's claimed for it—They offer a reward of 3 OUNCES OF GOLD to anyone who can break a test message without the Key (I'm sure you all know about the price of gold).

For more information about CRYPTEXT, contact:
Cryptext Corporation, P. O. Box 425, Northgate Station, Seattle, Washington 98125 (206)-364-8585

INTERFACE YOUR TRS-80 WITH A TYPESETTER

It is now possible to use your TRS-80 to produce high-quality copy on a phototypesetter. Picture your Electric Pencil files coming out looking like what you're reading now—with size, spacing, and style control, and perfect justification. Gretczko Advertising of New York City has developed an interface and software to make the conversion from a TRS-80 file to one which will run on a phototypesetting system. For the moment, they offer only a typesetting service—you send your text files, and they will be processed into typeset copy to your specifications. They are working on equipment to interface TRS-80's with phototypesetters of several different brands, and, though the inside workings of these machines are closely guarded by the corporations that manufacture them, they hope to make this system available for general sale soon.

For more information on TRS-80 Typesetting, contact:
Irvin Gretczko, Gretczko Advertising, 255 West 90th Street, New York, NY—(212)-787-5634

TRS-80 CASSETTE SOFTWARE DUPLICATION

Have you come up with a program that you think you might be able to sell, if only you could find a reasonably priced and thoroughly reliable way to mass-produce it? Well, Microsette Company is offering to duplicate TRS-80 Level II cassette programs—and their copies will load reliably over a volume setting from 4 to 8 or more on all Radio Shack cassette decks. They say that "even with the head purposely misaligned, these tapes will still load more reliably than prerecorded cassettes made by others." This service costs $217 for a minimum of 100 copies—and you can get your copies by writing or calling:
Microsette Company, 475 Ellis Street, Mt. View, CA 94043 (415)-968-1604

SPEAKING OF CASSETTES . . .

TARZAC Systems has announced their new line of Professional Five-Screw Leaderless Computer-Cassettes. The TARZAC Systems "Microcomputer Mass Memory Unit" consists of ten C-12 or ten C-20 Computer Cassettes in a deluxe vinyl storage book. TARZAC cassettes are unconditionally guaranteed for life—return any malfunctioning cassette pre-paid for immediate replacement.

Prices: ten C-12 Cassettes for $17.95; ten C-20 Cassettes for $24.95; Shipping $1.60 per Album.

Order from:
TARZAC, 700 Baker Road—Suite 115,
Virginia Beach, VA 23462 (804)-497-1165
(Educational institutions may take advantage of a 20% discount from retail prices—minimum order: $100).

OKIDATA PRINTERS

Okidata Corporation produces a line of low-cost, high quality impact printers, and say that their newest serial printer—the Microline 80, combines the best features of the Radio Shack Line Printers II and III, adds a few features of its own, and costs less—$945 for the Microline 80, compared to $999 for the Line Printer I and $1999 for the Line Printer III. The major features for comparison of the Microline 80 with the Radio Shack Printers were given as follows:

Printing with a 9 by 7 print matrix—giving a print quality equal to the Line Printer III.

Printing in upper/lower case, and in wide, medium, and 132-column condensed format—the last of which is only available with the Line Printer III.

6 or 8 line per inch spacing—only available with the Line Printer III.

Block Formatted Graphics—not available on any Radio Shack Printer.

Auto Line Feed—the Microline 80 is capable of handling a CR/LF or a CR only.

Adjustable Tractor feed—available on the Line Printer III—also available as an option with the Microline 80.

Okidata warrantees the printing head for 200,000,000 characters, and the ribbon for 2,000,000 characters. The Microline 80 interfaces are microprocessor-controlled; standard models include Centronics-compatible parallel and RS232 serial versions.

If you're interested, they're waiting to hear from you at:
Okidata Corporation, 111 Gaither Drive,
Mount Laurel, NJ 08054 (609)-235-2600

HAVE PROBLEMS ARRANGING YOUR SYSTEM?

Maybe there's an answer to your problem. DATACOM CABLE is now offering Data Cables manufactured to standard EIA—RS-232 specifications. Cables are available with Male/Male, Male/Female, and Female/Female connectors, and in 10, 15, and 25 foot lengths.
Contact:
Datacom Cable, Div. of Ossman Instruments Service Corp.,
1 Adler Drive, East Syracuse, NY 13057 (315)-437-7245

GIANT MONITOR SCREEN

From Europe comes a program to print giant messages on the TRS-80 screen. The program is useful wherever changing information must be monitored from a distance. Possible applications include process control in industry, laboratories, announcements, time-tables, and educational programs. The program is rather fast, being a "semi-machine program" (using VARPTR and POKE) and comes with an elaborate routine for input/output and editing.

Write to:
Dr. Joachim Traeger, Isartalstraße 45a
8000 München 5, West Germany

New Publications

CONSULTANT DIRECTORY FOR COMPUTER USERS

The COMPUTER CONSULTANT is a new publication aimed at helping the computer user who wants to avoid problems, who wants quality, professional assistance with his data processing requirements. Each issue of COMPUTER CONSULTANT provides descriptions of consultants in different parts of the country, with varying specialties—hardware selection, system development, and training, to name a few. A special "Consultants Wanted" section allows subscribers to make particular requests for consultants at no extra charge.

The publisher—
Battery Lane Publications, P. O. Box 30214,
Bethesda, MD 20014
—is offering charter subscriptions for $15 per year.

COMPUTER NEWSLETTER FOR ENGINEERS

Engineering Computer Applications, Inc., has begun publication of the ENGINEERING COMPUTER APPLICATIONS NEWSLETTER (ECAN). ECAN provides the information and guidance needed to obtain and effectively use microcomputers and desktop computers to increase productivity and profits. Experiences of other engineers, reports of computer capabilities and limitations, guidelines, new developments, costs, and literature reviews will be abundant. Computer jargon will be minimal.

To order your subscription, contact:
ECAN, Engineering Computer Applications, Inc., 5 Denver Tech Center—P. O. Box 3109, Englewood, Colorado 80111 (303)-771-5307

FINANCIAL SYSTEMS REPORT

The Financial Systems Report is a new periodical on computer systems for accountants, attorneys, insurance and investment advisors, and financial planners. Each month's issue will include news about programs, equipment, services and supplies; reviews of various computer information sources; notices of conferences, seminars, and new organizations; and an open forum for the exchange of views by subscribers.

The Report concentrates on comparing the virtues of time sharing (massive data bases, electronic mail, etc.) with the advantages of small computer systems (minimal cost for running time)—and the editors emphasize that it is most economical for a business to combine the best features of both:

"Timesharing is most economical when you need a special-

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ized program for periodic and limited use. Having your own in-house computer is most economical for applications that involve repetitive use of a small number of programs. Using timesharing for a general ledger application for 20 hours each week at an average cost of $25 to $50 per hour is not economical. Nor is it economical to pay $5000 for a program that you will use about 2 hours each month if a comparable program can be rented through a timesharing system for less than $150 per month."

It should be said, however, that it is a bit disappointing to see the FINANCIAL SYSTEMS REPORT using a TRS-80 Model II as its cover logo, and then find that nowhere in the first issue is there mention of anything to do with TRS-80's specifically, and that only one item refers to BASIC at all (we find that it's available along with FORTRAN and COBAL in a timesharing system). Several of the systems described in the Report sound really terrific—until you read the whole article. For instance, a tax forecasting program—which runs a sophisticated series of simulations to check the possible outcomes of various tax strategies for corporate Federal and State returns—is written in ANS Cobal and requires 150k of memory. A similar, simpler program is written in Fortran IV and can be modified to run on small computers with Fortran capability (CP/M anyone?). One can at least hope that the Report will in the future respond to the widespread popularity of the TRS-80 by including items of more direct interest to TRS-80 users—or quit using the Mod II logo.

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GETTING IT TOGETHER IN ASSEMBLY
(ASSEMBLY LANGUAGE FOR BEGINNERS)

Column #12: More about Arithmetic Operations

by
Dr. Hubert S. Howe, Jr.

16-Bit Instructions

As I mentioned in our last column, the Z-80 also has 16-bit addition and subtraction operations. Most of these use the HL register pair in the same way that the 8-bit operations use the accumulator. The index registers can also be used for addition only. The operations are as follows:

ADD	HL,ss	ss must be BC, DE, HL, or SP
ADC	HL,ss	
SBC	HL,ss	
ADD	IR,pp	pp must be BC, DE, SP, or IX or IY (IX can only be added to IX, and IY to IY)

One of the first important differences between the 8-bit and 16 bit operations is that the 16 bit operations require that the operands reside in the registers themselves; no add or subtract with memory or immediate data exists. Fortunately, the Z-80 also has instructions that load double registers directly to or from memory (the 8080 only allowed this with HL).

There are two important applications of the 16-bit operations: the computation of memory addresses and integer arithmetic in Level II Basic. Any memory address can be contained in a 16-bit register; you can thus compute the addresses where data are stored if you need to. Level II Basic integers may have values from –32768 to +32767. The main difference between these two applications is the same as between signed and absolute bytes: memory addresses are usually considered on an absolute scale from 0 to 65535, while Level II Basic integers use the sign bit. If you are familiar with the PEEK and POKE statements, perhaps you already know that if you want to PEEK or POKE from locations 32760 to 32770 you have to go from 32760 to 32767, and then from –32768 to –32766. The rule for this anomaly is that if the PEEK or POKE address is above 32767 you must subtract it from 65536. Locations 32768 to 65535 are thus referred to by –32768 to –1.

The 16-bit instructions can be used to perform the same multiple-precision adds and subtracts mentioned above in fewer instructions. The problem here is that the register pairs cannot be used to contain addresses since they have to be used to hold the data itself. This requires either reorganizing the use of the registers in the subroutines, or using additional instructions to fetch and store the bytes. The following subroutine performs a 32-bit add as shown in our previous

column using the 16-bit instructions. In this example, IX and IY contain the addresses of the first byte of the operands. IX is also used as a pointer to the result.

```
ADD4    LD      B,2         ;loop twice
        OR      A           ;clear carry
ADD4LP  LD      L,(IX)      ;1st byte of 1st operand
        LD      H,(IX+1)    ;2nd byte of 1st operand
        LD      E,(IY)      ;1st byte of 2nd operand
        LD      D,(IY+1)    ;2nd byte of 2nd operand
        ADC     HL,DE       ;perform addition
        LD      (IX),L      ;save lsb
        LD      (IX+1),H    ;save msb
        INC     IX          ;inc each reg twice
        INC     IX          ;since 2 bytes
        INC     IY          ;added each time
        INC     IY
        DJNZ    ADD4LP      ;continue
        RET                 ;done
```

It can easily be seen that the additional work required to fetch and store the data makes this method unwieldy and cumbersome. Note also that the previous contents of HL, DE, and B are lost in the above subroutine; saving and restoring them would require a minimum of six additional instructions.

The main advantage of the 16 bit arithmetic instructions is that they can be built right into the code of a program section so that they do not require calling an external subroutine, which is necessary for most other types of arithmetic performed by the Z-80.

One final note: all 16-bit numbers, whether they represent addresses in machine instructions or Level II Basic integers, are stored "backwards" in memory, with the least significant byte first. This is done automatically by the LD instructions, so that you never have to worry about it except if you go PEEKing through the individual bytes in memory. As we have seen, one advantage of this method (which goes back to the 8008, the predecessor of the 8080) is that the bytes can be added in the order in which they occur in memory for multiple-precision operations.

INC and DEC

The INC ("increment") and DEC ("decrement") operations are also classified as arithmetic operations, because they add or subtract 1 from the registers even though the value 1 can never be changed. There is a fundamental distinction between

the single- and double-register INC and DEC instructions: INC r and DEC r affect the condition codes, but INC ss and DEC ss do not. Unfortunately, Zilog uses the same mnemonic in each case, so the only way to keep it straight is to note carefully the operands. (In Intel's 8080 mnemonics, 'INC ss' and 'DEC ss' are replaced by 'INX s' and 'DCX s'; 'X' is always used for double registers, and 's' is the first register of the pair.)

INC and DEC should always be used when you want to add or subtract only one from a register, because the operation requires only one byte and executes in 4 T cycles. These are also convenient when you need to step through a series of bytes one at a time, as we saw above in the multiple-precision addition and subtraction loops.

Single registers can be used to hold a count of the number of times a series of instructions is to be executed. This feature is provided automatically in the DJNZ instruction, which DECrements B and branches to a nearby location (it is a jump relative) if B is non-zero. Up to 256 iterations can be achieved by this method, because the register is decremented before the 'JR NZ' occurs (to get 256 iterations, start B with the value zero). Similar operations can be carried out using any single register, although two instructions (the DEC and JR or JP NZ) are needed.

A similar procedure can be instituted with the double registers, but the fact that these INCs and DECs do not affect the condition codes forces a revision in the procedure. The use of two registers makes it possible to go through up to 65536 iterations in a loop. A special process is necessary to test whether the value in the double register is zero. One of the most common methods of doing this is the following, which tests whether HL is zero:

```
LD    A,H     ;load A from H
OR    L       ;or A with L
JR    NZ,LOC  ;if non-zero, continue
```

(Why this works will be explained later in our discussion of logical operations.) The disadvantage of this method is that it destroys the value in the accumulator, but practically any other method would either do the same or would be more complex than simply saving and restoring A.

Floating-Point Numbers

FLOATING-POINT NUMBERS are the most common method by which numbers containing both an integer portion and a fractional portion are represented in computers. A floating-point number contains a SIGN, EXPONENT, and FRACTION; there is also a sign of the exponent. The Level II Basic Reference Manual claims that the fraction contains a certain number of SIGNIFICANT FIGURES. Actually, it contains a number of significant BITS which more or less correspond to a number of significant decimal digits. The only difference between single and double precision numbers is the number of bytes used for the fraction: single precision numbers use three and double precision numbers use seven. The exponent is the same in each case and requires one byte. The accuracy of double precision numbers is greater, but still not perfect, as we will see below.

Floating-point numbers on the TRS-80 have the following format: the last byte contains the exponent, and the order of the first three bytes is 'backwards' in memory. The last byte

is what you will see if you PRINT PEEK(VARPTR(X)+3) for single precision numbers, where X is the number, or PEEK(VARPTR(X)+7) for double precision numbers. The first bit represents the sign of the exponent, 1 being used for positive exponents and 0 for negative exponents. A 'positive' exponent means that the binary point (same as 'decimal point' but for binary numbers) is moved to the right, and a 'negative' exponent means that it is moved to the left, producing a value less than 1. The exponent itself is contained in the remaining seven bits, and can thus range from –127 to +127. There is one exception: if this whole byte is zero, then the number itself is zero. 2 to the 127th power allows a range of values up to about 10 to the 37th or 10 to the –39th power. Any number in this range is represented with about six significant figures for single precision numbers or 16 significant figures for double precision numbers. The following are some examples of floating-point exponents:

hexidecimal	binary	meaning
81	1000 0001	+1: point moved one bit to the right
83	1000 0011	+3: point moved 3 bits to the right
7D	0111 1101	–3: point moved 3 bits to the left
80	1000 0000	+0: the point is immediately to the left of the first bit

The fraction of the number gives its value and is contained in the remaining bytes in a backwards order. In addition, the first byte of the fraction, stored next to last in memory (VARPTR(X)+2 for single precision numbers), gives the SIGN of the number in its leftmost bit, 0 indicating a positive and 1 a negative number. There is no difference between positive and negative numbers except for this bit (no two's complement notation for floating-point numbers!). This leaves the most significant bit unaccounted for, and THIS BIT IS ALWAYS IMPLIED TO BE A **1**. A fraction consisting of 3 bytes of zeros thus actually represents +1 binary. Now all we have to do in order to evaluate floating-point numbers is to remember that each binary bit represents a power of 2: positive values equal 1, 2, 4, 8, 16, etc., and negative values 1/2, 1/4, 1/8, 1/16, etc. The following examples illustrate how some floating-point values are actually stored in memory:

hexidecimal (order in memory)	binary fraction (correct order)	decimal value
(a) 00 00 00 81	1000 0000 0000 0000 0000 0000	1.0

The binary value of this number is 1 followed by all zeros. The exponent +1 means that the binary point is moved one bit to the right, producing 1.0000 (etc.). The sign of the number is positive.

(b) 00 00 40 83	1100 0000 0000 0000 0000 0000	6.0

When the exponent of +3 is applied, the binary number produced is 110.0, which equals decimal 6.

(c) 00 00 40 81	1100 0000 0000 0000 0000 0000	1.5

Moving the exponent one bit to the right produces 1.1 binary. ".1" represents one-half in binary notation, so this number is 1.5.

(d) 00 00 F0 84   1111 0000 0000 0000 0000 0000   –15.0

1111 binary equals 15, but don't forget that the first bit of the third byte is the sign of the number.

(e) 00 00 F0 80   1111 0000 0000 0000 0000 0000   0.9375

The exponent 0 means that the binary point is immediately to the left of .1111. This value is thus $1/2 + 1/4 + 1/8 + 1/16 = 0.9375$. This example shows that for values less than one, you don't always have exactly six significant figures. Here is a four-digit number represented completely correctly in only four bits. Most numbers do not have such accuracy.

(f) CD CC 4C 7D   1100 1100 1100 1100 1100 1101   0.1

Just looking at the binary value of this number tells you that it is a repeating fraction in binary form, just as 1/3 in decimal form gives .33333 . . . . The exponent 7D equals –3, so the fraction is .00011001100 . . . etc. The value is computed as $1/16 + 1/32 + 1/256 + 1/512$ . . . etc. $= .0625 + .03125 + .00390625 + .001953125 = .099609375$, getting closer and closer to .1 as the process continues.

These examples illustrate some of the problems that occur when using floating-point numbers. Many decimal numbers cannot be represented precisely without losing some tiny bit of accuracy. When many arithmetic operations are performed on the same values, the magnitude of this inaccuracy increases. This imprecision is a result of the method of number representation and does not disappear when double precision numbers are used, although the amount of error decreases. You must remember that the number always contains significant figures (bits). If you add 100000.0 and .0001 using single precision numbers, the result will be 100000 because of the loss of significance past the sixth digit. Figuring out the value represented by some number, or figuring the floating-point number corresponding to some value, is no easy task.

What these examples illustrate is that it is difficult enough just to understand how floating-point numbers are represented inside the computer, let alone how to do arithmetic on them. Each arithmetic operation requires a complicated subroutine that may execute thousands of machine instructions for each call. While Basic may be slow in general, it is usually preferable to perform such operations as floating-point calculations using Basic rather than assembly language.

Binary-Coded-Decimal Numbers

There is another number format frequently used with the 8080 and Z-80 microprocessors. It was considered to be so important by the designers of these microprocessors that they included a special machine operation and two special flags to enable arithmetic operations to be done easily in this form. This number format is called BINARY-CODED-DECIMAL or BCD. The special operation is the DAA ("decimal adjust accumulator") instruction, and the flags are the half-carry (H) and Add/Subtract (N) flags, which are used only by DAA although they are set or reset by many operations.

The advantages of BCD numbers are that they are inherently very easy to understand, and any inaccuracies they contain are the same as decimal numbers with which we are so familiar. Although four bits can contain values from 0 to 15, the values from 10 to 15 are never used. Instead, when a DAA operation is performed, any values above 9 are adjusted so that the maximum value contained in a digit is 9, and in a byte 99, the excess value being shifted into the carry bit.

Any series of N BCD bytes contains N × 2 decimal digits. In our examples below we will restrict our use of decimal numbers to two-byte quantities capable of holding values from 0 to 9999. We will first illustrate some BCD numbers, and then arithmetic operations (addition and subtraction) performed on them. One convenient property of BCD numbers is that their decimal and hexadecimal values are the same.

(a)	decimal:	1	2	3	4
	binary:	0001	0010	0011	0100

(b)	decimal:	5	6	7	8
	binary:	0101	0110	0111	1000

(c)	decimal:	9	9	9	9
	binary:	1001	1001	1001	1001
	(maximum value)				

When arithmetic operations are performed on BCD numbers, we have to remember that there are no special operations different from binary additions and subtractions, but BCD numbers must be adjusted so that they never represent a value of more than 9 in any digit. This is where the special DAA operation is required. How is works may be seen from some examples:

(d)	decimal	binary			
	1234	0001	0010	0011	0100
	+5555	0101	0101	0101	0101
	6789	0110	0111	1000	1001
	hexadecimal =	6	7	8	9

Since the sum of no two digits is greater than 9, no adjustment was needed here.

(e)	decimal	binary			
	6789	0110	0111	1000	1001
	+1111	0001	0001	0001	0001
	7900	0111	1000	1001	1010
	hexadecimal =	7	8	9	A

wrong!

When the sum of two digits is greater than 9, a correction in the form of a carry is required, just as it is when you add two digits by hand. The important and simple fact about this carry is that the computer can do it just by looking at each successive digit, starting with the least significant. This adjustment is made by means of the DAA instruction. If the value in any 4-bit digit after an add operation is performed is greater than 9, 6 is added to it and a carry is added to the next digit. The right digit within the byte sends its carry to the left digit, and the left digit sends it to the next byte by means of the carry flag. If the result is greater than 9999, it cannot be contained within two bytes anyway, so it languishes in the carry bit and

the result shows only the right four digits. As long as DAA is performed after each operation, the result will never get off.

In example (e) above, if a DAA is performed after the first (rightmost) addition which yielded 9A, A would be changed to 0 and 1 added to 9, producing another 0 and setting the carry bit. When the carry is added to the next byte it produces 79, thus yielding the correct value of 7900 as the result.

(f)

decimal	binary			
9999	1001	1001	1001	1001
+1111	0001	0001	0001	0001
11110	A	A	A	A
DAA by +6:	1	1	1	1 carry: 1

Here we see that, after we perform the DAA operation, the result is 1110, which is correct except that the first digit is missing, but the carry bit is set.

Writing a subroutine to perform BCD addition is really quite simple. The following subroutine uses index register IX as a pointer to the first operand and IY for the second. The result is stored in IX. The number of bytes in the BCD number is set to 2 by the LD B,2 instruction, but could be set to a larger value by simply changing this number.

```
BCDADD   OR      A          ;clear carry
         LD      B,2        ;2-byte add
ADDLP    LD      A,(IX)     ;get first operand
         ADC     A,(IY)     ;add second operand
         DAA                ;adjust result
         LD      (IX),A     ;store result
         INC     IX         ;point to
         INC     IY         ;next bytes
         DJNZ    ADDLP      ;continue till done
```

This subroutine clears the carry bit at the beginning so that it can do all the additions in one loop using ADC.

(g)

decimal	binary			
5432	0101	0100	0011	0010
−1928	0001	1001	0010	1000
3504	0011	1011	0000	1010
hexadecimal =	3	B	0	A wrong!
DAA by −6:	3	5	0	4 right!

How does the Z-80 know whether the last operation was an add or subtract, meaning that the DAA has to adjust the result by +6 or −6? The answer is that the N flag is set only by subtract operations and reset by add operations. Similarly, the half-carry flag is set only if the right 4 bits are greater than 9. The H flag is like an "internal" carry since its only function is to adjust the left digit.

These examples show that BCD arithmetic is easy to understand. Other advantages are the simplicity of converting numbers for printing them, which requires only a hexidecimal print routine, and the ability to insert a decimal point between any two digits in a series of bytes for fractional arithmetic.

Surprisingly, BCD arithmetic is not used by the TRS-80 for Level II Basic or any of the standard Radio Shack software. It thus remains one of the most underutilized resources of the TRS-80.

On Buying Software
Some Random Thoughts

Editorial by
Robert Sprung

The latest issue of KILOBAUD'S MICROCOMPUTER INDUSTRY NEWSLETTER (a monthly dealer publication) has a brutal attack on software. A representative from KILOBAUD purchased some cassettes at the New York Computer Show and was just astonished at the quality of software being sold. "One package, put out by a major software publisher, had the most trivial junk. There were no graphics at all and the programs generated such exciting items as prime numbers, perfect numbers, Fibonacci numbers and Armstrong numbers. Ugh! All that for $9.95! Something really has to be done about this. We tried another package . . . chess. The game was okay, but the graphics were poor. It was difficult to tell whether a pawn was black or white and this made visualizing the game most confusing. The coordinates for the moves were not on the screen so I had to look them up in the instruction book or else count across the screen. Phooey. Actually, the game itself was good. Damned thing beat me!"

How good is the software being sold? Are KILOBAUD's contentions above correct? For about a year now, I have been hearing about software rip-offs. Are they really rip-offs?

Let's look first at KILOBAUD's comments above. I must say that the comments are perhaps a bit biased, since KILOBAUD carries its own line of software—INSTANT SOFTWARE. I disagree with KILOBAUD's contention (or at least the contention of the quoted representative) that the software in question was "trivial junk." Although prime numbers, perfect numbers, Fibonacci numbers and Armstrong numbers are not important to most people, a mathematician would not consider these programs to be trivial. There are mathematicians who spend a lifetime using computers to find new prime numbers and perfect numbers. I also saw the program in question. Early mathematicians (high school math aces) would be very interested in such a program and certainly would not call it trivial junk. Now about the chess program—it sounds like it might be SARGON II being attacked. SARGON II sells for $29.95. The graphics may not be the best, but the program is superior. It beats the CHESS CHALLENGER 7 (which sells for well over $100). It takes a few minutes to get used to the graphics, but they are acceptable.

The purpose of this article is not to attack the opinions of KILOBAUD. There probably is a lot of junk software being sold—but what is junk and what is a rip-off? A $10 program that finds primes, and Fibonacci, Armstrong, and perfect numbers may be a rip-off to some and a blessing to others.

A perfect example of how people feel about software is our response to the LIBRARY 100. The LIBRARY 100 offers 100 programs for $49.50 (or about 50 cents per program). When we first began to sell software, we used to put a software evaluation form in with each order. We soon found that asking people to evaluate software was ridiculous. Opinions varied

so much that we soon discovered that individual responses were invalid. One response would say that loading the tapes was simple—they never had such easy loading tapes. Our next letter would indicate that the tapes were impossible to load because they were so volume-sensitive. Another letter compliments THE BOTTOM SHELF for the exceptional job they did with the LIBRARY 100—and still another letter would complain that too many of the programs were trivial.

Another example of varied opinions is the PAYROLL program that we are selling. The PAYROLL program is nationally advertised (we didn't write it—we just distribute it). We constantly get letters from from people who are using it and believe that it is an outstanding value (WANG COMPUTER sells an almost identical program for $2,500—the TRS-80 version is $99.95). We also get letters from unhappy users. Why doesn't it have New Jersey's tax tables on it? Why doesn't it make provisions for workers on a weekly salary—who get extra hourly pay—or for those who also get commissions, or need special provisions for alimony, union dues, social committee dues, and the payroll savings plan?

Is there a perfect program? Apparently not. Even the ELECTRIC PENCIL (probably the best program ever written for the TRS-80) has some minor mistakes. ALL PROGRAMS HAVE MISTAKES AND WEAK POINTS. Programs are usually written for the masses—and they don't suit any one individual. When you buy a $25,000 IBM program, you are stuck with the same problems. If you are using your IBM for business, you quickly find out that their $5000 payroll package requires modifications for your particular needs. That means you have to hire a programmer (or use one from IBM) to get your program modified. The other alternative is to modify your business to coincide with the program already available.

How much should you pay for a program? How much should a program sell for? This is usually determined by supply and demand—and by how much the programmer wants to make on his program. Let's take some examples— Michael Shrayer wrote the ELECTRIC PENCIL for the TRS-80. The ELECTRIC PENCIL probably took about one month's worth of work. How could he dare sell it for $150 (for the Disk version—$100 for Cassette)? Well, Michael Shrayer makes a living from the ELECTRIC PENCIL. It is the most widely used small computer word processor and is unequaled in quality. I believe that the author is certainly entitled to make a living from writing software. Down at the low end is INTERNATIONAL DATA SERVICES—IDS puts out a graphics program equal to the ELECTRIC PENCIL in quality (in its own field). The program sells for $3.95. The philosophy of IDS is to put out high quality software at a very low price. The problem is: 1) the price is so low that people don't want to buy it, feeling that it is of low quality; 2) dealers can sell it because the profit level is so low; and 3) IDS can't advertise because the price is so low that they have an almost null advertising budget. Because of the philosophy of IDS, almost nobody knows anything about their fine software.

Opinions vary greatly about price. How much is GSF worth? (That's the program from RACET computers with and instant sort). I would pay $250 for it. The program sorts 1000 names on our mailing list in 9 seconds. Mr. Smith (an unhappy buyer) wouldn't pay a cent for it—he couldn't understand the instruction book. Mr. Jenkins wouldn't pay a cent for it—he couldn't load the tape. Mr. Jones wouldn't pay a cent for it—he

never has to sort lists. Michael Shrayer probably wouldn't buy it—he'd write his own sorting program. Well, GSF is our best-selling and least often returned program. Perhaps the price should be raised!

PERFECT software is not available, and never will be. TRS-80 software is getting better. Software houses are learning that software has to be user-oriented. People have to understand how to use a program without reading 1000 pages of instructions or examining every program line. In general, all TRS-80 software has been improving. RADIO SHACK is being much more selective about the software that it sells and is upgrading their software. THE BOTTOM SHELF is selling software made strictly for the user. All of their software comes with simple instructions that take you through the program step by step. You will never get software that will do exactly what you want it to do. You either have to live with it—or modify it. All software contains errors (even IBM software). You have heard about all the computer error stories. Even a major department store got into trouble when their computer used to send out final notices to credit card owners who had a balance of $0.00 ("either pay the balance or your account will be closed!").

The policy of H&E Computronics, Inc., is to sell software that is widely accepted, relatively well documented or self-explanatory—and is a good value (in our opinion) which would be of interest to a large percentage of subscribers. Since we do offer a money-back guarantee on all the software we sell, we quickly find out if any particular piece of software is a rip-off (but we do realize that opinions vary considerably over the same piece of software). As stated elsewhere in this issue, we are phasing out the sale of software developed by H&E Computronics, since this is a conflict of interest with the goals of the News Magazine. We will continue to select software developed by companies independent of H&E Computronics, Inc.

```
R T U P N F O B A W U E R T Y X
E R N F F E R P D N R Y E K N I
T N I O P Y H O R N Y P F P N F
U L R X C P A T P E E K E P K O
R T O P D O R S D K S W U T C R
N E R N L A D I M S D T G M S A
K P R E S E T L N E A P O N A N
L K E W L L A A U T O W S R V D
D E R E N S B R R K L L U U E O
G O T O A E R D E N C R B N H M
R E S U M E X Y A O E F D A E R
E L L I K A R T R O N W V P I R
```

If you glance at this letter matrix for a moment, you may catch sight of a few basic commands—look longer, and more will appear. In fact, we counted at least 49 different commands! The words run in all directions, with no intersections greater than one letter (in other words, RESET cannot contain SET, FOR cannot contain OR, etc.).

Created by Andy Wolf

The Practical Business User
BREAKEVEN CHART

by
Steven M. Zimmerman, Ph.D.
and Leo M. Conrad

This month we have selected an analysis technique called the breakeven chart. It is one of the most useful yet simple techniques of financial analysis for business decision making. We have used the technique many times for our own business and those of our clients.

The program required to solve the breakeven problem is relatively simple, with the exception of the graphic section, which is based on some original work done by one of our students, Craig Stanley. For the new programmer who wants a program he can understand and that yields useful results, it is suggested the the graphic section simply be used without trying to understand the details of the programming involved.

A business person may obtain useful information from a breakeven chart without being highly trained in the art of business analysis and cost evaluation. The breakeven chart may be used to select between alternative methods of doing a job, or in deciding whether a particular business is worth starting at all. The breakeven chart, as implied by the use of the word "chart," is primarily a visual decision making tool.

Our program as presented here allows for the analysis of two alternative cost equations or a cost equation and a revenue equation. The theory of a breakeven chart assumes that there are just two types of costs in industry; fixed and variable. Fixed costs are those which do not vary with production or sales (output), while variable costs are those that vary directly with output.

Uses and Applications
There are two basic types of breakeven charts. The first type we call the Engineering Breakeven Chart. This application calls for the evaluation of two alternative production methods.

The assumption the engineer must make is that the job must be done and it is his task to select the best of alternative methods available.

An example of application a small business person may encounter is that of deciding between a gasoline powered car and one powered by diesel. The gasoline powered car has a lower purchase price than the diesel, but operating costs are greater than those of the diesel. The analysis for a proper decision is a classic example of application of the Engineering Breakeven Chart.
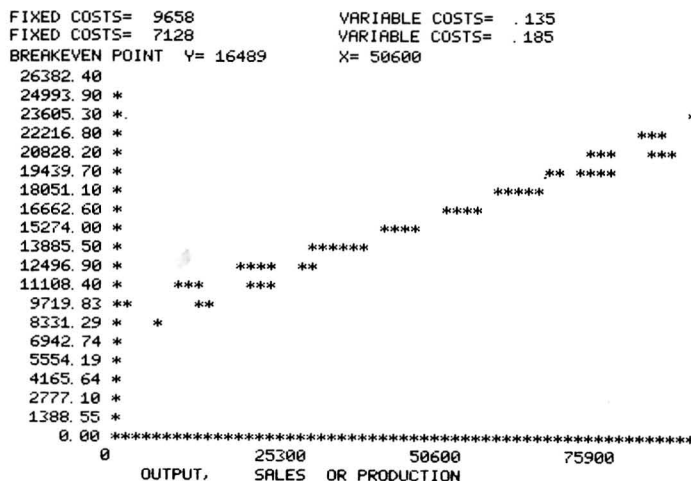
The second type of breakeven chart is the Business or Marketing Breakeven Chart. In this example, revenue generated by an application is compared to the cost of the application. This type of chart is used to make the basic decision of whether or not a specific business venture should be entered into.

A friend of ours recently opened a book store and used the breakeven chart to determine the amount of sales necessary to support the operation. After the yearly breakeven point for sales was determined, it was converted to a daily sales number to aid her in deciding whether the business would support a proper level of sales.
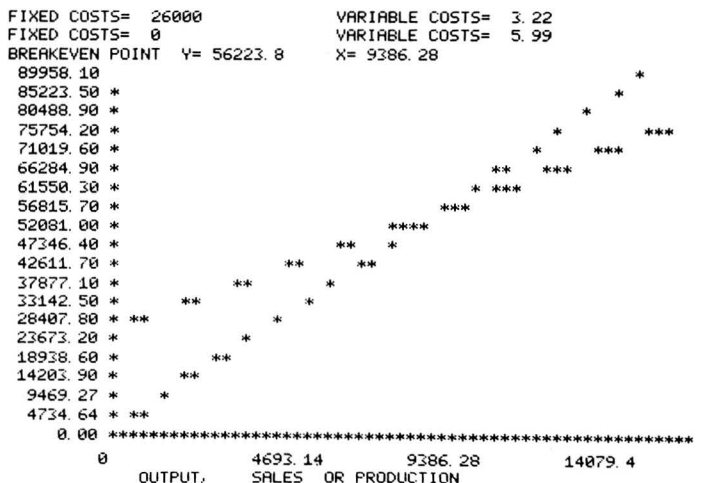
The key feature that seems most useful to the engineer and the business person is the ability to see relative costs or the cost versus revenue curves. Consequences of a poor decision can be seen by the user. If the breakeven point is near the actual level of operation forecast, the user knows there is trouble ahead. In most cases there is a clear decision.

To illustrate the two applications noted above, the following examples were selected to demonstrate the use of breakeven charts in decision making analysis.

```
PROBLEM: SMALL DIESEL VERSUS GASOLINE CAR
DATE: 11/13/79
OPERATOR: S. M. ZIMMERMAN AND L. M. CONRAD

FIXED COSTS=  9658            VARIABLE COSTS= . 135
FIXED COSTS=  7128            VARIABLE COSTS= . 185
BREAKEVEN POINT  Y= 16489      X= 50600
 26382. 40
 24993. 90 *
 23605. 30 *.                                        *
 22216. 80 *                                      ***
 20828. 20 *                              ***   ***
 19439. 70 *                                 ** *****
 18051. 10 *                           ******
 16662. 60 *                      *****
 15274. 00 *                  ****
 13885. 50 *             *******
 12496. 90 *        **** **
 11108. 40 *    ***   ***
  9719. 83 **   **
  8331. 29 *   *
  6942. 74 *
  5554. 19 *
  4165. 64 *
  2777. 10 *
  1388. 55 *
     0. 00 ***************************************************
       0         25300        50600        75900
          OUTPUT,   SALES  OR PRODUCTION
```

```
PROBLEM: BOOK STORE ANALYSIS
DATE: 11/13/79
OPERATOR: S. M. ZIMMERMAN AND L. M. CONRAD

FIXED COSTS=  26000           VARIABLE COSTS= 3. 22
FIXED COSTS=  0               VARIABLE COSTS= 5. 99
BREAKEVEN POINT  Y= 56223. 8   X= 9386. 28
 89958. 10                                          *
 85223. 50 *                                     *
 80488. 90 *                                  *
 75754. 20 *                              *   ***
 71019. 60 *                          *  ***
 66284. 90 *                        **  ***
 61550. 30 *                     * ***
 56815. 70 *                  ***
 52081. 00 *              ****
 47346. 40 *           **  *
 42611. 70 *         **   **
 37877. 10 *      **    *
 33142. 50 *    **    *
 28407. 80 * **      *
 23673. 20 *       *
 18938. 60 *     **
 14203. 90 *   **
  9469. 27 *  *
  4734. 64 * **
     0. 00 ***************************************************
       0         4693. 14       9386. 28       14079. 4
          OUTPUT,   SALES  OR PRODUCTION
```

Theory of Breakeven

The breakeven chart assumes that all costs in business and industry can be divided into two types; fixed or variable. By "fixed" we mean costs that do not change with a change in the volume of output, such as rent, interest on investment, or any other cost associated with the investment in fixed assets. Variable costs would be those costs that do change directly with output.

Examples of costs that change directly with output are generally considered to be labor and direct material. Power is also a cost that would vary directly with the output of a car as in the application section above.

In reality there are costs that vary with large changes in output or in some other manner than a direct linear (straight line) relationship with output. The breakeven chart forces the decision maker to classify all costs in one of the two extreme cases.

If one alternative has a lower fixed cost than another alternative with a higher variable cost, there will be a breakeven point in the positive domain. That is, the alternative with the lower fixed cost will be less expensive to operate at lower levels of output than the second alternative. At some point the alternative with the lower operating cost will become the lower cost alternative. This point is called the breakeven point.

> NOTE: If an alternative has a lower fixed cost and variable cost than a second alternative, the breakeven point is in the negative domain and the program will not be able to generate a graph. An error condition will result.

Program Output

We're going to say this over and over again, so you might as well get used to it now—THE FIRST THING A PROGRAM SHOULD OUTPUT IS THE INPUT! Answers to questions are no good unless you happen to know what the questions are. The detail of what is needed for input is left to the next section.

Housekeeping chores should be performed in all programs—the program needs to be identified, the work needs to be dated, and an operator should be identified.

If you will refer to the two printouts shown in the Uses and Applications section, you will see the output for this program. When two lines intersect in this program, the breakeven point is calculated as a single value for the decision variable (X), and sales level or output is the result. Total cost or total revenue at the point of breakeven is also breakeven. The costs for both alternatives or the cost and revenue are both the same at the breakeven point. This answer is what we were looking for in the first place.

If you will turn to look at the program you will see that the calculations for the breakeven point are complete and can be printed on the line printer by line number 260. The balance of the program is simply for producing a graph on the CRT and the printer.

The task of finding the breakeven point is relatively simple. The task of developing a graph is the hard part. The real value of the breakeven chart technique is as a visual or graphical decision making tool.

Program Input

The basic inputs we need in order to calculate breakeven points are the values from the two equations we are considering.

For the Engineering Breakeven Chart problem we need the fixed cost and variable cost of each of the two alternatives.

For the Business or Marketing Breakeven Chart problem, we need the fixed cost and variable cost for the process and the revenue generated per unit.

Program Notes

As already noted, we were able to complete the calculation of breakeven points with about one third of the statements in the program. The difficult part was getting the program to print out the results on the CRT and then duplicate the chart onto the printer.

We realize that most of our readers are just getting started in computer programming, and are probably more interested in the first part of the program. For those who are more advanced, we plan to review graphic procedures in a future column. For now we will look at the fundamental aspects of this program only.

All programs consist of first identifying the output and specifying the input, then developing a program that converts the input to output. To be able to understand the program, you must first be able to perform the calculations without a computer.

Problem: We have to find the intersection of two linear (straight) lines. Equations for the two lines may be written as follows:

$$Y(I) = A(I) * X + B(I) \qquad \text{For } I = 1, 2$$

The reason for using the Sub I approach is because this is how this program was written. Y(1) refers to the results from the first equation while Y(2) refers to the second equation. The act of finding the breakeven point is the task of finding the value of X in such a manner that Y(1) is equal to Y(2). This is accomplished with:

$$X = (B(2) - B(1)) / (A(1) - A(2))$$

Note that the above equation may be found on line 230 of the program. This is the sum total of the calculations needed. Lines 10 through 220 simply input the required data and identification material and then output this material as called for. Line 240 is another set of calculations we chose to include. This last line calculates the value of the total costs at the breakeven point. You should also note that lines 250-520 are graphics for the CRT; lines 3000 through 3130 copy the screen graphics onto the printer.

Running the Program

After typing "RUN" and hitting "ENTER" you will see on the CRT (screen) the following:

> BREAKEVEN CHART ANALYSIS 1979
> DEVELOPED BY S.M. ZIMMERMAN AND L.M. CONRAD
> FOR ALTERNATIVE #1 INPUT FIXED COST, VARIABLE COST?

Using the diesel chart as an example, you would enter 9658, representing the initial cost of purchasing a small diesel car, and then .135 (13½¢), representing the operating costs for that vehicle per mile. After hitting "ENTER" the computer will respond:

> FOR ALTERNATIVE #2 INPUT FIXED COST, VARIABLE COST?

Your response in this case should be to input the values for the gasoline powered car, 7128 and .185 (18½¢). When entered, the computer will respond with the question:

HARD COPY (Y/N)?

In most business applications you would want a printed copy, at least for your files, therefore we assume you have entered "Y" to the above question. The computer will now respond by asking three questions in sequence:

PROBLEM IDENTIFICATION?
DATE?
OPERATOR'S NAME?

As you answer these questions, the computer will send the information to your printer. The computer will then draw the graph on the CRT, and copy the results on the printer.

Special Problems
Two problems do exist with this program, mainly with reference to the type of printer you may have. Line Printer I will print correctly only if statement number 3100 is included in the program. Line Printer II requires that statement number 3100 be removed. It is suggested that you run the program with line 3100 included and if you have trouble, remove it.

The second problem is due to the manner in which the CRT display is copied onto the printer. Only every other line is copied from the screen to the printer. If you happen to have a very flat cost curve, it may not be copied at all.

Summary
The Breakeven Chart is a simple yet useful tool for management level decision making. Its scope is broad, yet flexible, and its input is rather simple in demand.

The material presented here can provide the novice or advanced TRS-80 Computer user with a program for immediate use. A future column will be devoted to the explanation of graphics programming, and for now we ask that you be concerned only with the basic program.

If you have any questions, problems with the program, or suggestions for other programs you would like to see, please write or call:

Dr. Steven M. Zimmerman
or Leo M. Conrad
College of Business
University of South Alabama
Mobile, Alabama 36688
(205)-460-6411

Next month's program will be a Check Writing program for your home or small business.

BREAKEVEN CHART
Program Listing

```
10 CLEAR300:REM  "BREAK"  BREAKEVEN
20 CLS
30 PRINT"BREAKEVEN CHART ANALYSIS 1979"
40 PRINT"DEVELOPED BY S.M. ZIMMERMAN & L.M. CONRAD"
50 FOR I=1 TO 2
60 PRINT"FOR ALTERNATIVE # ";I;"INPUT FIXED COST, VARIABLE COST";
70 INPUT B(I),A(I)
80 NEXT
90 INPUT"HARD COPY (Y/N)";P$
100 SS=1
110 IFP$="N"THEN220
120 INPUT"PROBLEM IDENTIFICATION";K$
130 LPRINT"PROBLEM: ";K$
140 INPUT"DATE: ";K$
150 LPRINT"DATE: ";K$
160 INPUT"OPERATOR'S NAME";K$
170 LPRINT"OPERATOR: ";K$
180 LPRINT" "
190 FORI=1TO2
```

```
200  LPRINT"FIXED COSTS= ";B(I),"VARIABLE COSTS= ";A(I)
210  NEXT
220  CLS
230  X=(B(2)-B(1))/(A(1)-A(2))
240  Y=A(1)*X+B(1):REM THE END OF THE BREAKEVEN CALCULATIONS
250  IFP$="N"THEN270
260  LPRINT"BREAKEVEN POINT  Y=";Y,"X=";X
270  S=(A(1)*X+B(1))/23
280  XX=50/X:REM CALCULATES SCALES FOR GRAPHICS
290  T=1.8*Y
300  TP=T/14
310  FORI=1 TO 13:REM BEGINING OF CRT GRAPHICS
320  PRINT TAB(0)T-TP*I
330  NEXT
340  PRINT
370  PRINT TAB(8)0;TAB(20)X/2;TAB(32)X;TAB(44)1.5*X
380  FOR I=18 TO 127
390  SET(I,40)
400  NEXT
410  FORI=0 TO 40
420  SET(18,I)
430  NEXT
440  FOR I=1 TO 2
450  FOR P= 0TO109 STEP 1/SS
460  Z=P/XX
470  W=(A(I)*Z+B(I))/S
480  IFW>40THEN500
490  SET(P+18,40-W)
500  NEXTP,I
510  PRINT@1,"BREAKEVEN POINT: Y=";Y,"X=";X;
520  IFP$="N"THEN520
3000 T=1.6*Y:REM BEGINNING OF PRINTER GRAPHICS
3010 TP=T/38
3015 S$="######.## "
3020 FOR D=2 TO 41 STEP2
3030 HH=T-(D-2)*TP
3040 IF HH<0 LET HH=0
3050 LPRINT USING S$; HH;
3060 FOR I= 18 TO 109 STEP 1.6
3070 IF POINT(I,D) LPRINT"*";:GOTO3090
3080 LPRINT" ";
3090 NEXTI
3100 LPRINT" "
3110 NEXTD
3120 LPRINTTAB(8)0;TAB(23)X/2;TAB(38)X;TAB(53)1.5*X
3125 LPRINT"            OUTPUT,    SALES   OR PRODUCTION"
3130 GOTO3130:REM A WAY TO END PROGRAM AND KEEP GRAPHICS
```

SALVO BATTLESHIP

From Semi-Sentient Software
A Sensational New TRS-80 Game
by Ken Brown

A Review by the Author

SEMI-SENTIENT Software

SENTIENT implies alive, aware, conscious, perceptive and thinking. When you play SALVO BATTLESHIP in the MEDIUM or HARD mode, you will wonder where the SEMI went. The computer displays some very SENTIENT thinking in this non-deterministic game. In a game such as this, there is no way to be certain of winning. You must out-think the computer one-on-one every time you play and every game is different. The software is smart and the game is habit-forming.

The "SALVO" makes it serious

This game is not to be confused with the one shot per turn kiddie versions of Battleship sold in toystores. The computer plays Battleship in 15-Gun Salvos (less hit losses)—an adult game which seldom lasts beyond ten turns and requires you to do some serious thinking if you don't want to lose quickly.

Alternating Displays

Display 1: YOUR DEFENSE SCREEN—Shows the 10 by 10 grid where you place your five ships: Aircraft Carrier (5 Guns), Battleship (4 Guns), Cruiser (3 Guns), Destroyer (2 Guns), and a Submarine (1 Gun). This display, shown during the computer's turn, also shows the computer's shots (as flickering flashes) and any hits on your ships (as steady burning with flashing DAMAGE ALERT). Every hit represents a gun knocked out for the duration of the game. In Salvo Battleship you shoot a Salvo with all of your guns once each turn. Every hit the computer makes reduces your capability to shoot back, and every hit you make cuts down the number of shots for the computer's next turn.

Display 2: YOUR BATTLE SCREEN—Another 10 by 10 grid, which shows the locations and patterns of all of your shots: As 1's for your first Salvo, 2's for the second, 3's for the third, etc. This display, shown on your turn, also shows the Salvo numbers of your hits on each of the computer's ships. Note that in Salvo Battleship you are not told which shot scored a hit, only which SALVO. This leads to many, sometimes complicated tracking situations. The information in this display will help you track down and destroy the computer's hidden ships, hopefully before the computer tracks down and destroys yours.

Many Modes of Play

These are called modes rather than levels because they represent different strategic approaches to the game. It must be remembered throughout: there is a tremendous advantage in shooting first. When the computer shoots first, you will start with 12 to 14 shots instead of 15, as a result of his hits.

EASY MODE is for children only. The computer shoots random shots throughout the game to match a child's random shots. The games are drawn out in this mode because the computer does not search for targets and home in on them (which would end the game quickly).

MEDIUM MODE: When you shoot first in the Medium mode, you are playing the Medium mode; but if the computer shoots first, the Medium mode becomes SUPER HARD. In the Medium mode the computer shoots random shots until he gets a hit. Then he uses his record of shots and hits to home in on and destroy that target. This mode offers a challenge to beginners: He's coming to destroy your ships with reasoned analysis and you must out-think him or lose.

HARD MODE: When you shoot first in this mode, you are simply in Hard mode; if the computer shoots first, you're playing in EXTRA HARD mode. The computer shoots patterns (randomly selected) designed to get a hit on both your Aircraft Carrier and Battleship as soon as possible. Then he homes in on both rather quickly. If you fail to reduce his firepower enough to significantly interfere with the completion of these patterns in Salvos 1, 2, and 3, then you will watch your ships get destroyed. You will find yourself with only 1 or 2 shots left in each Salvo, while the computer shoots at you with 8 to 10 shots. It is theoretically possible to battle back from such situations, but you will most likely lose. This mode is "Methodically Devastating" and represents a real challenge to the adult mind.

EXTRA HARD MODE: The computer shooting first in Hard mode is EXTRA HARD. The computer usually gets 2 or 3 hits on its first salvo using the Hard mode patterns, so you start the game with 12 or 13 shots. You must catch up and pass the computer in order to have any chance of winning. This is the "contest" mode of SALVO BATTLESHIP. It beats good players six games out of seven.

SUPER HARD MODE: The Medium mode with the computer shooting first is SUPER HARD, and this is the toughest mode to beat in SALVO BATTLESHIP. The Medium mode strategy still prevails—the computer shoots randomly until he hits something, and then homes in on it. But when the computer shoots first with 15 random shots, he gets four and five hits too often, and three hits normally. You may have a slim chance of winning if the computer gets less than three hits on the first Salvo. The computer often comes back with one more random Salvo. You will frequently be starting with 10 or 11 shots to the computer's 15. This is the "research" mode for those who wish to try to master the game of SALVO BATTLESHIP.

Prize Winning Debut
At the 1979 National Computer Conference (NCC '79) SALVO BATTLESHIP made its non-commercial debut in the Personal Computer demonstration/contest. The booth demonstrating this new game was crowded all day every day of the show. Individuals, committees and other exhibitors excitedly tried to beat the HARD mode. At the end of the show SALVO BATTLESHIP received a well deserved prize. It was NEW GAME OF THE YEAR 1979 at its NCC '79 debut.

The Sensational Battleship Contest
A few months later at the 1979 National Small Computer Show, the SEMI-SENTIENT SOFTWARE people staged a truly sensational commercial debut. Using three TRS-80 computers, they held a contest in their booth and gave prizes to anyone who could beat SALVO BATTLESHIP in the EXTRA HARD mode. There weren't many winners (only 25 out of 200

contestants) but the booth was packed from before the doors opened (with other exhibitors) until the power was turned off each night. Most of the contest winners chose the game over many more expensive prizes.

A survey was conducted during the contest, and with 99 contestants returning completed questionnaires, the following results were recorded:

I have played a complete game of SALVO BATTLESHIP by SEMI-SENTIENT SOFTWARE and these are my opinions: I found the game:
Boring (0); Dull (0); So-So (2); Interesting (47); Great Fun (42); Engaging (34); Fascinating (26); Challenging (98); Super-Super (23)

—check all that apply—

I would like to play it again—Yes (92); No (0); Maybe (7)

I would consider buying a TRS-80 as a result of playing this game—Yes (13); No (26); Maybe (29); I already own one (28); Other (3)

As a result of playing this game, I am impressed by the ability of S. S. SOFTWARE to produce software that THINKS—Definitely (66); Somewhat (25); Not at all (4); Blank (4)

High Quality Product
The BATTLESHIP cassettes are high quality, signal enhanced, and recorded on both sides by Cook Laboratories Inc. This company represents the standard in cassette quality. Dealers have praised the negligible return rate for failures and every tape returned so far (only three) has loaded perfectly under test. Any defective cassette will be replaced free of charge.

---

a fast-action challenge—

CLEANUP

by
Doug Schiller

This program will print a playing field that fills with alphanumeric and graphic characters, with a solid border enclosing the screen. The object of CLEANUP is to maneuver a moving line through the field, erasing all of the alphanumeric characters ("knockout" characters) as you go—but!—the line never stops moving, and you lose if you hit any of the graphics-block characters, run into the boundary line, or cross your own path.

When you run the program, a question will be asked:

WHAT DO YOU WANT YOUR DIFFICULTY TO BE (1-100)?

Don't be intimidated by this—start with level 1. The difficulty you choose will determine the number of knockout characters you have to erase—the higher the difficulty, the more you have to clean up (if the level is less than 4, all the knockout characters will be stars). Also, the speed of the moving line will vary with the difficulty level. If you win the game at level 1 the first time you play it, you are going to be a PRO (the highest known score as of September 1979 was 55). Don't expect to do well at first because it takes practice and skill.

You control the moving line with the four arrow keys—Up and Down, Right and Left. When the game begins, you will see a flashing dot on the playing field that indicates where the line will start—press the 'S' key and the dot will stop flashing—press an arrow key, and you're moving. The line will not stop until it crashes into something—even if you have erased all of

the knockout characters (winning the game) the line will keep on moving until it hits a boundary, its own path, or a block character. (At various times there will be signs flashing at the bottom and top of the screen reminding you of the directions.) When the line finally crashes, you will have two options—you can hit the 'S' key to start again at the same level of difficulty, or press (space bar) to exit the game or pick a new level.

Hints
Knockout the knockout characters from the side, because the line moves more slowly and there is more surface area on the side of each character.

Practice making turns. If you turn too slowly, you will probably crash. If you turn too fast, the computer might miss it, so that you crash into yourself.

After you press the 'S' key, you must not press any keys other than the arrows, or the computer will think that you have crashed.

Special Disk Instructions
Here's a couple of added features for disk owners—

After you type in your difficulty level, you are asked whether you want a time limit. If you type in 'YES' you will be asked how many minutes you want the game to last. The game will tell you when your time is up, and give you a chance to try again.

If you win, the disk is in, and you have the highest score, you can have the score put on disk as the official record score.

```
10  '*** ORIGINAL PROGRAM BY DOUG SCHILLER ***
20  CLS:CLEAR 1000:RANDOM
30  DEFINTA-Z:X=0:Y=0:S=0
40  FORX=1TO8:CL$=CL$+"CLEANUP ":NEXTX
50  PRINT@0,CL$;:PRINT@960-64,CL$;
60  FORX=0TO14
70  PRINT@X*64,MID$(CL$,X+1,1);
80  PRINT@X*64+63,MID$(CL$,X+17,1);
90  NEXTX
100  CL$="":PRINT@6*64+23,"WELCOME TO CLEANUP";
110  PRINT@8*64+25,"COPYRIGHT 1979";
120  PRINT@10*64+24,"BY DOUG SCHILLER";
130  GOSUB 1230
140  CLS:GOTO 240
150  '***** REM STATEMENTS FOR ADDITIONAL INFORMATION *****
160  'THE ANDROID POINTS HIS FINGER AT THE SCORE
170  'WHEN YOU WIN THE ARM SALUTES
180  'THE HIGHEST WINNING SCORE BY THE AUTHOR IS 55
190  'TO BYPASS THE MAN WITH POINTING ARM ADD LINE :
200  '          8050 GOTO 1240
210  'THE SPEED OF THE LINE IS PROPORTIONAL TO THE DIFFICULTY
220  'TO HAVE THE HIGHEST SPEED EVEN WITH LOW DIFFICULTIES TYPE
230  'AN "S" BEFORE YOUR DIFFICULTY LIKE: S5, S1, S8, ETC.
240  CLS:X=0:Y=0:S=0:TT=0:DIMR(300)
250  Z9$="1":INPUT"WHAT DO YOU WANT YOUR DIFFICULTY TO BE (1-100)";Z9$
260  IF LEFT$(Z9$,1)="S" THEN Z9=VAL(MID$(Z9$,2,3)):GR=1
     :ELSEZ9=VAL(Z9$):GR=0
270  PRINT:IFZ9>100ORZ9<1THENZ9=1
280  L$="N":IFMEM>12500ANDMEM<14500PRINT"DO YOU WANT THE COMPUTER TO
     GIVE YOU A TIME LIMIT SO THAT IF YOU ARE PLAYING WITH A FRIEND
     YOU CAN BOTH HAVE THE SAME AMOUNT OF TIME";:INPUTL$:PRINT
     :DOS=1:ELSEMB=0:GOTO 330
290  IFLEFT$(L$,1)<>"Y"ANDDOS=1THENCMD"T":GOTO 330
300  INPUT"HOW MANY MINUTES DO YOU WANT TO PLAY FOR";T2:MB=1:CMD"R"
310  DEFFNV=VAL(MID$(TIME$,10,2))*3600+VAL(MID$(TIME$,13,2))*60+VAL
     (MID$(TIME$,16,2)):T1=FNV
320  T2=T2*60:T2=T1+T2
330  CLS:Z9=INT(Z9)
340  FORZ=1TO18:X=RND(126):Y=RND(46):SET(X,Y):FORW=1TO40:NEXTW
     :RESET(X,Y):NEXTZ:SET(X,Z)
350  A1=3*Z9:A2=Z9*2
360  FORG=1TOA1
370  R=RND(14)*64+RND(62)+15360:IFPEEK(R)<>32THEN 370
380  IFZ9<4 THENP7=42ELSEP7=RND(63)+32
390  POKER,P7:R(G)=R:NEXTG
400  FORG=1TOA2
410  R=RND(14)*64+RND(62)+15360:IFPEEK(R)<>32THEN 410
420  POKER,129+RND(62):NEXTG
430  PRINT@0,STRING$(63,CHR$(131));
440  PRINT@15*64,STRING$(63,CHR$(176));
```

```
450 SET(126,0):SET(126,47)
460 FORM=0TO47:SET(0,M):SET(127,M):NEXTM
470 IFY<6THENAT=968:CS=176:ELSEAT=8:CS=131
480 PRINT@AT,"PRESS THE 'S' KEY ONCE YOU SEE THE FLASHING DOT";
490 RESET(X,Y):FORM=1TO100:NEXTM:SET(X,Y):FORM=1TO100:NEXTM
500 MV$=INKEY$:IF MV$<>"S"THEN 490
510 PRINT@AT,STRING$(52,CHR$(CS));:SET(X,Y)
520 A$="":B=0:S=0:IFZ9>25THEN 680 ELSEJV=1
530 IFZ9<20JV=2
540 IFZ9<15JV=4
550 IFZ9<10JV=5
560 IFZ9<5JV=6
570 IFZ9<3JV=7
580 IFGR=1THEN 680
590 A$=INKEY$:IFA$<>""THENB=ASC(A$):S=1
600 FORLV=1TOJV:NEXTLV
610 SET(X,Y):IFB=91THENY=Y-1:GOTO 670 :ELSEIFB=10THENY=Y+1:GOTO 670
620 IFB=9THENX=X+1:GOTO 670 :ELSEIFB=8THENX=X-1:GOTO 670
630 IFA$="S"ANDTR=0THENTR=1:A$=""
640 IFA$=""THEN 670
650 SN$="YOU PRESSED A NON-ARROW KEY":AT=(64-LEN(SN$))/2:IFY<6THEN
    AT=AT+960
660 PRINT@AT,SN$;:FORW=1TO600:NEXTW:GOTO 750
670 IFS=1ANDPOINT(X,Y)THEN 750 ELSE 590
680 A$=INKEY$:IFA$<>""THENB=ASC(A$):S=1
690 SET(X,Y):IFB=9THENX=X+1:GOTO 740 :ELSEIFB=8THENX=X-1:GOTO 740
700 IFB=91THENY=Y-1:GOTO 740 :ELSEIFB=10THENY=Y+1:GOTO 740
710 IFA$="S"ANDTR=0THENTR=1:A$=""
720 IFA$=""THEN 740
730 GOTO 650
740 IFS=0ORPOINT(X,Y)=0THEN 680 ELSES=0:GOTO 750
750 TT=0:S3$="         I AM NOW CALCULATING YOUR SCORE
760 IFY<5THENPRINT@963,S3$;:ELSEPRINT@3,S3$;
770 FORM=1TOA1:FF=PEEK(R(M)):IFFF>32ANDFF<128THENTT=TT+1:NEXTM:ELSENEXTM
780 IFTT=0THEN 830
790 S$="SPACE BAR TO CHANGE DIFFICULTY OR 'S' KEY FOR QUICK START"
800 IFY<5THENPRINT@963,S$;:ELSEPRINT@3,S$;
810 FOR MM=1 TO 40:RESET(X,Y):FORDD=1 TO 50:NEXT DD:SET(X,Y):FOR
    DD=1 TO 50:NEXT DD:JJ$=INKEY$:IF JJ$<>" " AND JJ$<>
    CHR$(13) AND JJ$<>"S"THEN NEXT MM
820 CLS:PRINT@6*64,"ON LEVEL";Z9;"YOU GOT";A1-TT;"OF THE";A1;
    "CHARACTERS ON THE SCREEN"
830 IFTT=0CLS:GOTO 1160 :ELSE 980
840 IFDOS=1ANDZ9>3THENCLS:INPUT"IS THE DISK HOOKED UP";LV$ELSE 1140
850 IFLEFT$(LV$,1)="N"THENPRINT"SORRY":FORW=1TO800::NEXTW:GOTO 1140
860 CLOSE:PRINT:PRINT"THE PERSON WITH THE HIGHEST SCORE IS:"
    :OPEN"R",1,"CLNFILE/DAT"
870 FIELD 1,30 AS NM$,08 AS DA$,08 AS TI$,04 AS Z9$,205 AS DUMMY$
880 GET1,1:IFLEFT$(DUMMY$,5)<>"DUMMY"THENPRINT:GOTO 910 :ELSE NM$(1)=
    LEFT$(NM$,INSTR(NM$<"*")-1):Z9$,INSTR(2,Z9$," ")-1)
```

```
890 PRINTNM$(1);".   ";NM$(1);" WON ON ";DA$:PRINT"AT ";TI$;" WITH
    A DIFFICULTY OF";Z9$(I);".":PRINT
900 IF VAL(Z9$)=>Z9THENPRINT:CLOSE:PRINT"SORRY, BUT YOU DO NOT HAVE
    THE HIGH SCORE":FOR W=1 TO 1500:NEXT W:GOTO 1140
910 PRINT"CONGRAGULATIONS!!! YOU NOT ONLY WON, BUT YOU HAVE THE
    HIGHEST":PRINT"SCORE.   NOW I WANT TO PUT INFORMATION ABOUT
    YOU ONTO THE DISK"
920 INPUT"WHAT IS YOUR NAME";J$(1):J$(1)=J$(1)+"*":LSET NM$=J$(1)
930 INPUT"WHAT IS TODAY'S DATE (MM/DD/YY)";J$(1):LSET DA$=J$(1)
940 LINEINPUT"WHAT TIME IS IT NOW (HH:MM:SS)? ";J$(1):LSET TI$=J$(1)
950 Z8$=STR$(Z9):LSET Z9$=Z8$
960 LSET DUMMY$="DUMMY"
970 PUT 1,1:CLOSE:GOTO 1140
980 IF A1<>0 AND TT<>0 THEN 990    ELSE 1140
990 P9=INT(100*(1-TT/A1)+.5):PRINT"YOU ONLY GOT";P9;"%"
1000 DE=25:FOR P=30 TO 6 STEP -1:PRINT@P+512,AN$:FOR W=1 TO DE
     :NEXT W,P:DE=10
1010 FOR P=1 TO 5:FOR P2=11 TO 9 STEP -1:PRINT@P2*64+10,AR$(P,P2-8);
     :NEXT P2:FOR W=1 TO DE:NEXT W,P
1020 FOR P=11 TO 9 STEP -1:PRINT@P*64+10,AR$(7,P-8);:NEXTP
     :FOR W=1 TO 30:NEXT W
1030 FORP=9TO11:PRINT@P*64+10,AR$(5,P-8);"   ";:FOR W=1 TO 10:NEXTW,P
1040 FOR P=8 TO 9:FOR P2=11 TO 9 STEP -1:PRINT@P2*64+10,AR$(P,P2-8);
     :NEXTP2:FOR W=1 TO 4:NEXT W,P
1050 IF P9>=50 THEN Y9=30:RESET(14,28):RESET(15,29):RESET(18,29)
     :RESET(19,28):ELSE Y9=32
1060 SET (26,Y9)
1070 FOR W=1 TO 700:NEXT W:DE=10
1080 FOR P=4 TO 1 STEP -1:FOR P2=9 TO 11:PRINT@P2*64+10,AR$(P,P2-8);
     "     ":NEXT P2: FOR W=1 TO DE:NEXT W,P
1090 PRINT@11*64+10,CHR$(191);"   ";
1100 IF MB<>1THEN 1120
1110 IF FNV>T2 THEN FOR W=1TO 400:NEXTW:CLS:PRINT"YOUR TIME IS UP"
     :PRINT:GOTO 1140
1120 IF JJ$="S" THEN X=RND(126):Y=RND(46):A$="":RANDOM:S=0:B=0:ELSE 1140
1130 FOR DD=1 TO 500:NEXTDD:CLS:SET(X,Y):GOTO 360
1140 INPUT"DO YOU WANT TO PLAY AGAIN";Y$:IF LEFT$(Y$,1)<>"N"THEN CLS
     :GOTO 250
1150 CLS:PRINT"GOOD-BYE":END
1160 CLS:PRINTCHR$(23):PRINT"FANTASTIC YOU'RE A WINNER":FOR ST=1TO6
     :ST$=ST$+"* ":NEXTST:FOR W=1 TO 500:NEXT W
1170 FOR ST=1 TO 13
1180 IF ST/2=INT(ST/2)THENS8=32ELSES8=191
1190 IF ST/2=INT(ST/2)THEN S$=" "+LEFT$(ST$,9)ELSE S$=ST$
1200 IF ST>9ST$="":S2$=STRING$(32,CHR$(S8)):PRINT@ST*64,S2$:GOTO 1220
1210 PRINT@64*ST,S$;STRING$(20,CHR$(S8));
1220 NEXT ST
1230 PRINT@15*64,"A TRUE HERO";:FOR W=1 TO 1000:NEXT W:GOTO 1470
1240 RESTORE
1250 READ C
```

```
1260  IF C=-1 THEN 1290
1270  AN$=AN$+CHR$(C+128)
1280  GOTO 1250
1290  FOR J=1 TO 6
1300  FOR X=10 TO 12
1310  FOR P=1 TO 3
1320  READ C
1330  AR$(J,X-9)=AR$(J,X-9)+CHR$(C+128)
1340  NEXTP,X,J
1350  FOR J=7 TO 9
1360  FOR X=1 TO 2
1370  FOR P=1 TO 4
1380  READ C
1390  AR$(J,X)=AR$(J,X)+CHR$(C+128)
1400  NEXT P,X,J
1410  FOR J=1 TO 4:READ RX(J),RY(J):NEXTJ
1420  DATA 48,63,63,63,48,123,62,61,15,62,61,123,56,46,63,29,52,123,63,
      42,63,21,63,123,65,42,0,21,65,123,8,14,0,13,4,0,0,0,0,-1
1430  DATA 61,0,0,52,0,0,47,16,0,61,0,0,52,0,0,11,36,16,61,0,0,52,0,0,
      11,12,4,61,0,0,52,32,28,3,3,0,61,0,48,12,14,1,0,0,0,61,52,0
      14,1,0,0,0,0
1440  DATA 61,0,56,5,12,14,1,0,61,0,0,0,12,12,14,1,61,0,0,0,12,12,12,12
1450  DATA 93,32,96,32,92,31,97,31
1460  RETURN
1470  CLS:PRINT@576+45,AN$
1480  FOR W=1 TO 150:NEXT W
1490  FOR J=1 TO 4
1500  RESET(RX(J),RY(J)):NEXTJ
1510  X1=93:X2=96:Y1=30:Y2=30
1520  FORX=1TO5
1530  SET(X1,Y1):SET(X2,Y2):FOR W=1 TO 50:NEXTW:RESET(X1,Y1):RESET
      (X2,Y2):FOR W=1 TO 50:NEXTW,X:GOTO 1600
1540  FOR J=1 TO 6
1550  FOR X=10 TO 12
1560  FOR P=1 TO 3
1570  READ C
1580  AR$(J,X-9)=AR$(J,X-9)+CHR$(C+128)
1590  NEXTP,X,J:RETURN
1600  FOR J=1 TO 6
1610  FOR X=12 TO 10 STEP -1
1620  PRINT@X*64+49,AR$(J,X-9);
1630  NEXT X:FOR W=1 TO 50:NEXTW,J
1640  FOR J=6 TO 1 STEP -1
1650  FOR X=10 TO 12
1660  PRINT@X*64+49,AR$(J,X-9);
1670  NEXT X:FOR W=1 TO 10:NEXTW,J
1680  PRINT@12*64+49,CHR$(191);" ";
1690  FOR W=1 TO 100:NEXTW
1700  K2=K2+1:IFK2=2THENK2=0:CLS:GOTO 840 :ELSE 1600
```

Programs By
GORDON SPEER

Hints of the Month

You can center titles automatically on a screen (or printer) with this algorithm—There are 64 spaces across the screen (numbered 0 to 63). The TAB function allows you to start printing in any of these spaces by number. If you put your title into a string variable and then use a TAB equal to one-half of the total line length minus one-half the length of the title string (T$):

PRINT TAB(31-LEN(T$)/2)

—you will find the titles center themselves perfectly. (To do this with an 80 character line printer, substitute 40 for 31; with 132-character printing, use 66—or use any point you want the title to center on).

Incidentally, if you would like a free table for your printer, talk to your local appliance dealer. If you strip the insides from a console color TV and cover the hole in the front with some fabric to match your decor, you will have the nicest printer stand you can imagine. The shelf inside holds the boxes of paper out of sight, and it is heavy enough that it doesn't wiggle when the printer is running.

HISTOGRAM
(Histogrm)

A Histogram is a graph that gives a visual record of the number of each value plotted. It might be used for test scores, agricultural tests, ballot counting, gas mileage compatisons, or utility bill comparisons.

When entering data the enter key may be repeatedly pressed to enter the same amount over and over. The same number need not be typed again. I'm finding good use for the fact that "IN AN INPUT STATEMENT, IF THE ENTER KEY IS PRESSED WITHOUT ENTERING ANY VALUE, WHATEVER THE VARIABLE WAS EQUAL TO BEFORE, IS RETAINED."

```
100 '    "HISTOGRM"
110 DEFINT A-Z
120 CLS
130 INPUT"HIGHEST NUMBER POSSIBLE";H
140 DIM C(H)
150 CLS
160 LET I=1:IF H/I<62 THEN 210   I*H<101 THEN 210
170 LET I=I*2: IF H/I<62 THEN 210
180 LET I=I*2.5: IF H/I<62 THEN 210
190 LET I=I*2: IF H/I<62 THEN 210
200 GOTO 170
210 PRINT@832,;
220 FOR T=I TO H STEP I
230 IF T/5/I<>INT(T/5/I) THEN 250
240 PRINT TAB(T/I-2)T;
250 NEXT T
260 PRINT@895,
270 INPUT"ENTER DATA";D
280 LET C(D)=C(D)+1
290 SET(D/I*2,38-C(D))
300 GOTO 260
310 '
320 ' AN ORIGINAL PROGRAM USING
330 ' LEVEL-II BASIC FOR TRS-80
340 ' BY: MR GORDON E. SPEER
350 '        3304 WOODLAWN ROAD
360 '        STERLING, IL 61081
370 '        PHONE(815)625-5251
```

LOGO

Logo was written to put an animated corporate symbol on the screen of the TRS-80 when it is not in use. It is the first graphic I use in any administrative program for a corporation, and contains the menu of programs available to the operator.

The logo is drawn vary simply using numerical data which turn on large blocks according to the following pattern:

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17							

Notice that the data begins with 8, 16 and the logo starts in the upper right corner of the screen.

The operator accesses the menu with the up-arrow.

Animation is provided according to the function of the company. This foundry logo fills with liquid metal, a pump company pumps water through the logo, etc.

Although most applicable to a disk-based system, it contains some features that can be useful to anyone.

```
100 '        'LOGO'
110 CLS:PRINT CHR$(23)
120 PRINT@750,"P & W"
130 PRINT@812,"FOUNDRY"
140 READ Q
150 IF Q=0 THEN 270
160 GOSUB 180
170 GOTO 140
180 'SUBROUTINE TO PRINT LOGO
190 LET Q1=128*INT((Q-1)/8)+8*(Q-1-8*FIX((Q-1)/8))
200 PRINT @ Q1+64,STRING$(4,191);
210 PRINT @ Q1+128,STRING$(4,191);
220 RETURN
230 DATA 8,16,24,32,31,30,29,37,45,53,52,51,50
240 DATA 41,33,25,17,9,1,2,3,4,12,20,19,18,53,0
250 DATA 776,712,648,584,520,456,416
260 DATA 352,288,224,160,96,1
270 A$=INKEY$
280 GOSUB 550
290 IF A$<>"[" THEN 270
300 CLS:PRINT CHR$(23)
310 'MENU
320 PRINT
330 PRINT"    ";STRING$(24,"=")
340 PRINT"     P & W   F O U N D R Y
350 PRINT"    ";STRING$(24,"=")
360 PRINT"            M E N U
370 PRINT
380 PRINT"      1    ERASE THE FILES
390 PRINT"      2    ADD AN EMPLOYEE
400 PRINT"      3    RUN THE PAYROLL
410 PRINT"      4    QUARTERLY TOTALS
420 PRINT"      5    EMPLOYEE DATA
430 PRINT"      6    RETURN TO LOGO
440 PRINT
450 PRINT"    ";STRING$(24,"=")
460 LET A$=INKEY$
470 '
         NOTE: THE NEXT 5 LINES WILL ONLY RUN ON A DISK SYSTEM
480 IF A$="1" THEN RUN"RESET"
490 IF A$="2" THEN RUN"INITIAL"
500 IF A$="3" THEN RUN"PAY1980"
510 IF A$="4" THEN RUN"QUARTER"
520 IF A$="5" THEN RUN"EMPDATA"
```

```
530 IF A$="6" THEN RUN
540 GOTO 460
550 ' SUBROUTINE TO FILL FLASK
560 READ Q
570 IF Q=1 THEN 610
580 FOR Y=1 TO 200:NEXT
590 PRINT@Q,STRING$(12,140);
600 RETURN
610 FOR Y=1 TO 2000:NEXT
620 RUN
630 '
640 ' AN ORIGINAL PROGRAM USING
650 ' LEVEL-II BASIC FOR TRS-80
660 ' BY: MR GORDON E. SPEER
670 '      3304 WOODLAWN ROAD
680 '      STERLING, IL 61081
690 '      PHONE(815)625-5251
```

TRIANGLE

One of the advantages of the power and speed of the microcomputer is the extension of the mathematical ability it gives the user. The non-calculus student can solve problems by iteration that normally require calculus. The non-trigonometry student can solve triangles with a fairly simple routine. TRIANGLE will find the sides and angles of any right triangle, and draw and then label them.

To run the program, three of the six sides and angles must be known, including the 90 degree angle. When unknown sides or angles are called for, simply press enter, The program recognises unknowns by their zero values. Note that angles must be changed to radians for the trig functions in BASIC. The six significant figure conversion factor of 57.2958 is used in the program for this. This is actually 180/pi.

Sample Problem:

angle A?	90
side C?	246
angle B?	(enter)
side A?	266
angle C?	(enter)
side B?	(enter)

```
100 '     "TRIANGLE"
110 CLS
120 PRINT"THIS PROGRAM FINDS THE SIDES AND ANGLES OF A RIGHT TRIANGLE"
130 PRINT
140 PRINT"ENTER ANGLES IN DEGREES, SIDES IN ANY LENGTH UNIT,"
150 PRINT"CONSECUTIVELY, STARTING WITH THE RIGHT ANGLE"
160 PRINT
170 INPUT"ANGLE A";A
175 IF A<>90 THEN 700
180 INPUT"SIDE  C";CC
190 INPUT"ANGLE B";B
200 INPUT"SIDE  A";AA
210 INPUT"ANGLE C";C
220 INPUT"SIDE  B";BB
240 IF B+C=0 THEN 600
250 IF B>0 THEN LET C=90-B
260 LET B=90-C
270 '
        FLIP IT OVER TO MATCH GRAPHIC
280 IF B>C THEN 320
290 LET T=B:B=C:C=T
300 LET T=BB:BB=CC:CC=T
```

```
310 '     FIND SIDES
320 LET BR=B/57.2958:CR=C/57.2958 'CHANGES ANGLES TO RADIANS
330 IF AA=0 THEN 360
340 LET BB=AA*SIN(BR)
350 LET CC=AA*COS(BR)
360 IF BB=0 THEN 390
370 LET AA=BB/SIN(BR)
380 LET CC=BB/TAN(BR)
390 IF CC=0 THEN 600
400 LET AA=CC/COS(BR)
410 LET BB=CC*TAN(BR)
420 IF B*C<0 THEN 700
430 '          GRAPHICS
440 FOR L=244 TO 950 STEP 62
450 PRINT@L,"/";
460 NEXT L
470 PRINT@927,STRING$(22,95);
480 LET X=106
490 FOR Y=10 TO 43
500 SET(X,Y)
510 NEXT Y
515 PRINT@743,"ANGLES(DEG)";
520 PRINT@881,"90";
530 PRINT@866,B;
540 PRINT@555,C;
550 PRINT@1000,CC;
560 PRINT@694,BB;
570 PRINT@607,AA;
580 PRINT@960,;
585 INPUT"<ENTER> TO RUN AGAIN";Q
586 RUN
590 '              FIND ANGLES
600 IF AA*BB=0 THEN 630
610 LET CC=SQR(AA*AA-BB*BB)
620 GOTO 680
630 IF AA*CC=0 THEN 660
640 LET BB=SQR(AA*AA-CC*CC)
650 GOTO 680
660 IF BB*CC=0 THEN 700
670 LET AA=SQR(BB*BB+CC*CC)
680 LET B=ATN(BB/CC)*57.2958
690 GOTO 250
700 PRINT"INVALID DATA"
710 FOR Z=1 TO 1000:NEXT Z
720 RUN
740 ' AN ORIGINAL PROGRAM USING
750 ' LEVEL-II BASIC FOR TRS-80
760 ' BY: MR GORDON E. SPEER
770 '      3304 WOODLAWN ROAD
780 '      STERLING, IL 61081
790 '      PHONE(815)625-5251
```

COMPUTRONICS INC.

MATHEMATICAL APPLICATIONS SERVICE™

GOLD SCALE

Before you run down to your local coin store to sell your grandmother's wedding ring, you might like to find out how much the gold in it is worth. This program requires that you make a simple balance out of a 12 inch ruler that has a centimeter scale along one edge. It is really very easy, just follow these directions:

1. balance the ruler on a pencil and read the centimeter scale to find the point of balance (mine reads 15.2 cm)
2. put the ring, or any other gold object on the ruler and balance it with a nickel. Try to get the nickel or the ring almost out to one end of the ruler, keeping the pencil at the point you determined in step 1.

3. read the locations of the center of the ring and the center of the nickel (mine are 2.3 cm and 29.2 cm respectively)
HINT: to weigh a necklace or bracelet, stick one end of the ruler over the edge of a table and loop the necklace over it.

The program is based on the fact that a nickel has a mass of 5 gm, and there are 31.1 grams in a troy ounce. It allows you to correct for karats (24ths) of purity, and carats (1/5 gm) of excess mass of mounted stones.

To work with silver: use 22.2K for sterling, 21.6K for coins, because they are 92.5% and 90% pure, respectively.

For heavy objects, use a stack of nickels and multiply the answers by the number of nickels, or try modifying the program to allow an input of the number of nickels.

```
100 CLS:PRINT CHR$(23)
110 PRINT"    G O L D    S C A L E
115 PRINT"   ======================="
130 PRINT
140 PRINT"       (GOLD)          (NICKEL)"
150 FOR X=30 TO 45:SET(X,15):SET(X,16):NEXT
160 FOR X=110 TO 120:SET(X,16):NEXT
170 FOR X=1 TO 126:SET(X,17):NEXT
180 PRINT@414,"O"
190 PRINT"              (PENCIL)"
200 PRINT
210 PRINT
220 INPUT"  LOCATION OF GOLD";G
230 INPUT"LOCATION OF PENCIL";P
240 INPUT"LOCATION OF NICKEL";N
250 INPUT"            KARAT";K
260 INPUT"  CARATS OF STONES";C
270 INPUT"       $/OZ OF GOLD";R
280 LET WT=ABS(N-P)*5/ABS(G-P)    'WEIGHT OF OBJECT IN GRAMS
290 LET M=(WT-C/5)*K/24           'WEIGHT OF GOLD OR SILVER, GRAMS
300 LET T=M/31.1                  'TROY OUNCES OF METAL
310 PRINT
320 PRINT"THE ITEM CONTAINS"M"GRAMS"
330 PRINT"OF GOLD, WORTH ";
340 PRINT USING"$####.##";T*R
350 PRINT:PRINT:PRINT
360 '
370 ' AN ORIGINAL PROGRAM USING
380 ' LEVEL-II BASIC FOR TRS-80
390 ' BY: MR GORDON E. SPEER
400 '      3304 WOODLAWN ROAD
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420 '      PHONE(815)625-5251
```

TIMER

One of the laws of falling objects formulated by either Galileo or Newton says that the maximum height reached by a projectile from the ground can be determined by the time aloft. Football commentators call this the "hang time" of a punt, and in Football it rarely exceeds 5 seconds. It applies equally to golf, baseball, howitzers, etc.

Height = 16 × (time/2)²

Timer is a stopwatch that calculates the height reached by a projectile, or the speed of a one mile race, or the two and a half mile memorial day race, by simply pressing the space bar to start and again to stop the timing interval. If you can think of any other calculations using the number of seconds, just put them in anywhere after line 230.

(Footnote for history buffs: Galileo was born the year Michelangelo died, and died the year Newton was born).

```
100 '      "TIMER"
110 CLS
120 LET T=10000
130 PRINT"STOPWATCH READY"
140 LET A$=INKEY$
150 IF A$=CHR$(32) THEN 170
160 GOTO 140
170 PRINT"TIMING"
180 LET A$=INKEY$
190 LET T=T+1
200 IF A$=CHR$(32) THEN 220
210 GOTO 180
220 LET S=(T-9980)*30/1697
230 CLS
240 PRINT
250 PRINT
260 PRINT
270 PRINTS"SECONDS"
280 PRINT
290 PRINT"ONE MILE:";3600/S;"MILES PER HOUR
300 PRINT
310 PRINT"INDIANAPOLIS 500 LAP:";9000/S;"MILES PER HOUR
320 PRINT
330 PRINT"FOOTBALL, BASEBALL, GOLF:";16*(S/2)[2;"FEET VERTICALLY"
340 PRINT
350 PRINT
360 PRINT
370 PRINT
380 GOTO 120
390 '
400 ' AN ORIGINAL PROGRAM USING
410 ' LEVEL-II BASIC FOR TRS-80
420 ' BY: MR GORDON E. SPEER
430 '      3304 WOODLAWN ROAD
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```

HOT TUB

Here's a good problem in household energy consumption. Even if you don't have a hot tub out on the patio in which to soak your tired bod after a long day at the factory, you may enjoy seeing how the cost of heating water is calculated.

Here are a few relevant facts:

The volume of a cylindrical tub is pi × r² × d.

There are 7.481 gallons in a cubic foot.

There are 8 pints in a gallon.

It takes 1 British Thermal Unit (BTU) to warm a pint of water 1 degree Farenheit.

A kilowatt-hour is 3,600,000 watt-seconds (joules).

There are 4.19 joules in a calorie.

There are 252 calories in a BTU.

Some heat will invariably be lost due to the surroundings, except on very hot days, so there is an extimated 80% efficiency tossed into the calculation for good measure.

To run this program for an ordinary bathtub, try changing the radius of the tub until you get about 30 gallons. That's about typical for a Saturday night bath.

If you don't know your electrical cost per kilowatt-hour, use 5¢. Charges vary from about 3¢ to 8¢ depending on where you live.

```
100 DEFDBL H  'PREVENTS EXPONENTIAL NOTATION WHEN
110 '         HEAT GETS INTO THE MILLIONS OF BTU'S
120 CLS:PRINT CHR$(23)  'WIDE CHARACTERS
130 PRINT"      H O T   T U B
140 FOR Y=10 TO 45    'DRAW THE TUB
150 SET(13,Y):SET(96,Y)
160 NEXT Y
170 FOR X=13 TO 96
180 SET(X,45)
190 NEXT X
200 FOR L=904 TO 250 STEP -64  'DRAW THE WATER (!)
210 PRINT@L,STRING$(20,95);
220 FOR C=1 TO 200:NEXT C 'TIME DELAY
230 NEXT L
240 FOR C=1 TO 1000:NEXT C 'TIME DELAY
250 CLS:PRINT CHR$(23)
260 PRINT"      H O T   T U B
270 PRINT
280 PRINT"CALCULATES COST OF HEATING THE
290 PRINT"WATER FOR YOUR HOT TUB FROM 50
300 PRINT"TO 104 DEGREES.
310 PRINT
320 INPUT"  DIAMETER OF TUB (FEET)";D
330 INPUT"ELECTRIC RATE: CENTS/KWH";E
340 LET R=D/2          'RADIUS IN FEET
350 LET PI=3.14159
360 LET V=PI*R*R*4.5 'VOLUME, 4.5 FEET DEEP
370 LET V=V*7.481     'CHANGES CUBIC FEET TO GALLONS
380 PRINT
390 PRINT"VOLUME OF WATER ="INT(V+.5)"GALLONS
400 LET H=54*8*V       'HEAT IN BTU'S
410 PRINT"HEAT REQUIRED = "INT(H)"BTU'S
420 LET C=H*252        'CALORIES
430 LET J=C*4.19       'JOULES OF ENERGY
440 LET J=J/.8         '80% EFFICIENCY
450 LET K=J/3.6E6      'KILOWATT HOURS
460 PRINT"ELECTRICITY REQUIRED ="FIX(K+.5)"KWH
470 PRINT"COST TO HEAT WATER = ";USING"$###.##";K*E/100
480 '
490 ' AN ORIGINAL PROGRAM USING
500 ' LEVEL-II BASIC FOR TRS-80
510 ' BY: MR GORDON E. SPEER
520 '      3304 WOODLAWN ROAD
530 '      STERLING, IL 61081
540 '      PHONE(815)625-5251
```

Prices reflect distribution on 8" single density diskettes. If a format is requested which requires additional diskettes, a surcharge of $8. per additional diskette will be added.

All Lifeboat programs require CP/M, unless otherwise stated.

DIGITAL RESEARCH

☐ **CP/M FLOPPY DISKETTE OPERATING SYSTEM** — Packages supplied on diskette complete with 8080 assembler, text editor, 8080 debugger and various utilities plus full documentation. CP/M should be configured for your particular computer/disk systems including: North Star Single, Double or Quad density, Altair 8" disks, Helios II, Exidy Sorcerer, Vector MZ, Heath H17† or H89†, TRS-80†, iCOM 3712 and iCOM Micro Disk plus many other configurations available off the shelf .... **$145/$25**
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All Microsoft prices are discounted!

MICROSOFT

☐ **BASIC-80** — Disk Extended BASIC, ANSI compatible with long variable names, WHILE/WEND, chaining, variable length file records .... **$300/$25**

☐ **BASIC COMPILER** — Language compatible with BASIC-80 and 3-10 times faster execution. Produces standard Microsoft relocatable binary output. Includes Macro-80. Also linkable to FORTRAN-80 or COBOL-80 code modules .... **$350/$25**

☐ **FORTRAN-80** — ANSI 66 (except for COMPLEX) plus many extensions. Includes relocatable object compiler, linking loader, library with manager. Also includes MACRO-80 (see below) .... **$400/$25**

☐ **COBOL-80** — Level 1 ANSI '74 standard COBOL plus most of Level 2. Full sequential, relative, and indexed file support with variable file names. STRING, UNSTRING, COMPUTE, VARYING/UNTIL, EXTEND, CALL, COPY, SEARCH, 3-dimensional arrays, compound and abbreviated conditions, nested IF. Powerful interactive screen-handling extensions. Includes compatible assembler, linking loader, and relocatable library manager as described under MACRO-80 .... **$625/$25**

☐ **MACRO-80** — 8080/Z80 Macro Assembler. Intel and Zilog mnemonics supported. Relocatable linkable output. Loader, Library Manager and Cross Reference List utilities included .... **$149/$15**

☐ **XMACRO-86** — 8086 cross assembler. All Macro and utility features of MACRO-80 package. Mnemonics slightly modified from Intel ASM86. Compatibility data sheet available .... **$275/$25**

☐ **EDIT-80** — Very fast random access text editor for text with or without line numbers. Global and intra-line commands supported. File compare utility included .... **$89/$15**

MICRO FOCUS

☐ **STANDARD CIS COBOL** — ANSI '74 COBOL standard and compiler fully validated by U.S. Navy tests to ANSI level 1. Supports many features to level 2 including dynamic loading of COBOL modules and a full ISAM file facility. Also, program segmentation, interactive debug and powerful interactive extensions to support protected and unprotected CRT screen formatting from COBOL programs used with any dumb terminal .... **$850/$50**

☐ **FORMS 2** — CRT screen editor. Output is COBOL data descriptions for copying into CIS COBOL programs. Automatically creates a query and update program of indexed files using CRT protected and unprotected screen formats. No programming experience needed. Output program directly compiled by CIS COBOL (standard) .... **$200/$20**

☐ **HDBS** — Hierarchical Data Base System. CODASYL oriented with FILEs, SETs, RECORDs and ITEMs which are all user defined. ADD, DELETE, UPDATE, SEARCH, and TRAVERSE commands supported. SET ordering is sorted, FIFO, LIFO, next or prior. One to many set relationship supported. Read/Write protection at the FILE level. Supports FILEs which extend over multiple floppy or hard disk devices.

☐ **MDBS** — Micro Data Base System. Full network data base with all features of HDBS plus multi-level Read/Write protection for FILE, SET, RECORD and ITEM. Explicit representation of one to one, one to many, many to many, and many to one SET relationships. Supports multiple owner and multiple record types within SETs. HDBS files are fully compatible.

☐ **MDBS-DRS** — MDBS with Dynamic Restructuring System option which allows altering MDBS data bases with new ITEMs, RECORDs, or SETs are needed without changing existing data.
HDBS-Z80 version .... **$250/$35**
MDBS-Z80 version .... **$750/$35**
MDBS-DRS-Z80 version .... **$850/$35**
8080 Version available at $75. extra.

Z80 version requires 20K RAM, 8080 version requires 24K RAM. (Memory requirements are additional to CP/M and application program.)

When ordering HDBS or MDBS please specify if the version required is for 1) Microsoft L80 i.e. FORTRAN-80, COBOL-80, BASIC COMPILER, 2) MBASIC 4, XX, or 3) BASIC-80 5.0.

Prices and specifications subject to change without notice.

EIDOS SYSTEMS

(lower prices!)

☐ **KISS** — Keyed Index Sequential Search. Offers complete Multi-Keyed Index Sequential and Direct Access file management. Includes built-in logic functions for 16 or 32 bit arithmetic, string/integer conversion and string compare. Delivered as a relocatable linkable module in Microsoft format for use with FORTRAN-80 or COBOL-80, etc. .... **$335/$23**

☐ **KBASIC** — Microsoft Disk Extended BASIC with all KISS facilities, integrated by implementation of nine additional commands in language. Package includes KISS. REL as described above, and a sample mail list program .... **$585/$45**
To licensed users of Microsoft BASIC-80 (MBASIC) .... **$435/$45**

All Micropro prices are discounted!

MICROPRO

☐ **SUPER-SORT I** — Sort, merge, extract utility as absolute executable program or linkable module in Microsoft format. Sorts fixed or variable records with data in binary, BCD, Packed Decimal, EBCDIC, ASCII, floating, fixed point, exponential, field justified, etc. Even variable number of fields per record! .... **$225/$25**

☐ **SUPER-SORT II** — Above available as absolute program only .... **$175/$25**

☐ **SUPER-SORT III** — As II without SELECT/EXCLUDE .... **$125/$25**

☐ **WORD-STAR** — Menu driven visual word processing system for use with standard terminals. Text formatting performed on screen. Facilities for text paginate, page number, justify, center and underscore. User can print one document while simultaneously editing a second. Edit facilities include global search and replace, Read/Write to other text files, block move, etc. Requires CRT terminal with addressable cursor positioning .... **$445/$40**

☐ **WORD-STAR/MAIL-MERGE** — As above with option for production mailing of personalized documents with mail list from Datastar or NAD .... **$575/$25**

☐ **WORD-STAR Customization Notes** — For sophisticated users who do not have one of the many standard terminal or printer configurations in the distribution version of WORD-STAR .... **NA/$100**

☐ **WORD-MASTER** Text Editor — In one mode has superset of CP/M's ED commands including global searching and replacing, forwards and backwards in file in video mode, and full screen editor for users with serial addressable-cursor terminal .... **$125/$25**

☐ **DATASTAR** — Professional forms control entry and display system for key-to-disk data capture. Menu driven with built-in learning aids. Input field verification by length, mask, attribute (i.e. uppercase, lowercase, numeric, auto dup., etc.). Built-in arithmetic capabilities using keyed data, constants and derived values. Visual feedback for ease of forms design. Files compatible with all CP/M-MP/M supported languages. Requires 32K CP/M .... **$350/$35**

☐ **CBASIC-2** Disk Extended BASIC — Non-interactive BASIC with pseudo-code compiler and runtime interpreter. Supports full file control, chaining, integer and extended precision variables, etc. . . **$109/$15**

☐ **PASCAL/M** — Compiler generates P code from extended language, implementation of standard PASCAL. Supports overlay structure through additional procedure calls and the SEGMENT procedure type. Provides convenient string handling capability with the added variable type STRING. Untyped files allow memory image I/O. Requires 56K CP/M . . . **$350/$30**

☐ **PASCAL/Z** — Z80 native code PASCAL compiler. Produces optimized, ROMable re-entrant code. All interfacing to CP/M is through the support library. The package includes compiler, companion macro-assembler and source for the library. Requires 56K and Z80 CPU.
Version 2 includes all of Jensen/Wirth except variant records .... **$275/$25**
Version 3 Upgrade with variant records and strings expected 3/80 .... **$395/$25**

☐ **PASCAL/MT** — Subset of standard PASCAL. Generates ROMable 8080 machine code. Symbolic debugger included. Supports interrupt procedures, CP/M file I/O and assembly language interface. Real variables can be BCD. Software floating point, or AMD 9511 hardware floating point. Version 3 includes Sets, Enumeration and Record data types. Manual explains BASIC to PASCAL conversion. Source for the run time package requires MAC (See under Digital Research). Requires 32K .... **$250/$30**

STRUCTURED SYSTEMS GROUP

☐ **GENERAL LEDGER** — Interactive and flexible system providing proof and report outputs. Customization of COA created interactively. Multiple branch accounting centers. Extensive checking performed at data entry for proof, COA correctness, etc. Journal entries may be batched prior to posting. Closing procedure automatically backs up input files. Now includes Statement of Changes in Financial Position. Requires CBASIC-2 .... **$1250/$25**

☐ **ACCOUNTS RECEIVABLE** — Open item system with output for internal aged reports and customer-oriented statement and billing purposes. On-Line Enquiry permits information for Customer Service and Credit departments. Interface to General Ledger provided if both systems used. Requires CBASIC-2. .... **$1250/$25**

☐ **ACCOUNTS PAYABLE** — Provides aged statements of accounts by vendor with check writing for selected invoices. Can be used alone or with General Ledger and/or with NAD. Requires CBASIC-2 . . . **$1250/$25**

☐ **PAYROLL** — Flexible payroll system handles weekly, bi-weekly, semi-monthly and monthly payroll periods. Tips, bonuses, re-imbursements, advances, sick pay, vacation pay, and compensation time are all part of the payroll records. Prints government required periodic reports and will post to multiple SSG general ledger accounts. Requires CBASIC-2 .... **$1250/$25**

☐ **INVENTORY CONTROL SYSTEM** — Performs control functions of adding and depleting stock items, adding new items and deleting old items. Tracks quantity of items on hand, on order and back-ordered. Optional hard copy audit trail is available. Reports include Master Item List, Stock Activity, Stock Valuation and Re-order List. Requires CBASIC-2 **$1250/$25**

MICROSOFT

(Middle-right column)

☐ **ANALYST** — Customized data entry and reporting system. User specifies up to 75 data items per record. Interactive data entry, retrieval, and update facility makes information management easy. Sophisticated report generator provides customized reports using selected records with multiple level break-points for summarization. Requires CBASIC-2 .... **$250/$15**

☐ **LETTERIGHT** — Program to create, edit and type letters or other documents. Has facilities to enter, display, delete and move text, with good video screen presentation. Designed to integrate with NAD for form letter mailings. Requires CBASIC-2 . . **$200/$25**

☐ **NAD** Name and Address selection system — interactive mail list creation and maintenance program with output as full reports with reference data or restricted information for mail labels. Transfer system for extraction and transfer of selected records to create new files. Requires CBASIC-2 .... **$100/$20**

☐ **QSORT** — Fast sort/merge program for files with fixed record length, variable field length information. Up to five ascending or descending keys. Full back-up of input files created .... **$100/$20**

GRAHAM-DORIAN SOFTWARE SYSTEMS

☐ **GENERAL LEDGER** — An on-line system; no batching is required. Entries to other GRAHAM-DORIAN accounting packages are automatically posted. User establishes customized C.O.A. Provides transaction register, record of journal entries, trial balances and monthly closings. Keeps 14 month history and provides comparison of current year with previous year. Requires CBASIC-2. Supplied in source . . . **$995/$35**

☐ **ACCOUNTS PAYABLE** — Maintains vendor list and check register. Performs cash flow analysis. Flexible — writes checks to specific vendor for certain invoices or can make partial payments. Automatically posts to GRAHAM-DORIAN general ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source .... **$995/$35**

☐ **ACCOUNTS RECEIVABLE** — Creates trial balance reports, prepares statements, ages accounts and records invoices. Provides complete information describing customer payment activity. Receipts can be posted to different ledger accounts. Entries automatically update GRAHAM-DORIAN general ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source .... **$995/$35**

☐ **PAYROLL SYSTEM** — Maintains employee master file. Computes payroll withholding for FICA, Federal and State taxes. Prints payroll register, checks, quarterly reports and W-2 forms. Can generate ad hoc reports and employee form letters with mail labels. Requires CBASIC-2. Supplied in source .... **$590/$35**

☐ **INVENTORY SYSTEM** — Captures stock levels, costs, sources, sales, ages, turnover, markup, etc. Transaction information may be entered for reporting by salesman, type of sale, date of sale, etc. Reports available both for accounting and decision making. Requires CBASIC-2. Supplied in source . . . **$590/$35**

☐ **JOB COSTING** — Designed for general contractors. To be used interactively with other GRAHAM-DORIAN accounting packages for tracking and analysing expenses. User establishes customized cost categories and job phases. Permits comparison of actual versus estimated costs. Automatically updates GRAHAM-DORIAN general ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source **$995/$35**

☐ **APARTMENT MANAGEMENT SYSTEM** — Financial management system for receipts and security deposits of apartment projects. Captures data on vacancies, revenues, etc. for annual trend analysis. Daily report shows late rents, vacancy notices, vacancies, income lost through vacancies, etc. Requires CBASIC-2. Supplied in source .... **$590/$35**

☐ **CASH REGISTER** — Maintains files on daily sales. Files data by sales person and item. Tracks sales, over-rings, refunds, payouts and total net deposits. Requires CBASIC-2. Supplied in source . . . . **$590/$35**

☐ **tiny C** — Interactive interpretive system for teaching structured programming techniques. Manual includes full source listings .... **$75/$40**

☐ **BDS C COMPILER** — Supports most major features of language including Structures, Arrays, Pointers, recursive function evaluation, linking loader and library. Floating point function library included. Lacks data initialization and static and register class specifiers. Documentation includes "THE C PROGRAMMING LANGUAGE" by Kernighan and Ritchie. .... **$125/$15**

☐ **WHITESMITHS C COMPILER** — The ultimate in systems software tools. Produces faster code than Pascal with more extensive facilities. Conforms to the full UNIX*** Version 7 C language, described by Kernighan and Ritchie, and makes available over 75 functions for performing I/O, string manipulation and storage allocation. Linkable to Microsoft REL files. Requires 60K CP/M .... **$630/$30**

☐ **POLYVUE/80** — Full screen editor for any CRT with XY cursor positioning. Includes vertical and horizontal scrolling, interactive search and replace, automatic text wrap around for word processing, operations for manipulating blocks of text, and complete hensive 70 page manual .... **$135/$15**

☐ **POLYTEXT/80** — Text formatter for word processing applications. Justifies and paginates source text files. Will generate form letters with custom fields and conditional processing. Support for Daisy Wheel printers includes variable pitch justification and motion optimization .... **$85/$15**

☐ **ALGOL-60** — Powerful block-structured language compiler featuring economical run time dynamic allocation of memory. Very compact (24K total RAM) system implementing almost all Algol 60 report features plus many powerful extensions including string handling direct disk address I/O etc. Requires Z80 CPU .... **$199/$20**

☐ **Z80 DEVELOPMENT PACKAGE** — Consists of: (1) disk file line editor, with global inter and intra-line facilities; (2) Z80 relocating assembler, Zilog/Mostek mnemonics, conditional assembly and cross reference table capabilities; (3) linking loader producing absolute Intel hex disk file .... **$95/$20**

*CP/M is a trademark of Digital Research.
**Z80 is a trademark of Zilog, Inc.
***UNIX is a trademark of Bell Laboratories.
****WHATSIT? is a trademark of Computer Headware.
*****Electric Pencil is a trademark of Michael Shrayer Software.
★TRS-80 is a trademark of Tandy Corp.

†CP/M for Heath, TRS-80 Model I and PolyMorphic 8813 are modified and must use specially compiled versions of system and applications software.

††Recommended system configuration consists of 48K CP/M, 2 full size disk drives, 24 x 80 CRT and 132 column printer.

Ⓜ Modified version available for use with CP/M as implemented on Heath and TRS-80 Model I computers.

Ⓛ User license agreement for this product must be signed and returned to Lifeboat Associates before shipment may be made.

ⒾⒺ This product Includes/eXcludes the language manual recommended in Sundries and Notions above.

(right column)

☐ **ZDT** — Z80 Monitor Debugger to break and examine registers with standard Zilog/Mostek mnemonic disassembly displays. $35 when ordered with Z80 Development Package .... **$50/$10**

☐ **DISTEL** — Disk based disassembler to Intel 8080 or TDL/Xitan Z80 source code, listing and cross reference files. Intel or TDL/Xitan pseudo ops optional. Runs on 8080 .... **$65/$10**

☐ **DISILOG** — As DISTEL to Zilog/Mostek mnemonic files. Runs on Z80 only .... **$65/$10**

☐ **XASM-68** — Non-macro cross-assembler with nested conditionals and full range of pseudo operations. Assembles from standard Motorola MC6800 mnemonics to Intel hex .... **$200/$25**

☐ **XASM-65** — As XASM-68 for MOS Technology MCS-6500 series mnemonics .... **$200/$25**

☐ **TEXTWRITER III** — Text formatter to justify and paginate letters and other documents. Special features include insertion of text during execution from other disk files or console, permitting recipe documents to be created from linked fragments on other files. Has facilities for sorted index, table of contents and footnote insertions. Ideal for contracts, manuals, etc. Now compatible with Electric Pencil**** prepared files .... **$125/$20**

☐ **POSTMASTER** — A comprehensive package for mail list maintenance that is completely menu driven. Features include keyed record extraction and label production. A form letter program is included which provides neat letters on single sheet or continuous forms. Compatible with NAD files. Requires CBASIC-2 .... **$150/$15**

☐ **WHATSIT?**** — Interactive data-base system using associative tags to retrieve information by subject. Hashing and random access used for fast response. Requires CBASIC-2 .... **$125/$25**

☐ **XYBASIC** Interactive Process Control BASIC — Full disk BASIC features plus unique commands to handle bytes, rotate and shift, and to test and set bits. Available in Integer, Extended and ROMable versions.
Integer Disk or Integer ROMable .... **$295/$25**
Extended Disk or Extended ROMable .... **$395/$25**

☐ **SMAL/80** Structured Macro Assembled Language — Package of powerful general purpose text macro processor and SMAL structured language compiler. SMAL is an assembler language with IF-THEN-ELSE, LOOP-REPEAT-WHILE, DO-END, BEGIN-END constructs .... **$75/$15**

☐ **SELECTOR III-C2** — Data Base Processor to create and maintain multi Key data bases. Prints formatted sorted reports with numerical summaries or mailing labels. Comes with sample applications, including Sales Activity, Inventory, Payables, Receivables, Check Register, and Client/Patient Appointments, etc. Requires CBASIC-2. Supplied in source .... **$295/$20**

☐ **GLECTOR** — General Ledger option to SELECTOR III-C2. Interactive system provides for customized COA. Unique chart of transaction types insure proper double entry book keeping. Generates balance sheets, P&L statements and journals. Two year record allows for statement of changes in financial position report. Supplied in source. Requires SELECTOR III-C2, CBASIC-2 and 52K system .... **$250/$25**

☐ **CPM/374X** — Has full range of functions to create or re-name an IBM 3741 volume, display directory information and edit the data set contents. Provides full file transfer facilities between 3741 volume data sets and CP/M files .... **$195/$10**

☐ **BASIC UTILITY DISK** — Consists of: (1) CRUNCH-14 — Compacting utility to reduce the size and increase the speed of programs in Microsoft BASIC and TRS-80 BASIC; (2) DPFUN — Double precision subroutines for computing nineteen transcendental functions including square root, natural log, log base 10, sin, arc sin, hyperbolic sin, hyperbolic arc sin, etc. Furnished in source on diskette and documentation . . . **$50/$35**

☐ **THE STRING BIT** — FORTRAN character string handling. Routines to find, fill, pack, move, separate, concatenate and compare character strings. This package completely eliminates the problems associated with character string handling in FORTRAN. Supplied with source .... **$65/$15**

☐ **BSTAM** — Utility to link one computer to another also equipped with BSTAM. Allows file transfers at full data speed (no conversion to hex), with CRC block control check for very reliable error detection and automatic retry. We use it! It's great! Full wildcard expansions to send ★.COM, etc. 9600 baud with wire. 300 baud with phone connection. Both ends need one. Standard and Ⓜ versions can talk to one another. Compatible TRSDOS version also available **$150/$5**

★ ★ ★ ★ ★ ★ ★
SUNDRIES & NOTIONS

☐ **HEAD CLEANING DISKETTE** — Cleans the drive Read/Write head in 30 seconds. Diskette absorbs loose oxide particles, fingerprints, and other foreign particles that might hamper the performance of the drive head. Lasts at least 3 months with daily use. Specify 5" or 8" .... **$20 ea./$45 for 3**

☐ **FLIPPY DISK KIT** — Template and instructions to modify single sided 5¼" diskettes for use of second side in single sided drives **$12.50**

☐ **FLOPPY SAVER** Protection for center holes of 5¼" floppy disks. Only 1 needed per diskette. Kit contains centering post, pressure tool, tough 7-mil mylar reinforcing rings. Installation tools and rings for 25 diskettes **$14.95**
Re-orders of rings only **$7.95**

☐ **PASCAL USER MANUAL AND REPORT** — By Jensen and Wirth. The standard textbook on the language. Recommended for use by Pascal/Z, Pascal/M and Pascal/MT users **$8**

☐ **THE C PROGRAMMING LANGUAGE** — By Kernighan and Ritchie. The standard textbook on the language. Recommended for use by BDS C, tiny C, and Whitesmiths C users **$12**

Shopping List No.10

Everything on Shopping List #10 runs on 64K TRS-80 Model II

Software for most popular 8080/Z80 computer disk systems including **NORTH STAR, iCOM, MICROPOLIS, DYNABYTE DB8/2 & DB8/4, EXIDY SORCERER, SD SYSTEMS, ALTAIR, VECTOR MZ, MECA, 8" IBM, HEATH H17 & H89, HELIOS, IMSAI VDP42 & 44, REX, NYLAC, INTERTEC, VISTA V80 and V200, TRS-80 MODEL I and MODEL II, ALTOS, OHIO SCIENTIFIC, DIGI-LOG** and **IMS 5000** formats.
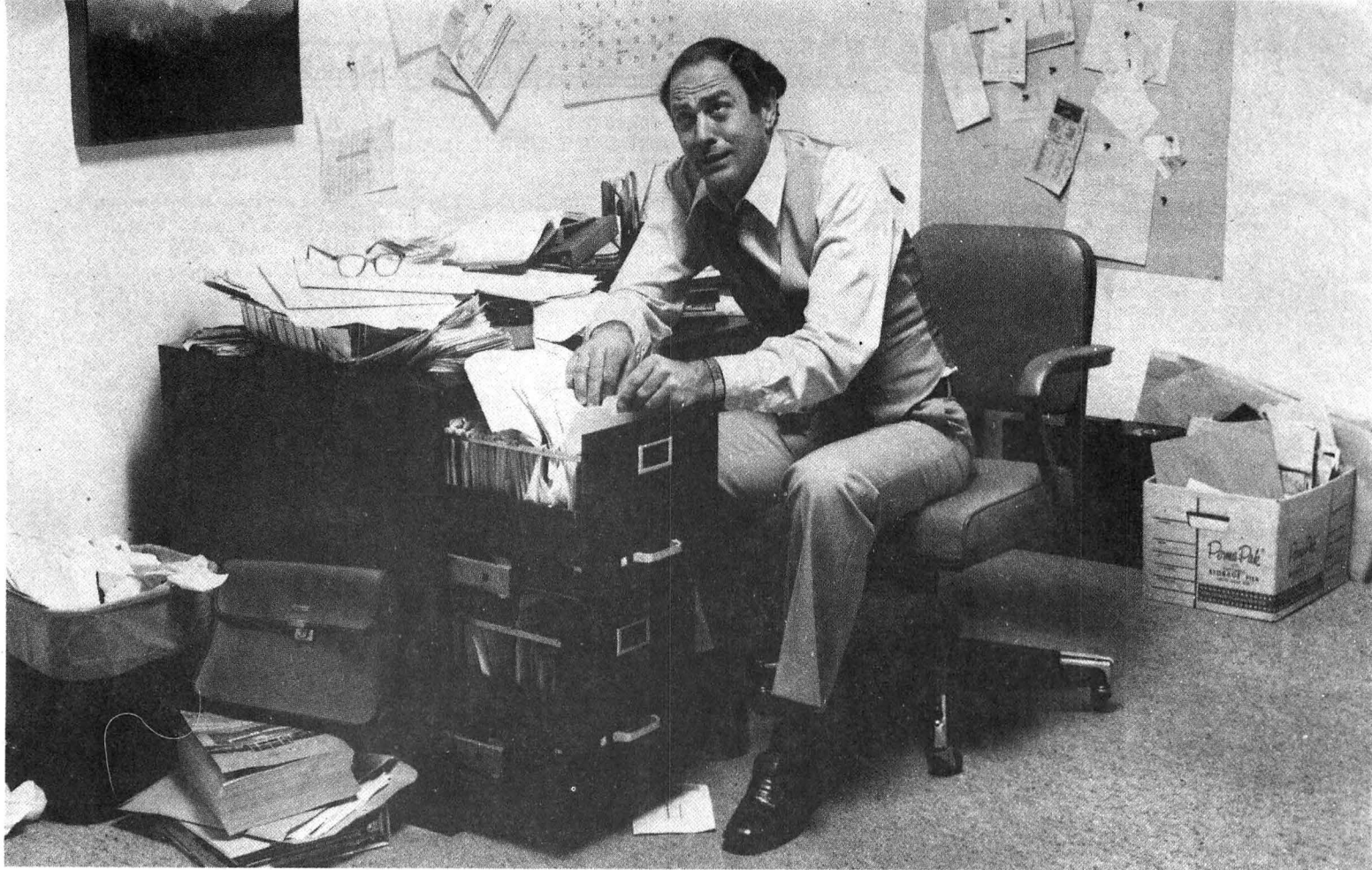
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Record keeping problems? Our CCA Data Management System solves them easily.

Having information at your fingertips can make your job a whole lot easier. And that's what the CCA Data Management System is all about.

With this Personal Software™ package and an Apple II™ or TRS-80™ disk system, it will be far easier to keep inventories, customer lists, accounts receivable and payable records, patient histories and many more items.

In fact, you can use the CCA DMS for all of your data management needs, rather than buying (expensive) or writing (time consuming) separate programs for each application. That's because DMS lets you create your own filing systems, adapting itself to the types of records you keep. You specify the number and names of each data field—without any programming.

With DMS keeping all of your records, you only have to learn how to use one system. That's easier, too. It's menu driven, with plenty of prompts to help you create files and add, update, scan, inspect, delete, sort, condense and print data. Our comprehensive 130-page step-by-step instruction manual even provides complete "how to" inventory and mailing list applications so you can start processing immediately.

DMS is a very powerful system, with more file and record storage capacity than other data base programs on the market.

*Apple is a trademark of Apple Computer, Inc.; TRS-80 is a trademark of the Radio Shack Div. of Tandy Corp.

And it also gives you greater data handling flexibility. To customize DMS, write add-on BASIC programs that read or write DMS files and perform any kind of processing you want.

You can sort and print your data in nearly any form of report and mailing label you want. Sort data by up to 10 fields for zip code, balance due, geographic location or whatever. And print reports with subtotals and totals automatically calculated.

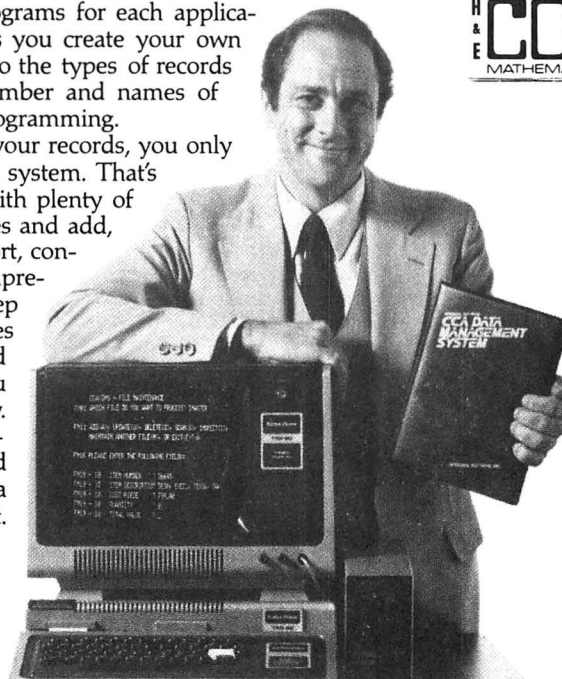## H&E COMPUTRONICS INC.
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COORDINATED BUSINESS SYSTEMS

SMALL BUSINESS SYSTEMS GROUP

- EACH MODULE CAN BE OPERATED INDIVIDUALLY OR AS A COORDINATED SYSTEM.
- TURN-KEY ERROR CATCHING OPERATION FOR BEGINNERS
- FREE 30-DAY TELEPHONE CONSULTATION WITH SBSG
- EACH MODULE CAN BE FORMATTED TO SPAN DATA ON UPTO 4 DISK DRIVES.
- COMPLETE MANUAL AND DOCUMENTATION ACCOMPANY EACH MANUAL
- MINIMUM SYSTEM REQUIREMENTS - 2 DISK DRIVES FOR MODEL I...1-DISK DRIVE FOR MODEL II

ACCOUNTS PAYABLE

The accounts payable system receives data concerning purchases from suppliers and produces checks in payment of outstanding invoices. In addition, it produces cash management reports. This system aids in tight financial control over all cash disbursements of the business. Several reports are available and supply information needed for the analysis of payments, expenses, purchases and cash requirements. All A/P data feeds General Ledger so that data is entered into the system just once. These programs were developed 5 years ago for the Wang micro-computer and have been tested in many environments since then. The package has been converted to the TRS-80™ and is now a well documented, on-line, inter-active micro-computer system with the capabilities of (or exceeding many larger systems.

ACCOUNTS RECEIVABLE

The objective of a computerized A/R system is to prepare accurate and timeley monthly statements to credit customers. Management can generate information required to control the amount of credit extended and the collection of money owed in order to maximize profitable credit sales while minimizing losses from bad debts. The programs composing this system were developed 5 years ago, especially for small businesses using the Wang Microcomputer. They have been tested in many environments since then. Each module can be used stand alone or can feed General Ledger for a fully integrated system.

PAYROLL

Payroll invoices many complex calculations and the production of reports and documents, many of which are required by government agencies. It is an ideal candidate for the computer. With this Payroll system in-house, you can promptly and accurately pay your employees and generate accruate documents/reports to management, employees, and appropriate government agencies concerning earnings, taxes, and other deductions. The package has been converted to the TRS-80™ and is now a well documented, on-line, interactive micro-computer system with the capabilities of (or exceeding) many larger systems.

CAPABILITIES:

- ★ performs all necessary payroll tasks including:
  - file maintenance, pay data entry and verification
  - computation of pay and deduction amounts
  - printing of reports and checks
- ★ can handle salaried and hourly employees
- ★ employees can receive:
  - hourly or salary wage
  - vacation pay
  - holiday pay
  - piecework pay
  - overtime pay

CAPABILITIES

- ★ menu driven; easy to use; full screen prompting and cursor control
- ★ invoice oriented; everything revolves around the invoice; handles new invoice or credit memo or debit memo
- ★ invoice information recorded; invoice #, description, buyer, check register #, invoice date, age date, amount of invoice, discount (in %), freight, tax ($), total payable
- ★ transaction print and file maintenance procedures insure accuracy
- ★ flexible check calculation procedure; allows checks to be calculated for a set of vendors - or - for specific vendors
- ★ program prints your checks; contiguous computer checks with your company letterhead can be purchased from SBSG
- ★ reports include (samples on back):
  - open item listing/closed item listing - both detail and summary
  - debit memo listing/credit memo listing
  - aging
  - check register report (to give an audit trail of checks printed)
  - vendor listing and vendor activity (activity of the whole year)
- ★ fully linked to GENERAL LEDGER; each invoice can be distributed to as many as five (5) different GL accounts; sysem automatically posts to cash and A/P accounts

CAPABILITIES

- ★ menu driven; easy to use; full screen prompting and cursor control
- ★ invoice oriented; invoices can be entered before ready for billing, when ready for billing, after billing or after paid
- ★ allows entry of new invoice, credit memo, debit memo, or change/delete invoice
- ★ allows for progress payment
- ★ transaction information includes:
  - type of A/R transaction
  - customer P.O. #
  - description of P.O.
  - billing date
  - general ledger account number
  - invoice amount
  - shipping/transportation charges
  - tax charges
  - payment
  - progress payment information
  - transaction print and file maintenance procedures insure accuracy
- ★ customer statements printed; computer statements with your company letterhead can be purchased from SBSG
- ★ reports include; (samples on back)
  - listing of invoices not yet billed
  - open items (unpaid invoices)
  - closed items (paid invoices)
  - aging
- ★ fully linked to General Ledger; will post to applicable accounts: debits A/R. credits account you specify

(PAYROLL CAPABILITIES CONTINUED)

★ employees can be paid using any combination of pay types (except, hourly cannot receive salary & salary cannot receive hourly)
★ special non-taxable or taxable lump sums can be paid regularly or one time (bonus, reimbursements, etc)
★ health & welfare deductions can be automatically calculated for each employee
★ earnings-to-date are accumulated and added to permanent records; taxes are computed and deducted: US income tax, Social Security tax, state income tax, other deductions (regular or one time)
★ paychecks are printed; computer checks with your company letterhead can be purchased from SBSG
★ calculations are accumulated for; employee pay history, 941A report, W-2 report, insurance report, absentee report
★ fully linked to General Ledger. Each employee's payroll information can be distributed to as many as (12) twelve different GL accounts; system automatically posts to cash account.

INVENTORY/CONTROL INVOICING

- OVER 1000 ITEMS ON MODEL I
- OVER 3000 ITEMS ON MODEL II
- LOW STOCK ALARM
- INVOICING DEDUCTS FROM INVENTORY
- COMPLETE INVENTORY REPORTS
- REORDER POINT REPORT
- QUICK ITEM ACCESS

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