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ISSUE NUMBER 46

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THE ORIGINAL MAGAZINE FOR TRS-80™* OWNERS

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BITS AND PIECES

Howard Y. Gosman

VERSAPAYROLL

We have just gotten a preview of a this new product from the program development staff at H & E Computronics. VersaPayroll is a menu-driven program, written in BASIC, that can operate either as an isolated program or with the four other modules of the VersaBusiness System (VersaLedger, VersaReceivables, VersaPayables and VersaInventory). If used with VersaLedger, VersaPayroll will post end-of-month totals to the VersaLedger file. VersaPayroll has a very large capacity compared to most other payroll programs — 300 employees on a Model I, 600 employees on a Model III, Apple or CP/M computer, 1200 employees on a Model II, and virtually unlimited on hard disk drives. VersaPayroll requires at least one disk drive and 48K of memory.

VersaPayroll consists of two programs, the Initialization Program and the Payroll Program, that manage three diskette files. The first file, INITDATA, holds standards needed by the system — your company's address, a number indicating how many disk drives are attached, and all of the Federal, State and Local tax tables. This file comes with current Federal and FICA tables already entered. The Initialization Program prompts you to enter all of the needed information, and allows you to display the tax tables to check accuracy. The Initialization Program must be used before operating the main Payroll Program for the first time. The Initialization Program is also used later to update the INITDATA file — when tax rates change.

The Payroll Program keeps track of the other two files:

EMPLDATA holds general personal information about each employee— their name, address, social security number, state and local code, marital status, number of exemptions, salary

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The purpose of the *H & E COMPUTRONICS MONTHLY NEWS MAGAZINE* is to provide and exchange information related to the care, use, and application of the TRS-80™ computer systems. H & E COMPUTRONICS, Inc. does not take any financial responsibility for errors in published materials. Users are advised to check and edit vital programs carefully.

The H & E COMPUTRONICS MONTHLY NEWS MAGAZINE encourages comments, questions, and suggestions. H & E COMPUTRONICS will pay contributors for articles and programs published in the magazine.

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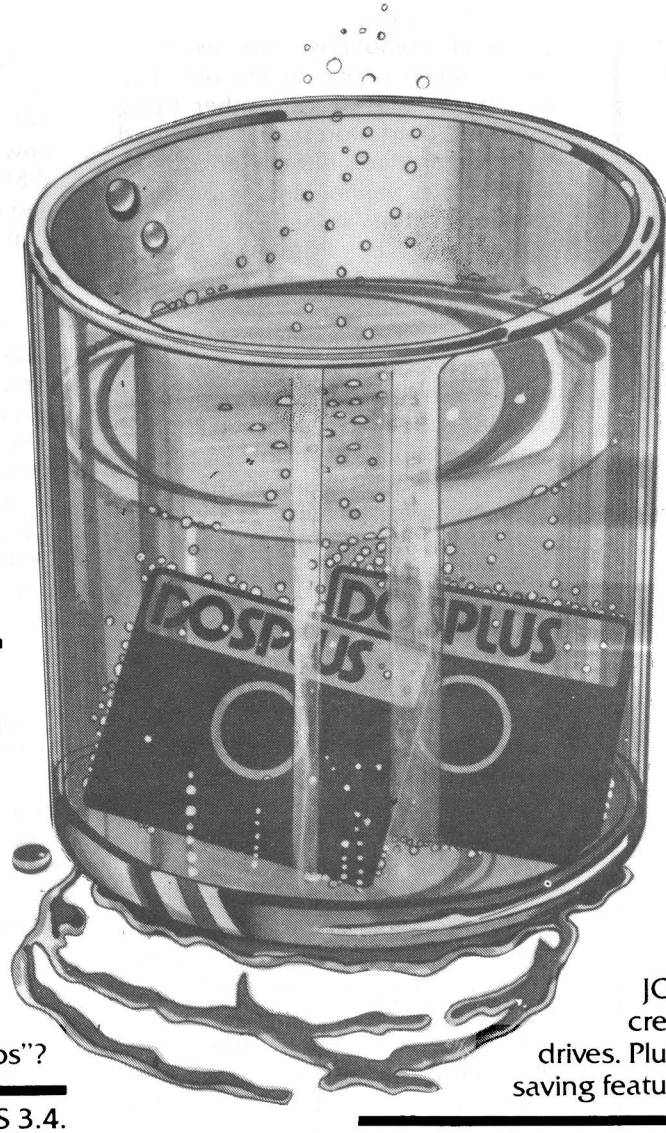

Do you have that tired dragged out feeling known as "DOS Drag" from an operating system that is just **too** slow? Do you have "Computis Interruptous" because you spend more time with your DOS manual than you do at your computer? Has an undependable DOS got you down with the inadvertent "Dumps"?

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THE CRYSTAL BALL

(News and Rumors of Interest to TRS-80™ Owners)

IBM News

The success of the IBM Personal Computer has been so great that it is changing the entire look of the field of personal computing. For example, Sears, which is one of the only two outlets for the PC (the other being ComputerLand stores), has disclosed that IBM products have taken a "large lead in sales volume among products carried in the stores." Sears also carries the NEC PC-8001A, Vector Graphics Series 3, and a Wang word processor.

Rumors are circulating that IBM will shortly announce an expansion of its dealer base for the PC. A large number of independent retailers have applied for dealerships, but in the meantime dealers have been experiencing availability problems because of the large demand for the PC. IBM is said to be planning to ship 1.2 million personal computers by 1984.

Rumors are also circulating that IBM plans to introduce two new products:

- a mini-floppy disk drive that uses disks smaller than 5-1/4 inches.
- a "big brother" for the Personal Computer.

Turn your APPLE into an IBM PC?

Two companies have announced 8088 16-bit microprocessor cards that convert the Apple II computer into an IBM PC "work alike." The cards are the "88 Card" from Coprocessors, Inc. and the "MetaCard" from Metamorphic Systems, Inc. Both cards come with 64K RAM, and they plug into vacant slots in the Apple. Both cards are said to be fully compatible with the Apple peripherals and to offer users the choice of running programs degigned either for the Apple or for the IBM PC.

There are some significant differences between the two cards, however. The MetaCard allows simultaneous operation of Apple and IBM programs, while the 88 Card does not. Digital Research's CP/M-86 (a operating system which has not yet been released for the IBM PC) comes standard with the MetaCard. Both cards are similar to Microsoft's Softcard, which allows Apples to run CP/M programs. They're not cheap, however: the 88 Card has an "introductory" price of $899, and the MetaCard is listed at $980.

Zenith Working on 16-Bit Micro

Zenith Corp. will release a 16-bit microcomputer in July. Dubbed the Z-100 in preliminary work, it will be upwardly compatible with the present Z-89 8-bit micro. Although Microsoft and other companies are doing significant development work for the computer, they are forbidden to release any information about it due to a non-disclosure agreement.

Zenith, the parent corporation of Heath, presently produces 150 computers a day in its Benton Harbor factory. Heathkit now has 60 stores, and ten more will open this year. In 1980, 40% of the total Heath/Zenith sales was in computer products. The Heathkit Users Group presently has 13,500 members and is adding 400 members per month.

Software Sales Expected to Triple in Next Year

Sales of software will triple in a year, according to David S. Wagman, president of Softsel Computer Products, a major software distributor. Wagman predicts that, as users become more sophisticated, the need for specialized applications will spur the proliferation of new software.

Wagman bases his predictions on two other factors: rising software development costs, which will boost retail prices, plus falling hardware costs. As competition increases, hardware manufacturers will find new and better ways to produce equipment faster and better. Software, on the other hand, is a labor-intensive industry, resulting in just the opposite price trend.

The retail prices of software packages has been increasing by about 20% a year. The only way that software prices will drop is through a push in mass marketing to make up for high development costs.

Recently Dennis Mandell, president of On-Line Microcenters, predicted that hardware and software sales will be about even by 1985. Currently his chain of stores gets 80% of its revenue from sales of hardware products. ■

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Because of games like these.

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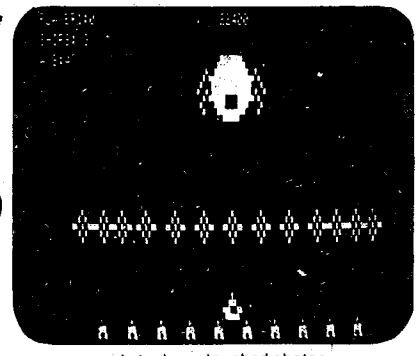

Actual unretouched photos

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Games may be played with or without joystick.

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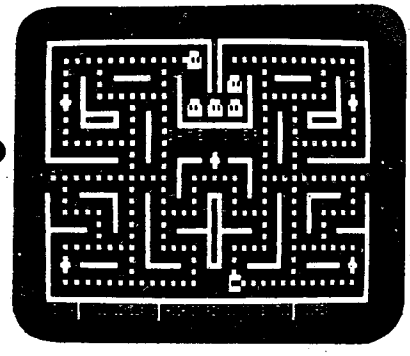


DEFENSE COMMAND

NEW!

Big Five has done it again! Now the most popular arcade game of all time has a fascinating new twist. The Invaders are back! You are alone, valiantly defending the all important nuclear fuel cannister stockpile from a convoy of thieving aliens who repeatedly break off and attack in precision formations. An alien passes your guard, swiftly snatching up a cannister and flying straight off. Quick! you have one last chance to blast him out of the sky. Great action and sound!

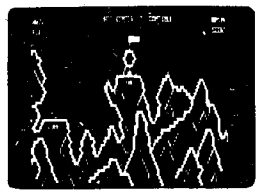
SCARFMAN

BEST SELLER

THE LATEST ARCADE CRAZE now runs on your TRS-80.
It's eat or be eaten. You control Scarfman around the maze, gobbing up everything in your path. You attempt to eat it all before the monsters devour you. Difficulty increases as game progresses. Excellent high speed machine language action game. From The Cornsoft Group. With sound.
CAUTION: Played with the Alpha Joystick, Scarfman may become addictive.

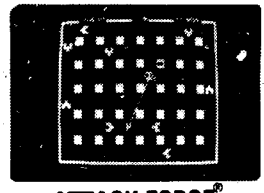
SUPER NOVA®

Asteroids float ominously around the screen. You must destroy the asteroids before they destroy you! (Big asteroids break into little ones.) Your ship will respond to thrust, rotate, hyperspace and fire. Watch out for that saucer with the laser! As reviewed in May 1981 Byte Magazine.



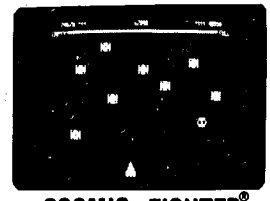
LUNAR LANDER

As a vast panorama moonscape scrolls by, select one of many landing sights. The more perilous the spot, the more points scored — if you can land safely. You control LEM main engines and side thrusters. Absolutely the best use of TRS-80 graphics we have ever seen! From Adventure International. With sound.



ATTACK FORCE®

As your ship appears on the bottom of the maze, eight alien ships appear on the top, all traveling directly at you! You move toward them and fire missiles. But the more aliens you destroy, the faster the remaining ones become. If you get too good you must endure the "Flagship"... With sound effects!



COSMIC FIGHTER®

Your ship comes out of hyperspace under a convoy of aliens. You destroy every one. But another set appears. These seem more intelligent. You eliminate them, too. Your fuel supply is diminishing. You must destroy two more sets before you can dock. The space station is now on your scanner... With sound!

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continued from page 2

or hourly rate of pay, pay period, and designated amounts for up to three special deductions (optional). As each employee is entered into the file, an employee number is assigned by the computer. When an employee leaves, their record is classified as inactive, and the employee number is not reassigned. All of the information in this file can be easily updated when necessary.

PAYDATA holds all of the actual payroll records for each employee—data on the last paycheck issued, month-to-date totals, last month's totals, quarter-to-date totals, and year-to-date totals. This file can be viewed at any time, and it can even be edited, although the author definitely does not recommend it, because the alteration of figures calculated by the computer will affect later calculations, and cause discrepancies in your permanent records.

Using the data stored in all three files, the Payroll Program will generate all needed reports and paychecks. The general procedure to follow when printing paychecks is to print out a payroll register, which involves the calculation of all of the data for each paycheck (using a default value of, for instance, 40 hours), and the printing of the register itself, which shows how each check will look. Then you look for and correct any errors in any employee's paycheck data (number of hours worked, etc.), and reprint the register, looking again to make sure everything's correct. Then you ask for the "Print Paychecks" procedure, where you are first asked to confirm the date and starting check number, and then shown each check and asked to verify that it should be printed. If you print a check, the employee's permanent pay record is updated at the same time—if you choose not to print a check, that employee's record is not updated. VersaPayroll also allows a single check to be issued at any time, for an advance or reimbursement for expenses. The check can be a normal paycheck, with hours and deductions calculated, or a straight sum, in which case no deductions apply.

The Report Printing procedure generates all needed and government-required reports, including:

941 Report. Quarterly report of total quarterly wages, withholdings, taxable FICA wages paid and FICA withholdings.

Federal Unemployment Tax Report. Quarterly report stating total year-to-date and quarter-to-date wages paid by the employer, and total wages subject to federal unemployment tax.

State Unemployment Tax Report. This report includes a list of all the employees including their social security numbers, their federally taxable wages and state taxable wages, their total wages, year-to-date gross pay and year-to-date FICA tax payments.

W-2 Forms. This program will eliminate that yearly scramble to get W-2s out by January 31st.

Employee End-of-Quarter Report. This summary of each employee's permanent record includes all of their personal data plus their pay data records. The information is presented in five columns, showing their last paycheck, the current month, the previous month, quarter-to-date totals and year-to-date totals. Grand totals follow the employee listing.

Employee Data Sheet. This report lists all active and inactive employees, with all pertinent personal data, as well as their pay and their active status. This report is helpful to have on hand when running VersaPayroll, since it lists each employee with his or her employee number, which is needed for access to that employee's record.

At the end of every month, all needed reports should be printed, and then you use the "Initialize New Month" procedure, which stores the current month-to-date figures as "last month's data," and clears the current-month record to prepare for the new month's data. If a new quarter is beginning,all quarterly reports should be printed, and then the file that contains the quarter-to-date records is cleared out to prepare it for the new quarter. It is suggested that an archival disk of each month's data be made as a permanent record.

VersaPayroll's operating manual clearly describes how to use every feature of the program, and also has an appendix including instructions on how to start a data diskette, how to save a duplicate of each month's data diskette for archival purposes, the procedure for starting a new fiscal year, and how to customize the headings for the 3 optional special deductions.

VersaPayroll was written at H & E Computronics, and full software support is offered by their staff, as well as a 30-day money-back guarantee. This program is easy to use, and the reference manual serves as a good self-teaching guide. A person with no previous computer or payroll experience can learn to operate this program. VersaPayroll is priced at $99.95, the same price as each of the other four modules of the VersaBusiness System.

"Lemon Aid" Loader

We have just had a chance to try the new "Lemon Aid Loader" from Lemons Technical Services, 325 North Highway 65, Buffalo, MO 65622, telephone (417) 345-7634. This remarkable little product is plugged in between the computer and the cassette recorder, and it makes it an easy matter to load "impossible" tapes. You turn up the volume on the cassette recorder all the way, and the box takes cares of the rest.

The loader works only for 500 baud cassette tapes, for the TRS-80 Model I or the low speed of the Model III.

CHART$

CHART$ is a computer program from CP/$, P. O. Box 77, Plano Texas 75074 that draws bar graphs. It was originally intended to be used by investors, but because it is so versatile and easy to operate, it can be used by anyone to keep track of any kind of data. No knowledge of programming is necessary, because CHART$ provides an easy-to-follow sequence of menus and prompts that leads the user through the program execution.

CHART$ is available on disk for 48K, 2-disk TRS-80 Models I and III. A printer is optional but strongly recommended. Versions are available for the Epson MX-80, Radio Shack Line Printers V and VI, Okidata Microline and other printers that use block graphics. The price is $79.95, and the manual may be purchased separately for $9.95.

We Are Computers

A retail computer store has opened near to our area (Elmsford, New York), and there are some very interesting

things about this store that might be of interest to our readers. For example, the store sells Radio Shack TRS-80 Model III and Color Computers at prices less than Radio Shack! It also has excellent bargains on hardware such as disk drives, RS-232-C interfaces and modems. Finally, it has a repair service that can handle both Radio Shack and non-Radio Shack products.

The store maintains a dial-up bulletin board system for anyone wanting to leave messages at (914) 592-5385. If you want to tatk to someone in person, call (914) 592-5090. ■

LETTERS TO THE EDITOR

Crystal Ball True?

First of all, I would like to congratulate you on the fine magazine you publish. It was on the strength of your April 1981 Epson MX-80 hardware review that I purchased that same printer, and I have not been disappointed.

The reason for this letter however is to inquire about the CRYSTAL BALL prediction in the September, 1981 issue of your magazine. In the above prediction you stated that LIFEBOAT ASSOCIATES was developing a board for the TRS-80 Model III that will make the CP/M disk operatind system and several other features available. In same, it was also mentioned that a second board was under devlopement to give the video monitor the 24 by 80 character display.

My question is, have these boards been developed, and if so, how successful are they?

Also, it appears that LIFEBOAT ASSOCIATES does not advertise in your magazine, and I do not have their address to inquire about the atoremen-tioned boards.

It is also noted that, while your magazine does a great job in reviewing software packages, there seems to be a lack of hardware review. In my case for example, I would like to purchase the internal disk drives, but not from Radio Shack. Considering the number of companies that sell disk drives for the Model III, selection becomes very difficult, and nowhere can you find information about the mechanical reliability of the units being advertised in the various magazines.

It is recognized that a mechanical description and estimate of reliability is more difficult than a software review, but what good does a super duper DOS do if the drives are not reliable or if the heads require frequent alignment?

I'm sure that you will keep up the good work you are doing and that your magazine format will improve even more.

J. Geerinck
18 Heneager Street
Port Hope, Ontario
Canada L1A 3P7

Lifeboat Associates did work on the devices we predicted, but did not release them. Undoubtedly part of the reason has been that they require hardware modifications not supported by Radio Shack. Microcomputer Technology, Inc., 3304 W. MacArthur, Santa Ana, CA 92704 has both of the products you mentioned above, as well as several other modifications for the Model III.

Facts behind Mr. Shirley's Letter

I am writing to you in regards to the letter in your March issue of *Computronics* from Jon Shirley of Radio Shack to myself.

The letter which you published was his response to my letter regarding his column. In my letter to him I was stating that he should not be the judge of all small manufacturers without being cfrtain.

I suggest to you that in the future before you publish an article be aware of all facts pertaining to it.

Warrent Rosenkranz, President
VR Data Corp.
777 Henderson Blvd. N-6
Folcroft Industrial Park
Folcroft, PA. 19032

Repair Problems

I just read a letter in the March issue, and I feel I must respond.

I am in the Navy, and consequently I am transferred between duty stations periodically. One significant factor in my decision to purchase a TRS-80 was the policy that any Radio Shack store would honor a warranty for the RS product regardless of which one I purchased the product in. I made my initial hardware purchase at the Radio Shack store in the Charles Towne Mall in Charleston, S. C. when I was stationed there. Subsequently I was transferred to Massachusetts.

Here I went to my local store in South Weymouth and had the lower case mod and the keypad mod installed. The manager sent it to the area repair center for installation. When I received it back the BREAK button physically would not depress. It went back to the repair center. When it came back the 7,8, and 9 keys on the keypad would not release as they were binding on

continued on page 8

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continued from page 7

the bezel. Back to the repair center. On the third try and after a month involved they completed the simple installation right.

Then I had a problem with my Line Printer IV while it was still in warranty. I took it to my local store, where the manager sent it to the repair center. After two weeks he called to find out its status. He was told it would be back the following week. Friday of the following week I went in to get it. It was not back and the manager called the repair center again. He was told it needed a new PC board and they did not know when they could locate one. The manager called the district office but nothing was done. So I called Ft. Worth. After I related the story I was told they would check into it. The next day I came home from work and had a message to call the district office in Charleston, S.C. since the printer was purchased in that district. A call to them resulted in my being given a new LPIV a couple of days later. I was without a printer for over a month.

So one of the quality repair centers Mr. Shirley referred to could not do a simple keypad installation. They also promised a return date for my printer before they even knew if they had the parts to fix it—they acknowledged it was very sick. A small company could probably have repaired the printer they sold me in less than a month of lost time, and they could probably do a keypad installation right the first time—at least with enough quality control to check it out before they returned it.

My local store manager was MOST helpful, even though I did NOT purchase most of my TRS-80 products through him. The district office was not supportive of him or interested in assisting me.

I will be transferred in July to San Diego. I worry that there the store managers may be out of the mold of the Boston district office and repair center here and not that of my local store manager.

I have a few thousand dollars invested in my TRS-80 Model I hardware and software. If I did not, I would take my own advice that I give to friends and purchase an OSBORNE for less money with more capability just as my friends have. I continue my love-hate relationship with TANDY: love because I bought my first computer from them, and hate because I feel that they do not care after I purchased their products as indicated by numerous things such as the above or the lack of guidance they have given about dirty contacts, which causes a reset in the middle of my preparing this letter.

I write to you because I wish to rebut Mr. Shirley's letter. I wrote the same information to Tandy in Ft. Worth, addressed to the author of the "View from the Seventh Floor." (I know they got the letter because they deposited the check I enclosed for a subscription to their newsletter. I must now pay for them to send me the corrections to programs I purchased from them.) They never answered my letter.

Lt. Carl Wales, USN
205 B Lyra Drive
South Weymouth, MA 02190

Praise for Program Conversions

When I received my February issue of *Computronics*, I quickly spotted your article on program conversions. My instantaneous thought was "great" —this is what I had hoped somebody would do for a long time," but my hopes were dismayed by reading on and finding that the conversion article was strickly confined to the TRS-80 Models I, II, and III.

I am one of those frustrated owners of a Model III that has very often come across super looking magazine programs only to find they were written for Apple, Pet or some other obscure computing contraptions!

I am basically ignorant when it comes to writing programs. I can, and often do, input a magazine program, such as the many that are found in *Computronics*, and can often work the bugs out that are due to inputting typo errors. I cannot, however, translate a program from one dialect to another such as Apple to TRS-80. Unfortunately, I also do not know of any books on this subject, and I am sure there must be many others like me that need this sort of help.

I really have little desire to write or create programs. I do not have the time to devote to many weeks of

classroom training to learn to do this. I only want to use my computer in the many ways I enjoy using it and am able to find many useable programs in Computronics and other fine magazines. Now if I could learn to convert one dialect to another I would be extremely happy.

I, for one who has been reading *Computronics* for a long time, strongly urge you to carry out your plans to write more about conversions and to cover other dialects.

Eric Norton
10104 Southridge Terrace
Oklahoma City, OK 73159

Mr. Kaplan has already begun covering the problems of conversion from other computers. He would be interested in hearing from readers with ideas about further conversion problems.

Use of XFERSYS

In your March 1982 article on understanding TRSDOS, you are in error when you say (p. 64) "XFERSYS is an undocumented and fairly useless program . . . ."

For those of us who bought Model III's early in the game, XFERSYS is the program we use to convert a TRSDOS 1.2 to TRSDOS 1.3. Not at all useless if you own a pile of 1.2 disks!

Wynne Keller
RD 1 Box 4130
Solon, ME 04979

Calculating the Horizon

I enjoyed the program in the March issue for calculating the distance to the horizon. Before looking at your program, I figured it out myself and came up with the same equation.

It is interesting to calculate the distances between two different heights; just calculate each distance to the horizon and add them together.

Also, one can calculate the height needed very easily by doing a little approximating. Your basic equation:

$$(R+A)^2 = R^2+H^2$$

gives

$$R^2+2RA+A^2=R^2+H^2$$

$$A(2R+A)=H^2,$$

and since A will be small compared to 2R it can be omitted, giving

$$2RA=H^2$$

2R being the earth's diameter or 41,817,600 feet. Then:

$$H = \sqrt{(A\times 2R)}$$

and $A = H^2/2R$

just nice for a calculator!

I started to wonder about the ant. height required when there was an intervening hill, but decided I didn't need that much practice in trigonmetry!

Ray Sommers
1396 County I
Custer, WI 54423

H & E Computronics welcomes letters on any subject. If you wish a personal reply, please enclose a self-addressed, stamped envelope.

H & E Computronics also welcomes readers to submit programs, articles, or reviews for publication. Please address correspondence to:

The Editor
H & E Computronics
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Spring Valley, NY 10977

Please submit programs on media (cassettes or diskettes). Also please indicate the system it was prepared on, and include any necessary instructions. ■

CORRECTION

In the "Program Conversion (Part IV)" article in the May 1982 issue, a portion of a program was inadvertently omitted. Near the end of the section entitled "Apple Sequential Files" the following program should have appeared:

```
10 D$=CHR$(4)
20 PRINT D$;"OPEN TEST"
30 PRINT D$;"WRITE TEST"
40 PRINT "COMPUTER": PRINT "COMPUTRONICS":
PRINT "APPLE"
50 PRINT D$;"CLOSE TEST"
```

We regret any inconvenience caused by this omission.

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PROGRAM PREVIEWS

A. A. Wicks

This Month: GRAMMATIK

Success breeds imitation, and imitation begets increased awareness by the successful. So it has been with spelling-check or proofreading programs; and you, the customer, directly benefit from this. Even now, several spelling-check programs are now being released in later versions, with many worthwhile advantages.

One company, Aspen Software (at one time known as "Soft-Tools"), has gone a step beyond spelling checking — a direction that was inevitable in the intense and popular world of word processing. This Company has now released a program called GRAMMATIK, which not only analyzes writing style at both the word processing sentence level, but also looks for typographical errors (not misspelled words), such as doubled prepositions (the the), and misplaced capitals (FLoppy).

When I had read the first two pages of the GRAMMATIK manual (I always read the manual first, and recommend that everyone should do so), I was so enthused about the potential of this program that I could hardly wait to put it through an exercise. An overview of this program before getting down to our usual in-depth study of its features, will give you the highlights.

We have not yet reached the stage in any computer program where the computer will put our thoughts into words. Nor do we have here a program that says, "This is incorrect, you should say so-and-so.% The question as to whether any particular phrase is better than another is absolutely subjective, and what you may like, I may not. But GRAMMATIK, in the "style% area, will pick out phrases that are generally recognized as being in poor usage, or execessively wordy or repetitive, and will provide statistics regarding your use of these words or phrases in your document. Additionally, the program looks for your use of sexist words. The program does not, however, recognize the meanings of words, or relationships of subject-verb meanings. Nevertheless, by pointing to questionable parlance, it may suggest the need for document revision.

Two things should be done before commencing to use GRAMMATIK. (Three, if you count the reading of the manual as the first). The distribution disk should be backed up, and the instructions for doing this are explicit. I mention this because frequently this is not the case, and I do consider it important that such instructions leave no doubts in the user's mind about how this important function is performed. The next action is to insure that the document has either had a spelling check program applied to it, or you are assured that there are no spelling or typographical errors in the document. This is merely for accuracy, the only result of not doing so would be that your document would continue to have errors if they were already there, because GRAMMATIK will not detect these.

The primary analysis program is GMK, and this reads in phrase dictionaries and checks the document. The phrase dictionary is under PHRASES/GMK. There are over 500 phrases and words in the latter program, as well as error category information and suggestions for alternatives. (The Model I/III 32k version has about 300 phrases).

Calling GRAMMATIK (GMK) will load principal program for analyzing a document. Once this program is loaded, a menu is presented, offering a choice of actions. The first to be taken is to select "D" to read the "PHRASES" dictionary. Then we identify the source file, by typing "I=<file>" ("file" being the file name). The menu, which is listed alphabetically by single "Command" letter, "Meaning", and "Current Setting", may be configured as desired, or defaults accepted. For example the Command "P or NOP", meaning "Printer," or "No Printer" will default to NOP, but may be changed before beginning the check. There are many options of this type — "List Errors on File" (to disk file, with only the errors and summary going to the file); "Show Suggestions" will provide suggestions to be considered in lieu of the word or phrase targeted as erroneous; and, one option that is especially valuable is "E". This option allows a choice regarding the errors that will be displayed. Normally, all errors will be shown, but suppose you have no problem in discerning the correct usage of "effect" and "affect". Because many persons do have difficulty in this regard, GRAMMATIK flags either of these words when found, and classifies them as a "commonly misused word". The resulting display paragraph shows alternate words and gives a definition of the word detected. You therefore use the "E" command to avoid this display if it does not affect you. If you do have problems with such words, a few times with GRAMMATIK will provide subtle instruction — and perhaps you will soon be entering an "E" to turn them off. Additional commands will be described later in this review as their application becomes apparent. At the moment, we now enter "//" to start the checking process.

Checking the PHRASES dictionary is reasonably rapid, but of course depends on the length of the document. A 3000-word article selected for test took about three minutes to check. Immediately following, the screen displays the text of the file line-after-line, as read from the disk, pausing as errors are found, and displaying the error. GRAMMATIK analyzes on the word, phrase and sentence level. A word is considered as a sequence of letters a to z, in either upper or lower case, which are separated from other words and symbols by characters that are not letters (space, period, etc.). Numbers and certain abbreviations are recognized as units, but all other symbols are considered as individual characters. (Some typical abbreviations are: cu. ft. lbs. gal. Capt. Lt. Mr. Ms. Mrs., plus 16 others including all of the Months). Any sequence of words or characters in the phrase dictionary are recognized as such. Periods, questions marks and exclamation marks are recognized as end-of-sentence marks. However, periods used in quantity, such as for ellipsis, are not recognized as end of sentence. Quotation

continued on page 14

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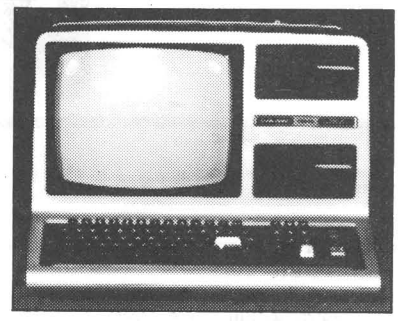

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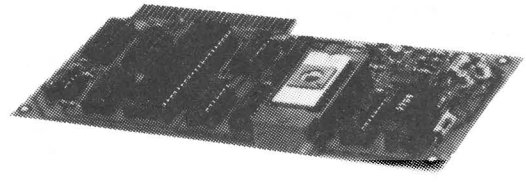

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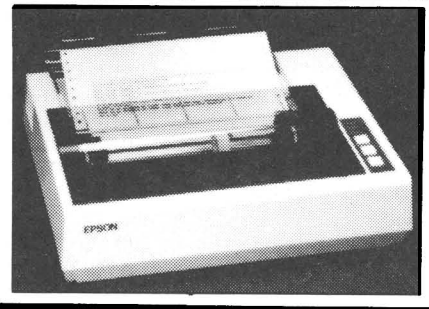

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- **RUN-ONLY** program mode restricts the operator to program defined input only.
- **MINI-DOS** allows the executing program to be interrupted by the operator to perform one or more of the 51 DOS commands executable under MINI-DOS, and then continue the interrupted program's execution.
- **CHAIN** or **DO** commands activate chaining whereby keyboard input comes from the specified disk file, allowing a pre-determined set of commands and/or parameters to be automatically inputted.
- Dump display to printer function.
- Enhanced **DEBUG** facility (14 commands) allows interrupting current program execution, inspecting/altering memory or disk, and resuming execution, continuous or single step, with/without stops.
- DOS vectors defined for Assembly Language programmers.
- DOS-CALL allows user programs and BASIC to execute DOS commands.
- The programmer may create his own resident DOS commands.
- Programs may enable/disable user routines driven off the timer interrupt.
- The programmer may create his/her own resident DOS commands.
- Model I built-in lower case driver, blinking cursor, auto key repeat.
- **ROUTE**ing of keyboard, display, printer and (Model III only) RS232C. May be routed to a user routine in memory, but not to/from disk unless via a user routine.
- Except for the spooler, there are no high memory routines for DOS or BASIC; this includes **ROUTE** and **CHAIN** functions.
- Lower case DOS commands honored.
- Full error messages displayed instead of error codes.
- 31 enhanced **COPY** parameters.
- Copy By File allows 6 criteria for file selection.
- 15 enhanced **FORMAT** parameters.
- Partial diskette re**FORMAT** permitted.
- File **PURGE** by wildcard extents and/or user files.
- **DIR**ectory command allows wildcard extents, user files, short or extended format, dump to printer.
- User may specify diskette's directory location.
- Expanded directory provides for up to 222 file entries.
- Some DOS commands may be aborted without reset.
- **R** command repeats last performed DOS command.
- **CREATE** command to pre-allocate a disk file.
- **ERROR** command displays error message associated with error code.
- **HIMEM** command sets/displays DOS/BASIC high memory address.
- **DATE** command sets/displays computer's date.
- **TIME** command sets/displays computer's time.
- Model III **FORMS** command for printer control.
- Model III **SETCOM** command for RS232 control.
- Enhanced **LIST/PRINT** commands for ASCII files with pause, abort and partial file listing.
- Alter chaining state via the **CHNON** command or commands within the chain file.
- A program or a chaining sequence may display a message with/without pause.
- **CLEAR** command to zero memory and to purge routes, user DOS commands and user timer routines.
- Commands to enable/disable BREAK key, blinking cursor, lower case driver
- **PROT** command to change diskette **NAME/DATE/PASSWORD**
- **ATTRIB** command to change a file's attributes.
- **CLS** command to clear screen.
- **AUTO** specifies the command to execute automatically at reset/power-on.
- **SYSTEM** specifies the default system configuration values (usually enable or disable) which become effective on RESET/POWER UP.

  Diskette/file password checking
  RUN-ONLY mode
  Keyboard debounce (Model I)
  Screen dump to printer (JKL)
  DEBUG 123 entry
  MINI-DOS
  Break key as keyboard key
  Hardware lower case (Model I)
  Assign default drive number for **DIR**
  Assign default drive number for file creation
  Memory protect value
  Clear key as keyboard key
  Disk master password required for full diskette or **CBF COPY**
  Auto Repeat key function
  TIME/DATE question on power-up
  TIME/DATE question on reset
  Display disabled until operator/program reenables
  Manual operator chaining pause/abort
  Manual operator **AUTO** command override
  R = repeat last DOS command performed
  Built-in lower case driver (Model I)
  Lower to upper case toggle
  Blinking cursor
  Number of physical drives on computer
  Number of disk I/O retries
  Time delay for 1st repeat of auto repeat key
  Specify the cursor character
  Specify the write of the directory sector's address mark for Model I single density diskette in Model III format for easy Model I, Model III diskette exchangeability

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Why NEWDOS/80™ VER. 2.0 Is the Best DOS for your TRS-80 Model I or III Computer

DISK BASIC FEATURES

- In one statement from DOS READY, BASIC can be brought up, the number of files set, the memory size set and a program LOADed or RUN.
- **RUN-ONLY** prevents the operator from getting to READY or DOS READY, thus giving the program almost total control.
- Via the CMD function, all DOS commands are executable from BASIC, either directly or dynamically.
- **MINI-DOS** is available from BASIC.
- **DEBUG** is available from BASIC.
- **CHAIN**ing is available from BASIC.
- Variable passing between programs via the **V** parameter of RUN.
- Abbreviated commands:
  (A)uto; **(D)**elete; **(E)**dit or comma; **(L)**ist or period
- Accidental text line deletion more difficult
- Text line scrolling foreward or backward.
- Text page scrolling foreward or backward.
- **DI** moves text line to new position
- **DU** duplicates text line to new position
- Built-in **RENUM**ber with line number and limited syntax error check. A portion of text may be moved to another part of the program with all references to that code resolved.
- Built-in **REF**erence function will display/print references to all line numbers, integers and variables. It will display references to a single line number, integer, string, function code (reserved word) or a group of packed or unpacked characters, and then allows displaying of each referencing text line in turn with editing as necessary.
- A program may be loaded into reserved high memory via CMD or MINI-DOS and its execution address extracted from the two bytes at 17411 (4403H).
- **MERGE** functions with packed or ASCII text files.
- Built-in text space eliminator and/or remark deleter.
- Built-in calendar date conversion.
- Dynamic **ERASE** of selected variables, keeping all others.
- Dynamic **KEEP** selected variables, **CLEAR**ing all others.
- After clearing an array via **ERASE** or **KEEP**, the array may be redimensioned via **DIM.**
- Dynamic text line deletion.
- Dynamic text line insertion via **MERGE**, which with dynamic **DELETE**, allows use of overlays.
- **SWAP** contents of 2 variables of the same type.
- Single Stepping starting at specified text line number.
- In-memory sort of up to 9 arrays in either ascending or descending order
- **RENEW** function to reinstate **NEW**ed program.
- Full BASIC error messages, including associate DOS error message, if applicable
- With default start up parameters and no reserved high memory, 48K RAM has 38261 bytes available.
- SUPERZAP, DIRCHECK and other programs using only memory from 5200H to 6FFFH can be executed directly from BASIC without disturbing the program text or variables (if 8K BASIC free memory available, exclusive of string area).

FEATURES of NEWDOS/80 enchanced BASIC disk file I/O.

- In addition to TRSDOS sequential and random file types, **NEWDOS/80** has two new file types (Marked Item and Fixed Item) divided into five subtypes **(MF, MU, MI, FF** and **FI)**
- These five subtypes do not require **LSET, RSET, MKI$, MKS$, MKD$, CVI, CVS** or **CVD;** instead, **GETs** and **PUTs** are done directly to/from the variables named in a list.
- The string separating character sequence ; " , " ; used with PRINT is not used with the new file types; instead only a comma is used as the separator.
- **MU** files are used as an option to the older PRINT/INPUT files.
- **FF** files are used as an option to the older RANDOM files.
- Record lengths up to 4095 bytes supported.
- Records may be all of the same length (**MF** and **FF**), of varying lengths (**MU**) or unknown length (**MI** and **FI**).
- Sequential files may be accessed randomly.
- Files may be accessed by **R**elative **B**yte **A**ddress to allow accessing of variable length or unkown length records.
- Existing files may be extended.

UTILITY PROGRAMS INCLUDED WITH NEWDOS/80

- **SUPERZAP** is a disk/memory display and modification program, also used as the vehicle for installing patches to **NEWDOS/80.**

- **DISASSEM** is a Z80 load module (CMD) disassembler that builds cross reference tables for all location references including those by JR instructions, includes in the disassembly printable characters for all hex bytes to help locate character strings and sends the disassembly to the display, printer or a disk file. The disk file can then be edited and/or assembled using EDTASM, if it is not too large.

- **DIRCHECK** is a program that displays directory contents and checks directory integrity (its primary function), displaying specific error codes to assist user attempts at directory trouble shooting and/or repair. Optionally will zero out unused (dead) file names.

- **EDTASM** is Apparat's enchancement of Radio Shack's 1978 tape editor/assembler program to operate from disk and with disk files. Requires purchase of that Radio Shack program (not a newer one) as a pre-condition of use of Apparat's EDTASM.

- **LMOFFSET** allows load module (CMD) transfer between disk and tape. Displays program start, end and entry addresses. Optionally allows load address relocation (not execution relocation) and subsequent execution as from non-disk BASIC via SYSTEM.

- **CHAINBLD** is a mini-text editor for creating/maintaining chaining files.

- **NEWDOS/80** manual chapter titles and page counts

  1. Introduction (5)
  2. DOS Library Commands (52)
  3. DOS Routines (12)
  4. DOS Features (14)
  5. DOS Modules, Data Structures, and Miscellaneous Information (12)
  6. Additional Programs Supplied on **NEWDOS/80** Diskette (22)
  7. Disk BASIC, non-I/O Enhancements (17)
  8. Disk BASIC I/O Enhancements and Differences (21)
  9. Error Codes and Messages (2)
  10. Glossary (9)
  11. Error Reporting, Incompatibility Handling, and Patching (8)
  12. Conversion Information and Miscellaneous Comments (9)
  13. ZAPs (increasing with time)
  14. Appendix A: Marked and Fixed Item File discussion (47)
  15. Appendix B: Marked and Fixed Item File examples (18)
  16. Index (4)

- Full time support staff
- Information, minor enhancements and corrections to **NEWDOS/80** are issued, at no charge, to registered owners only.

NEWDOS/80 Version 2.0 for the model I is a separate and distinct product from the model III. Each is sold separately.

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continued from page 10

marks and parentheses (also brackets and braces), are recognized and are counted to make sure they balance. All words, and the comma and semi-colon, are checked for erroneous doubling (e.g. at at). When the end of a sentence is detected, the next word is checked to insure that they are either all upper or lower case, or that only the first letter of a word is capitalized (which assumes a proper name. Finally, the single letter "I" is checked for capitalization. Clearly, this is an impressive base for document analysis. We have digressed to discuss what this can do for you — let us now continue with the program process.

When the screen pauses at an error, the following display is provided, with the text suspended in mid-sentence above it:

```
-----> a number of
*  At sentence 23 - 'W' - wordy phrase
*  Suggestion:  several, many, some
```

The first line is from the text immediately preceding, and extracts the phrase that is considered erroneous or questionable. The sentence number is counted from the beginning of the document, as a reference. There are eighteen Error Codes (in this case "W"), and all are identified in an Appendix in the manual. There are too many to describe in detail here, but some of the more interesting and useful that are used as flags are: R-Redundant, such as "seldom ever" or "join together." S-Spelling. "Can not" would not be detected by a spelling check program, but will be identified by GRAMMATIK, although it is not a spelling checker, per se, T-Trademark. Trademarks, such as "Xerox" will be detected if not capitalized — a most useful flag. (When a trade-marked word is detected, a suggestion is also given to allow avoidance of the word if desired — in this example, the word "photocopy" is recommended). P-Punctuation, for example, missing spaces after a punctuation mark, and end of sentence punctuation outside of quotation marks.

There are other data bases available within the program, all useful to a word-oriented activity. There is SEXIST, which is a dictionary of about 100 words that are gender specific. By calling on this dictionary file to scan a document, sexist words will be displayed in the way that words and phrases were. Some documentation will need sexist words as an essential part of the text. Here, SEXIST would never be called; however, a technical text would avoid these references, and will need to be culled by SEXIST alerting the user to their existence in the document. This base may be used alone, with PHRASES, or with a user-supplied dictionary.

The last statement indicates that dictionaries may be created by the user. Entering words or phrases into your own dictionary is easy, but takes a while to format. You may use your word processor for this, and the result is in the same format when displayed, as with PHRASES. Also, an optional chained sequence of actions may be formatted, allowing all functions that one requires to be loaded and performed. This occurs after you have entered the name of your document file.

Still another practical program within GRAMMATIK is PROFILE. This does exactly as its name suggests — it provides a profile report of all words used in the document. As before, the length of time to process a document depends on its length, but the results are impressive — especially when printed. Starting with all words used once, these words are listed alphabetically in six columns, with the initial heading showing the "Total Number of Different Words." Then, as each list is completed, the words used twice, thrice and on top completion. Obviously, it would be unusual for every quantity in sequence to have a word or words in the group — one sample showed "this" as being used 46 times; the next grouping was for "is" being used 54 times.

SORTDICT allows soriting of dictionaries for maintainance and ease of reading. It may be used to sort any file that has data items on seperate lines, so these too, may be words or phrases.

The program includes a sample line editor called MINIED. The manual suggests using your normal word processor capability; but for quick, minor changes MINIED will often be adequate. It is self-documenting, and has commands for new text insertion, insertion of new phrases at the end of an existing file from the keyboard, appending of files, and the usual delete, replace, and insert commands. As the function is run, a "Help" command provides guidance regarding each function.

When a document has been analyzed, a Summary Report is provided for output to screen or printer. The summary is excellent — detailed and informative. Anyone working with words will relish its explicit content. The first item is the total errors detected. Then, the number of sentences and words contained in the document; average sentence length (characters); number of questions and imperatives. The shortest and longest sentence lengths follow, with the line number of the sentence involved indicated.

As the manual suggests, the preceding information in the summary will not indicate whether the text is coherent and well organized, ". . . documents with many long sentences and polysyllabic words tend to have stylistic difficulties . . . " A technical document should have short but informative sentences for ease of understanding of the text. The summary Report with its analysis points the way to improvements you may make.

There is more to the Summary, as it also provides the quantity of the "to be's" and prepositions used. A high ration of these compaered to the number of sentences may indicated overusage of these word classes, which would also suggest that some revisions may be needed. The "to be's" that are flagged are: am are be been being is was were.

The final line of the Summary is "User Catagory Totals." You may define up to seven different catagories, consisting of single words or phrases to be counted, or a group of words or phrases. Actually, you may define only five, as "to be" and prepositions are automatically placed in categories 1 and 2. The categories you might wish to include could be the number of times you used "however," or "that" and "which." If you find that by habit you use some word excessively, then you may soon cure yourself by having the word defined into its own category, and subsequently brought up to stare you in the face. (Some authors might like to include

continued on page 30

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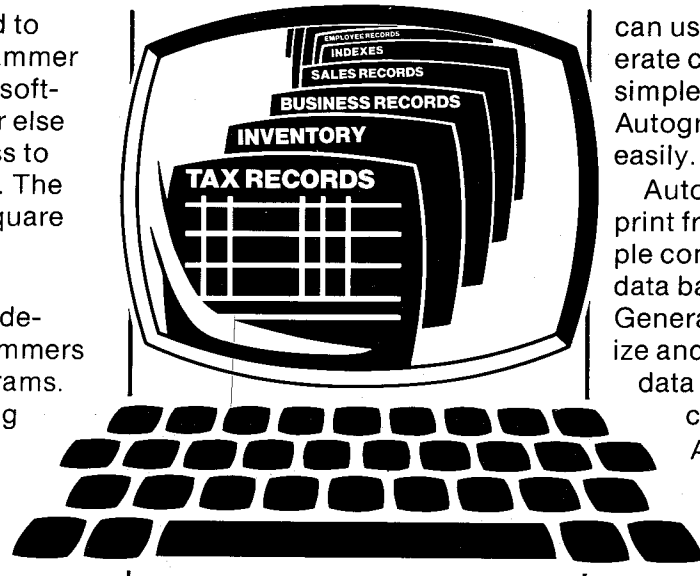

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MODEL III CORNER

Hubert S. Howe, Jr.

This Month: RS-232-C Communications

COMMUNICATIONS

Many years ago, the Electronics Industries Association (EIA) developed a standard called "RS-232-C" for interfacing data terminal and data communications equipment. Since that time, billions of dollars worth of computer equipment has been constructed incorporating this standard, which has become by far the most universally used method for interfacing data processing equipment. Most video terminals, line printers, modems, minicomputers, microcomputers and other equipment now use this standard for communication between one device and another.

The RS-232-C interface, which is a separate board installed in the TRS-80 Models 1 or 3, is also referred to as a "Universal Asynchronous Receiver-Transmitter" or "UART". Its method for data transfer is a *serial* process, which means that data are sent one bit at a time, preceded by a start element and followed by a stop element. The UART assembles or disassembles the parallel data into serial bits for transmission or reception. The fact that a serial process is used means that only two wires (plus ground) are necessary for the connection of the devices, although the use of a 25-pin cable and plug has become standard, as explained below. Most transmission is *asynchronous*, which means that a synchronizing clock does not have to be sent with the data, and gaps of different lengths may exist between the characters. The start element is a single logic zero data bit added to the front of each character, and the stop element is a logic one added to the end. There is no upper limit to the length of the stop element, but the lower limit depends on system characteristics. The TRS-80 allows 1.0 or 2.0 data bit intervals for the stop bit.

The data characters that are transmitted are not always bytes, as you might imagine from everything else on the TRS-80. They may be from five to eight bits in length, and the most widely used standard is for seven-bit ASCII characters.

Most serial communication equipment is connected using 25-pin DB-25 connectors, even though only a few of these pins are actually used for most applications. The functions of these pins are summarized in table 1. Much communication equipment will work with only pins 2, 3, and 7 connected. In order to test the RS-232-C interface, it is possible to short pins 2 and 3 together in order to echo the data transmitted back to look like data received.

Although many different devices may communicate using the RS-232-C interface, on the TRS-80 there are really only two important applications for it: communication between two different computers, with or without the transmission going through a modem, and the use of a serial printer (instead of the standard printer interface, which is for a parallel printer). Both of these applications require different kinds of software, and they will be discussed separately later in this column.

Pin Number	Abbreviation	Description
1	PGND	Protective (chassis) ground
2	TD	Transmit Data
3	RD	Receive Data
4	RTS	Request-to-Send
5	CTS	Clear-to-Send
6	DSR	Data Set Ready
7	SGND	Signal Ground
8	CD	Carrier Detect
20	DTR	Data Terminal Ready
22	RI	Ring Indicator

Table 1: RS-232-C Pin Designations and Signal Functions

RS-232-C CHARACTERISTICS

When two pieces of data processing equipment are interfaced for purposes of communication, there are several options that may be specified in order to make the communication successful. These include at least the baud rate, parity, word length, and stop bits, and several additional options described in the *TRS-80 Model III Operation and Basic Language Reference Manual.* (These are not as important as the others, and are not important for all systems.)

The most important characteristic of RS-232-C data communications is the *baud rate.* "baud" is usually explained as "bits per second"; therefore the "rate" is really redundant, and a more appropriate term would be "data rate". (Nevertheless, this term has become so widely used in computer technology that we cannot object to its use.) Baud rate is actually defined as the inverse of the time duration of the shortest signal element, which is normally one data bit interval. The baud rate is equal to the bit rate if one stop bit is used.

The most widely used baud rates are 110, 300, and 1200, although many other values are possible (higher values are usually double the previous value, up to 19.2K baud). The TRS-80 Models 1 and 3 allow 16 different baud rates, which are shown below in the discussion of RS-232-C ports and their functions. When two devices are connected by means of a cable, transmission can occur at high rates such as 9600 or 19.2K baud. Transmission over a telephone modem is usually limited to rates less than 2K baud.

The other important RS-232-C characteristics are the number of stop bits, word length, and parity. All these can be software selected on the TRS-80 Models 1 and 3. Only one or two stop bits may be used. Word length values of 5, 6, 7, or 8 bits may be selected. The most common value is 7 bits for ASCII data. *Parity* provides a simple method for verifying the transmission of data. A *parity bit* is determined by the sum of the bits in the data. An even number of "1" bits would produce a zero, and an odd number would produce a

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one. This would be the case if *even parity* is used; *odd parity* is the reverse. Parity can also be optionally disabled. In any event, the software must check the parity bit in the UART status register in order to determine whether an error has occurred.

The TRS-80 Model 3 also adds some other characteristics to its RS-232-C interface. Like the parity disable option, data transmission may also be disabled. The Data Terminal Ready and Request to Send signals may be set either high or low. In addition, there is a "wait/don't wait" switch. In the "wait" position, this switch requires that the communicating device respond to the transmission before another data value is sent. In the "don't wait" position, transmission may continue regardless of the acknowledgement.

Radio Shack's *TRS-80 Model III Operation and Basic Language Reference Manual* describes all of these characteristics in relation to the ROM software routines, and does not distinguish which aspects are part of the hardware and which are controlled by the software. The wait/don't wait switch is a function of the software. Other characteristics are part of the hardware, and may be used by programs if needed.

RS-232-C PORTS AND THEIR FUNCTIONS

There are four input/output ports that determine the functions of the RS-232-C interface, and fortunately they are identical for both the Models 1 and 3. The ports used are numbers 232 through 235 (E8 through EB hexadecimal). The functions of the ports are different depending on whether they are used for input or output. Descriptions of these functions are shown in Table 2.

Port	IN/OUT	Function
232 (ØE8H)	IN	Modem Status Register
	OUT	Master Reset
233 (ØE9H)	IN	Configuration Sense Switches
	OUT	Baud Rate Select
234 (ØEAH)	IN	UART Status Register
	OUT	UART Control Register
235 (ØEBH)	IN/OUT	Data Register

Table 2: Functions of the RS-232-C Input/Output Ports.

The functions of the individual bits of the ports 232-234 are shown in tables 3, 4, and 5. Reading a byte from port 232 produces the values indicated. Writing any byte to this port resets the controller. The RS-232-C interface is configured by outputting bytes to ports 233 and 234. Inputting a byte from 233 gives the current configuration, whereas inputting a byte from 234 shows whether the UART is ready to transmit or receive data or whether various errors have occurred. Port 235 is strictly for reading or writing data, which can be done only when the status register indicates that the UART is ready.

In order to configure the RS-232-C interface, it is necessary to decide the characteristics desired and to assemble a byte with these characteristics in the bits indicated, and then to output the byte to ports 233 or 234. Both the word length select and the baud rate select must be given in more than one bit, and in this case it is necessary to notice carefully that various bits are "backwards" in the RS-232-C registers. To select the word length, 0 is used for 5 bits, 1 for 6 bits, 2 for 7 bits, and 3 for 8 bits. These values 0-3 are represented as 00, 01, 10, and 11 in binary form and can therefore be specified in two bits. The problem is that word length select bit 2 goes to bit 5 rather than bit 6, so that in

IN/OUT	Bit	Function
INPUT		MODEM STATUS REGISTER
	Ø	Unused
	1	Receiver Input (UART Pin 2Ø)
	2	Unused
	3	Unused
	4	Ring Indicator (Pin 22)
	5	Carrier Detect (Pin 8)
	6	Data Set Ready (Pin 6)
	7	Clear to Send (Pin 5)
OUTPUT		MASTER RESET
	Ø-7	Any byte resets controller

Table 3: Functions of port 232 (0E8H)

IN/OUT	Bit	Function
INPUT		SENSE SWITCHES
	Ø	Baud Rate 2
	1	Baud Rate 1
	2	Baud Rate 3
	3	Parity: Ø=enabled, 1=disabled
	4	Stop Bits: Ø=1, 1=2 bits
	5	Word Length 2
	6	Word Length 1
	7	Parity: 1=even, Ø=odd
OUTPUT		BAUD RATE SELECT
	Ø-3	Receive Baud Rate Select
	4-7	Transmit Baud Rate Select

Table 4: Functions of Port 233 (E9H)

IN/OUT	Bit	Function
INPUT		UART STATUS REGISTER
	Ø-2	Unused
	3	Parity Error: 1=true
	4	Framing Error: 1=true
	5	Overrun Error: 1=true
	6	Data Transmitted: 1=true
	7	Data Received: 1=true
OUTPUT		UART CONTROL REGISTER
	Ø	Data Terminal Ready (Pin 2Ø)
	1	Request to Send (Pin 4)
	2	Break: Ø disables transmit data
	3	Parity Inhibit: 1=disable, Ø=enable
	4	Stop Bit Select: Ø=1, 1=2 bits
	5	Word Length Select 2
	6	Word Length Select 1
	7	Parity Select: Ø=odd, 1=evCen

Table 5: Functions of port 234 (EAH)

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- total sales on account for a given month, number of invoices sent, average sale per invoice
- how much an account purchased during month, how many invoices were sent, average invoice for month
- tell you what percent of sales an account is to total sales by month
- tell you what percent of a/r an account is
- print mailing labels for your accounts
- print statements at any time you want them (either individual or all accounts)
- print alphabetical hardcopy of accounts and account numbers
- print all items sold for month
- alphabetical sort of items sold by month
- this set of programs can be custom modified by you or us
- AND MUCH MORE!!

AGING REPORT FOR LYNN'S A/R SYSTEM

Aging Report 01/31/82 Page 1

Account	Current	30-60 Days	60-90 Days	90+ Days	Total
ABC Inc.	$ 249.00	$ 65.20	$ 00.00	$ 00.00	$ 314.20
Old Co. Inc.	00.00	84.40	165.20	00.00	249.60
New Co. Inc.	97.75	00.00	00.00	00.00	97.75
Deadbeat Inc.	00.00	00.00	00.00	345.00	345.00
Totals	$346.75	$ 149.60	165.20	345.00	$ 1,006.55

Aging reports can be compiled on a daily, weekly or monthly bases.

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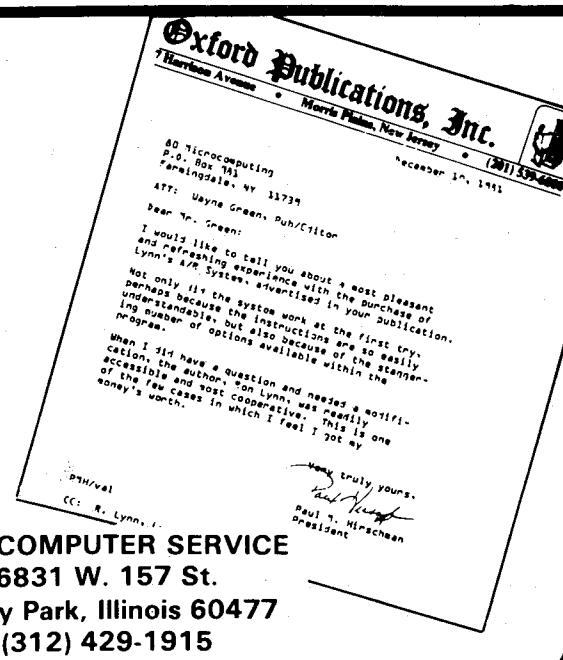
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assembling the complete byte to be output to port 235 it is necessary to use 01 for 7 bits.

For example, suppose that we desire to configure the RS-232-C interface with even parity enabled, one stop bit, and a 7-bit word length. (These would be the default values for many communication systems.) We notice from Table 5 that parity is enabled by placing a 0 in bit 3, that one stop bit requires a 0 in bit 4, that even parity requires a 1 in bit 7, and that a word length of 7 bits requires 01 in bits 5 and 6, from our discussion above. We must also place a 1 in bit 2 to enable data transmission, and the contents of bits 0 and 1 determine the request to send and data terminal ready signals. The complete byte is thus 10100100 binary or 0A4H hexadecimal. Before this value can be output to port 234, it would be necessary to output any value to port 232 to reset the controller.

The baud rate is set by outputting a byte to port 233. Since the UART can transmit and receive data at different rates, it is necessary to specify both rates. Sixteen different baud rates may be specified; these are shown in Table 6. (These values are given as hexadecimal "nibbles" in order to simplify the combining of values for both the transmit and receive rates in bits 4-7 and 0-3, respectively.) The most commonly used rates are 110, 150, 300, 600, 1200, 2400, 4800, and 9600 baud, and most systems require transmission and reception at the same rates. To set the baud rate, it is necessary to output a byte to port 233, after the controller has been reset by outputting any value to port 232. To specify 300 baud, for example, the value of 55H would be used, specifying 5 for both transmitting and receiving data.

Nibble	Baud Rate	Nibble	Baud Rate
ØH	5Ø	9H	2ØØØ
1H	75	AH	24ØØ
2H	11Ø	BH	36ØØ
3H	134.5	CH	48ØØ
4H	15Ø	DH	72ØØ
5H	3ØØ	EH	96ØØ
6H	6ØØ	FH	192ØØ

Table 6: Baud Rate Select values.

When the TRS-80 is used as a terminal in data communications, it is customary to display the incoming bytes on the video screen. Unfortunately, the software required to display the carriage return (0DH) takes a considerable amount of time in relation to the faster baud rates, since the entire contents of the screen must be scrolled following the carriage return. (This is even worse with many hard-copy printers!) Therefore, one or more bytes following the carriage return may be lost. To avoid this problem, it is necessary to have the transmitting device produce one or more *nulls* (hexadecimal 00) following the carriage return, and fortunately this feature is a standard in many communication protocols. Table 7 shows the number of nulls required for the most important high baud rates. When this precaution is taken, the TRS-80 is capable of communicating at these rates.

Baud Rate	Number of Nulls
11Ø-6ØØ	none
12ØØ	2
24ØØ	4
48ØØ	8
96ØØ	16

Table 7: Nulls required after carriage return at high baud rates.

TERMINAL PROGRAM

As mentioned above, the two principal applications of the RS-232-C interface on the TRS-80 Model 1 and 3 computers is for a data communications terminal and as an interface for a serial printer. Each application requires somewhat different software. In this section we discuss the terminal, and in the next the printer.

A "dumb" terminal is a combination ASCII keyboard and video display which is connected to another device, such as a minicomputer or a modem. It allows data to be entered on the keyboard and transmitted to the other device, and it displays data transmitted from the other device on the video display or on a hard copy printer. Such terminals are called "dumb" because, although they may incorporate a microprocessor and memory, the computing power of the terminal is not used except for the communication.

There are many ways in which the TRS-80 could be used as a terminal when equipped with the appropriate software. By using a modem, which usually is connected to a telephone line, it is possible to access a time-sharing computer or "bulletin board". "Modem" is an abbreviation for "MOdulator/DEModulator." It translates the serial data into tones which can be sent across a standard telephone line. There are numerous modem protocols, but the most important ones are Bell 103 for 300 baud and Bell 212A for 1200 baud. By connecting another computer or device directly to the RS-232-C cable, it would be possible to use the TRS-80 as a terminal without a modem.

A complete listing of a dumb terminal program is included below. In reviewing its operation, let us first describe the process in general and then review the assembly language code. In the following discussion, we will assume that the RS-232-C interface is connected to a modem, which is in turn communicating with another computer. We want to be able to carry on a two-way dialog at all times.

The terminal program must constantly toggle between the RS-232-C interface and the keyboard to see whether a character is present at either device. Characters typed at the keyboard are transmitted to the modem, and characters received from the modem are displayed on the video screen. These are the only necessary functions, but in the program we add three others: a true BREAK key, use of the CLEAR key to clear the video display, and an exit from the program, which is accomplished by typing "control-C". (Control keys are produced by holding down both the shift and down arrow keys and typing a letter.) On most communication equipment, "break" is a signal that actually disrupts communication in order to inform the other device of some special condition, such as a desire to suspend whatever operation is currently in progress. Before starting the communication process, we must initialize the RS-232-C configuration and baud rate.

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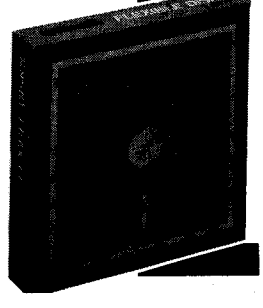

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TERMINAL PROGRAM

```
;DUMB TERMINAL PROGRAM
KBCHAR  EQU     2BH             ;ROM ROUTINES
VDCHAR  EQU     33H
VDCLS   EQU     1C9H
TRSDOS  EQU     402DH
;
MODEM   EQU     232             ;RS232 PORTS
CONFIG  EQU     233
STATUS  EQU     234
DATA    EQU     235
;
        ORG     7000H
TERM    LD      (OLDSP),SP      ;SAVE OLD SP
        LD      SP,STKTOP       ;LOAD NEW ONE
        CALL    VDCLS           ;CLEAR THE SCREEN
        LD      A,14            ;TURN ON CURSOR
        CALL    DISP
        CALL    RSINIT          ;INITIALIZE RS232
;
INS     CALL    RSIN            ;NEW UART INPUT?
        JR      Z,OUTS          ;NO
        CP      0               ;YES. IGNORE NULL
        JR      Z,OUTS
        CP      7FH             ;IGNORE RUBOUT
        JR      Z,OUTS
        CALL    DISP            ;DISPLAY UART INPUT
;
OUTS    CALL    KBCHAR          ;NEW KBD INPUT?
        OR      A
        JR      Z,INS           ;NO
;SPECIAL FUNCTIONS
        CP      1               ;BREAK KEY:
        JR      Z,BREAK         ;BREAK TRANSMISSION
        CP      3               ;CONTROL-C:
        JR      Z,EXIT          ;EXIT
        CP      31              ;CLEAR KEY:
        JR      Z,CLEAR         ;CLEAR SCREEN
;OMIT FOLLOWING LINE FOR HALF-DUPLEX MODEM
        CALL    DISP            ;DISPLAY IT
        CALL    RSOUT           ;SEND TO UART
        JR      INS             ;END OF MAIN LOOP
;EXIT PROGRAM
EXIT    LD      SP,(OLDSP)      ;RESTORE SP
;CHANGE FOLLOWING TO '1A19H' FOR NON-DISK SYSTEM
        JP      TRSDOS          ;RETURN TO DOS
;CLEAR KEY DEPRESSED
CLEAR   CALL    VDCLS           ;CLEAR SCREEN
        JR      INS
;BREAK KEY PROCESSING
BREAK   LD      A,0A0H          ;ZAP BREAK BIT
        OUT     (STATUS),A
BKON    LD      A,(3840H)       ;KEY STILL DOWN?
        CP      4               ;BREAK BIT
        JR      Z,BKON          ;WAIT TILL RELEASED
        LD      A,0A4H          ;RESTORE CONFIG
        OUT     (STATUS),A
        JR      INS             ;RESUME
;
;SUBROUTINES
DISP    PUSH    AF              ;DISPLAY BYTE
        CALL    VDCHAR          ;SAVE & RESTORE
        POP     AF              ;CHARACTER
        RET
;INITIALIZE UART
RSINIT  OUT     (MODEM),A       ;RESET UART
        LD      A,55H           ;300 BAUD
        OUT     (CONFIG),A      ;SET BAUD
        LD      A,0A4H
;EVEN PARITY ON, 7 BITS, 1 STOP BIT
        OUT     (STATUS),A
        RET
;RECEIVE CHARACTER
RSIN    IN      A,(STATUS)      ;CHECK STATUS
        BIT     7,A             ;CHAR READY?
        JR      NZ,RSRCD        ;YES
        XOR     A               ;NO:
        RET                     ;RETURN ZERO
RSRCD   IN      A,(DATA)        ;GET CHAR
        RET                     ;RETURN IN A
;TRANSMIT CHARACTER
RSOUT   LD      C,A             ;SAVE CHAR IN C
NOTRDY  IN      A,(STATUS)      ;CHECK STATUS
        BIT     6,A             ;READY?
        JR      Z,NOTRDY        ;NO
        LD      A,C             ;GET CHAR IN A
        OUT     (DATA),A        ;TRANSMIT IT
        RET
;DATA STORAGE
OLDSP   DEFS    2               ;STACK POINTER
        DEFS    64              ;STACK AREA
STKTOP  EQU     $
        END     TERM
```

SERIAL PRINTER PROGRAM

The other major application for the RS-232-C interface is for communicating with a serial printer. In this situation it is desirable not just to have a special means to access the serial printer, but to have it work with standard line printer functions on the TRS-80, such as the LPRINT statement in BASIC. For this purpose, we will not only design driver program software; we will also use the line printer DCB in low RAM to replace the ROM driver address with the address of our driver program, and we will automatically set the memory size for BASIC programs. The only detail we need to know about the line printer driver is that it is entered with the byte to be printed in register C.

Much of the software to access the RS-232-C interface has already been covered in the terminal program above, and we will use some of the subroutines shown in that program here. Now we only need an output routine, because the printer is only an output device. In order to make this program different, let us assume that the printer operates at 1200 baud, and that we are required to transmit a line feed following a carriage return. This program is assembled into two areas in RAM: the code at 5200H is used to set up the new driver, which is located at FF78H and requires less than 32 bytes. All that we do here is change the line printer DCB address and set the BASIC memory size pointer at 40B1H.

continued on page 30

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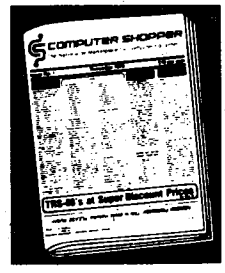

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PROGRAM CONVERSION (PART V)

Richard Kaplan

This month I will discuss various aspects of upgrading from TRSDOS to CP/M, the so-called "universal" operating system. I will explain exactly what CP/M is, what its advntages are, and how to convert existing software to this operating system.

WHAT IS CP/M?

CP/M (an acronym for "Control Program/Microprocessors") is a universal operating system available on hundreds of 8080 or Z-80-based microcomputers. CP/M formats a disk in a special manner, which is readable by virtually any other (8-inch) computer which is also equipped with CP/M. A software vendor can write a program on a TRS-80, for example, and the same disk can be purchased by owners of Vector Graphics equipment, Data General Computers, IBM computers, and hundreds of other computers. The result is that by purchasing CP/M you will have access to the largest software library in the world—the CP/M library.

WHY SHOULD I PURCHASE CP/M?

By purchasing the CP/M operating system, you will improve the usefulness of your computer in many ways, including gaining access to a tremendous variety of software.

CP/M loads and saves programs from disk much faster than does any version of TRSDOS. This is an important consideration if you intend to use your TRS-80 for business purposes. CP/M operates faster for ALL disk accessing needs, so if you maintain a mailing list (for example) you will spend much less time waiting to retrieve information from disk.

Should you ever decide to upgrade to another computer system, if you own a TRS-80 operating with TRSDOS you may experience some difficulties transferring your existing software and data to your new system. With CP/M, all of your software will run IMMEDIATELY on ANY new computer you purchase, providing you own a CP/M system that uses 8-inch disks.

CP/M is simply a series of machine-language programs written by Digital Research, Inc. This operating system may be purchased on disk from a number of software vendors, including H & E Computronics. All you must do is insert your CP/M disk into your computer instead of your TRSDOS disk (when you boot up your system). The result is a literal transformation of your computer into a different machine. BACKUP, FORMAT, etc. will no longer work on your computer (temporarily)! Instead, CP/M commands will be substituted.

There are several versions of CP/M available for the Model II. The two most popular are Lifeboat CP/M and Pickles and Trout CP/M. Regardless of the version you purchase, you will be able to read ANY 8-inch CP/M program manufactured. (Actually, you will only be able to read all SINGLE-density CP/M disks, but this is generally the standard format for supplying 8-inch CP/M software).

Model I CP/M is available from Lifeboat Associates in New York. Model III CP/M is not yet very popular; there is presently only one version of CP/M available for the Model III, sold by Microcomputer Technology in Santa Ana, California. This Model III CP/M is sold as a card, which must be installed into your computer. It is a hardware modification that is not supported by Radio Shack.

WHAT ELSE SHOULD I PURCHASE?

In addition to purchasing CP/M, it is usually necessary to purchase Microsoft BASIC. If you intend to do any programming in BASIC, this is a necessity. Unlike with TRSDOS, BASIC is not supplied with the CP/M operating system.

Many software packages designed for CP/M systems require Microsoft BASIC (known as MBASIC). Versaledger (from Computronics) and Peachtree Business Software are two examples of software which requires MBASIC.

If you own a 5 1/4" version of CP/M, you will find that CP/M is not as universal among this size disk. There are several formats of 5 1/4" CP/M, and, although programming is the same for any CP/M computer, not all formats are readble by all versions of 5 1/4" CP/M. It is possible to purchase conversion programs to change between various CP/M formats, so this should not be a major obstacle in purchasing CP/M software in order to accomodate users of many 5 1/4" systems.

CAN I TRANSFER MY EXISTING SOFTWARE?

It is possible to convert a TRSDOS disk to a CP/M-readable format. Although programming modification will still be necessary, all of you data can be transferred, and the transfer of your programs will save unnecessary re-typing of those programs lines which will not require modification.

Conversion from TRSDOS to CP/M is generaly accomplished through a utility program. Model II users running Lifeboat CP/M, for instance, can use a program called GETFILE. This program can convert any 8-inch TRSDOS disk to CP/M format.

WHAT WILL I HAVE TO CHANGE?

There are essentially two types of files which must be converted to run under CP/M. Machine language programs are the most difficult. Unless you are an accomplished machine-language programmer, I would not suggest that you even attempt to convert this type of program.

BASIC programs can be converted to run under Microsoft MBASIC fairly easily. Most elements of programming which need to be changed are fairly ofjective and straightforward.

CLS

The CLS statement is used to clear the screen on all three TRS-80's. When running under Microsoft MBASIC, however,

this statement does not exist. Microsoft MBASIC clears the screen by means of a CHR$ code. This means that you must execute a statement such as PRINT CHR$(X), where X is the code for your version of CP/M. For a Model II running under Lifeboat CP/M, for example, the statement PRINT CHR$(26) clears the screen.

The conversion process can be greatly simplified if you purchase a word processor, such as a Word Star. If you purchase a word processor which has the capability of modifying BASIC programs, you can execute what is known as a global search and replace. You can, for example, replace every occurrence of CLS with PRINT CHR$(26), thus greatly lowering the time requirements for converting your program.

(Note: If you wish to modify a BASIC program, you must SAVE this program in uncompressed (ASCII) format. Instead of typing SAVE "TEST" for example, you would type SAVE "TEST",A. This program would then be readable by a word processor which can read standard ASCII text files).

PRINT @

MBASIC does not support the PRINT @ statement. Although some versions of CP/M include a feature to simulate this statement, it is generally necessary to write a routine to locate the cursor on the screen. First, you must look up the codes to home the cursor to the upper left corner, to code to move the cursor down a line without erasing characters, and the code to move the cursor one position to the right without erasing characters.

Let's say you have set X to equal the value to home the cursor, Y to move the cursor down, and Z to move the cursor across. First, you should include the following subroutine in your program:

```
60000 DN=INT(Q/80)
60010 AC=Q-INT(Q*80)880
60020 PRINT CHR$(X)
60030 IF DN<>0 THEN PRINT STRING$(DN,Y);
60040 IF AC<>0 THEN PRINT STRING$(AC,Z);
```

(NOTE: The preceding program was designed for the Model II. If you own a Model I or Model III, you should change each occurence of '80' to '64'.)

Assuming you have included the previous subroutine in your program and set the appropriate values for X, Y, and Z, you should replace PRINT @ statements as follows:

```
PRINT @1000, "THIS IS A TEST"
```

would become

```
Q=1000: GOSUB 60000: PRINT "THIS IS A TEST"
```

DISK ACCESS

There are several differences between the way TRSDOS and CP/M handle disk access.

TRSDOS identifies a program (or file) with the format PROG/BAS:N, where PROG is the name of the program, BAS is an optional "extender" (to further identify the program), and N can be either 0, 1, 2, or 3 (to denote the drive on which the file resides). CP/M identifies a program (or file) with the format N:PROG.BAS, where N can be A, B, C, OR D, PROG is again the file name, and BAS is again an optional extender. To give some examples of equivalent disk file specifications, I have listed the following:

TEST/BAS:0 under TRSDOS would become A.TEST.BAS under CP/M.

PROGRAM:2 under TRSDOS would become C:PROGRAM under CP/M.

Most disk commands operate identically in TRSDOS and CP/M (GET, PUT, FIELD, MKD, CVD, etc.). The OPEN statement, though using the same notation in TRSDOS and CP/M, has one difference between the two operating systems: TRSDOS will search for a file on all drives in a system, whereas CP/M will only search the drive specified.

The TRSDOS statement OPEN "R", 1, "TEST" would search all drives in the system and open the file on the first drive on which it is found, if it already exists, or else it would open the file on the first drive (drive 0). Under CP/M, this statement would search the default drive (drive A). If the file did not exist, CP/M would open the file on drive A and would not search the remainder of the other disks.

Let's say your TRSDOS program has the following line:

```
10 OPEN "R",1,"PROG/DAT"
```

An equivalent CP/M routine would be the following:

```
10 OPEN "R",1,"A:PROG.DAT"
20 IF LOF(1)<>0 THEN 100
30 CLOSE: KILL "A:PROG.DAT": OPEN "R",1,"B:PROG.DAT"
40 IF LOF(1)<>0 THEN 100
50 CLOSE: KILL "B:PROG.DAT": OPEN "R",1,"C:PROG.DAT"
60 IF LOF(1)<> 0 THEN 100
70 CLOSE: KILL "C:PROG.DAT": OPEN "R",1,"D:PROG.DAT"
80 IF LOF(1)<> 0 THEN 100
90 CLOSE: KILL "D:PROG.DAT": OPEN "R",1,"A:PROG.DAT"
100 REM THE REST OF THE PROGRAM GOES HERE
```

The preceding routine would search all drives on a 4-drive system to see if the file PROG/DAT existed. If it did, the file would be opened on the first drive on which it appeared. If it did not exist, it would be created on drive A. (NOTE: If you only have 2 drives, you should delete lines 60 through 90 and replace "C" in line 50 with "A". If you have 3 drives, you should delete lines 80 and 90 and replace "D" in line 80 with "A")

LOF

Under TRSDOS, a random-access file can have variable-length records. That is, records in a file can be of any length (up to 255), provided all records in a file are of equal length.

Under CP/M, variable-length files are supported, but the LOF is not computed correctly for non-standard files (those with record lengths other than 128). Under CP/M, the default record size is 128 characters. (Under TRSDOS, the default is 256 characters).

If you have a TRSDOS program which uses the LOF function on a file with a record length other than 128, you should keep a record manually of the length of the file.

continued on page 31

PRACTICAL BUSINESS PROGRAMS

BREAK-EVEN ANALYSIS FOR MORE THAN TWO ALTERNATE INVESTMENTS

Steven M. Zimmerman, Ph.D. and L. M. Conrad

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Break-even analysis is a finanical decision making tool of great value in making preliminary analysis of business investments. It is a simple technique and has the additional advantage of being graphical, which means it may be understood by a greater number of individuals. Limitations on the approach include the fact that many detailed considerations are left out, however, as a first preliminary screen method it is an outstanding tool.

Our original version of this program was published in this magazine's March 1980 issue. In that version we designed a two alternative comparison program to do both the analytical evaluation, and to draw a picture of the comparison. The original program was very simple to operate because it compared only two alternatives.

This version of the program allows for the comparison of up to six alternate decisions at the same time. Operation of the program is a little more complex but if you need to compare a number of alternatives at the same time the effort is worth it.

We have limited the number of alternative to six because the graphics on our TRS-80 are not detailed enough to handle more than this number. Even with a limit of six the graph can get very busy a times.

BACKGROUND AND THEORY

There are two basic types of break-even charts. One is designed to compare the total of the fixed costs and variable costs of an investment with the revenue function while the second is designed to compare the total cost of two or more alternative investments. The first type chart may be referred to as a business chart, while the second type may be called an engineers chart due to the nature of the decisions generally being studied.

This program allows for the making of both the business decision, should I go into business, and the engineer's decision, which is the best way to do the job, at the same time. The revenue function may be compared to total cost functions of up to five alternate ways to do the job.

TOTAL COST

The cost model we are using in the program assumes a fixed investment type cost for each alternative having nothing to do with the volume of production or sales. Examples of this type of cost includes the purchase price of a car, or machine, the investment in a building etc.

The second type of cost is assumed to vary directly with the volume sold or produced. This cost is assumed to have a straight, linear, relationship with the measure of output.

We are aware of the trend in some quarters to use more powerful cost models. Since the objective of break-even analysis in our oponion should be a preliminary decision making evaluation we believe such more complex models would not be of value.

The equation for total cost may be written:

$$TC = FC + VC * X$$

where

TC is the total cost
FC is the fixed cost
VC is the variable costs
X is the number of units produced.

Revenue functions may get very complex with price breaks and such. For the break-even model we assume a single price per unit no matter how many units are sold. The equation we use is:

$$R = P * X$$

where

R is the revenue
P is the price per units
X is the number of units sold

We have defined X as the number of units produced in our first equations and the number of units sold in the second equation. In order to do a break-even analysis, we must assume the number of units sold is equal to the number of units produced. In some business ventures this is a valid assumption, in others it is not. Do not forget it is one of the foundation assumptions upon which break-even analysis is based.

In summary, to use the break-even analysis program you must know the fixed cost and variable cost of each alternative. If a revenue function is being considered you must also know the price per unit, or average price per unit.

RUNNING THE PROGRAM

The program starts with the following headings and question:

```
BREAK-EVEN CHART ANALYSIS VERSION 2
DEVELOPED BY ZIMMERMAN, CONRAD 1982
NUMBER OF ALTERNATIVES (2 TO 6)?
```

For our sample run we have decided to compare two alternative investments plans with one revenue function. The answer to the above question must be three in this case. Type 3 and hit the ENTER key.

The next thing you will see is:

```
FOR ALTERNATIVE # 1 INPUT FIXED COST, VARIABLE COST?
```

All inputs are treated as if they were investments. To input the revenue function we assume the fixed costs are zero and then input the revenue earned per unit. Assuming we are working with a product which has a average selling price of $50.00, we input for the above question 0,50 and hit the ENTER key.

The question will be repeated for alternative 2 and 3. Assume the second alternative has a fixed cost of $5,000 and

a variable cost of $32.00. Input 5000,32 for the fixed and variable cost of alternative 2.

Assume the last alternative has a fixed cost of $7,000 and a variable cost of $17.00. For this question type 7000,17 and hit the ENTER key.

The next question is:

HARD COPY (Y/N)?

If you have a printer the computer will produce on any regular printer a rough copy of the break-even chart from your screen. No special graphics printer is needed for the routine we have developed. We realize that special graphic printers do a better job for this task. However, most people have the other type of printer.

We suggest you do not ask for a hard copy at this time. The program is designed to retain all its information, with the exception it will turn the printer off between runs. This means you can recycle to obtain printer output after you have obtained the screen picture which tells the best story for the task being studied.

Type N and hit the ENTER key.

The next question is:

MAXIMUM VALUE ON X SCALE & SCALE FACTOR ON Y SCALE

This question is very difficult to answer at this time. You can only guess what you would like your picture to look like until you have completed a preliminary scaling. We guessed the value of the X scale should be 200 and used a 1 for the Y factor for the data we inputted. Now type 200,1 and hit the ENTER key.

The screen will now clear and a break-even chart will be drawn. Looking at the picture we realized the break-even points were all at the upper end of the picture. The instruction on the top of the screen says "ENTER TO CONTINUE," so we did and the following was printed on top of the screen:

```
BREAK-EVEN POINT Y( 1 -2 )=13888.9  X( 1 - 2 )=277.778
BREAK-EVEN POINT Y( 1 -3 )=10606.1  X( 1 - 3 )=212.121
BREAK-EVEN POINT Y( 2 -3 )=9266.67  X( 2 - 3 )=133.333
```

This tells us the value of the output where alternative 2 starts to make a profit is 278 units, while the output at which alternative 3 starts to make a profit is 212 units. It also tells us alternative 3 becomes cheaper than alternative 2 after 133 units have been produced. In other words, long before either alternative investment starts to earn a profit the higher investment alternative costs less than the lower investment alternative.

The Y value associated with the X value of break-even is simply the total cost or revenue at the time the break-even occurs.

Now that we see where break-even points are we can draw a better picture or pictures to study the investment. The program is designed such that you need not enter new data as you recycle if you wish to redraw the picture.

If you hit ENTER you will see the heading again. Do nothing except hit ENTER and you will see the question asking about the cost of the first alternative. Hit ENTER for this question and all others until you return to the scale question. This time type 1,300 and look at the picture.

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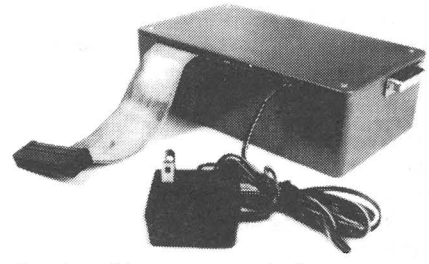

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   b) Turn off RTS,
   c) Receive data only from terminal,
   d) Receive data only from host,
   e) Send data only to host,
   f) Send data only to terminal,
   g) Operate in dumb terminal mode,
   h) Operate in ST80 ™ mode,
   i) Check CTS status. (clear to send)

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Repeat the cycle again typing 1,600 for the scale question the next time. Repeate once more typing .5,600 this final time.

At this point we liked the picture we saw and decided to save it with our printer. We again recycled except when we got to the hard copy question we answered Y and obtained the following:

PROBLEM IDENTIFICATION?

A break-even analysis is of little value a week after it is made if you do not know what investment it refers to. Problem identification is very important.

The next question is:

DATE?

The same investment may be looked at a number of times. The data of any analysis is important.

OPERATOR?

For the record it is always nice to know who did the work. We typed in MR. LEO and hit the ENTER key.

This completes the special input for the hard copy output. From this point on the computer produces the same results that were on the screen on the printer. Due to the difference between the printer and the screen, the order of output is slightly different.

EXAMINING THE PROGRAM

The headings and input data for the analysis are included in lines 10 through 230. The calculations of the break-even points take place in lines 240 through 270. Lines 280 through 350 prepare the computer for both the screen graphics and output to the printer.

The graphics start in line 350 and continue through line 530. Lines 540 through 560 print the break-even analysis on the screen while lines 570 through 720 is the routine which copies the screen onto the printer.

```
1Ø CLEAR 3ØØ : DIM X(6,6),Y(6,6) : REM  "BTWO"  BREAK-EVEN
REVISION #2
2Ø CLS
3Ø PRINT "BREAK-EVEN CHART ANALYSIS VERSION 2"
4Ø PRINT "DEVELOPED BY ZIMMERMAN, CONRAD 1982"
5Ø INPUT "NUMBER OF ALTERNATIVES (2 TO 6)";NA : FOR I=1 TO NA
6Ø IF NA<2 OR NA>6 THEN 5Ø
7Ø PRINT "FOR ALTERNATIVE # ";I;"INPUT FIXED COST,
VARIABLE COST";
8Ø INPUT B(I),A(I)
9Ø NEXT
1ØØ INPUT "HARD COPY (Y/N)";P$
11Ø SS=1
12Ø IF P$="N" THEN 23Ø
13Ø INPUT "PROBLEM IDENTIFICATION";K$
14Ø LPRINT "PROBLEM: ";K$
15Ø INPUT "DATE: ";K$
16Ø LPRINT "DATE: ";K$
17Ø INPUT "OPERATIOR'S NAME";K$
18Ø LPRINT "OPERATOR: ";K$
19Ø LPRINT " "
2ØØ FOR I=1 TO NA
21Ø LPRINT "NO= ";I,"FIXED COSTS= ";B(I),"VARIABLE COSTS= ";A(I)
22Ø NEXT
23Ø CLS
```

```
240 FOR I=1 TO NA-1 : FOR J=1 TO NA-I : IF A(J+I)=A(I) THEN
X(I,J+I)=9999999999999 : GOTO 260
250 X(I,J+I)=(B(J+I)-B(I))/(A(I)-A(J+I))
260 NEXT J,I
270 FOR I=1 TO NA-1 : FOR J=1 TO NA-I :
Y(I,J+I)=A(I)*X(I,J+I)+B(I) : NEXT J,I : REM THE END OF THE
BREAKEVEN CALCULATIONS : X(I),Y(I) ARE BREAK-EVEN BETWEEN I
AND I+1
280 IF P$="N" THEN 300
290 LPRINT " " : FOR I=1 TO NA-1 : FOR J=1 TO NA-I : LPRINT
"BREAK-EVEN POINT  Y(";I"-";J+I;")=";
Y(I,J+I),"X(";I"-";J+I;")=";X(I,J+I) : NEXT J,I
300 INPUT "MAXIMUM VALUE ON X SCALE & SCALE FACTOR FOR Y
SCALE";MX,SF : CLS
310 XX=100/MX : REM CALCULATES SCALES FOR GRAPHICS
320 MY=0 : FOR I=1 TO NA : IF (A(I)*MX+B(I)) > MY THEN
MY=A(I)*MX+B(I)
330 NEXT I : T=SF*MY : S=T/23 : TT=T*1.9
340 TP=T/14 : PP=TT/14
350 FOR I=1 TO 13 : REM BEGINING OF CRT GRAPHICS
360 PRINT TAB(0)TT-PP*I
370 NEXT
380 PRINT
390 PRINT TAB(8)0;TAB(22)MX/3;TAB(36)(2/3)*MX;TAB(50)MX
400 FOR I=18 TO 127
410 SET(I,40)
420 NEXT
430 FORI=0 TO 40
440 SET(18,I)
450 NEXT
460 FOR I=1 TO NA
470 FOR P= 0 TO 109 STEP 1/SS
480 Z=P/XX
490 W=(A(I)*Z+B(I))/S
500 IF W>40 THEN 520
510 SET(P+18,40-W)
520 NEXT P,I
530 PRINT @1,"ENTER TO CONTINUE" : Q$=INKEY$ : IF Q$=""
THEN 530  ELSE IF P$="Y" THEN 560
540 K=0 : FOR I=1 TO NA-1 : FOR J=1 TO NA-I : K=K+1 :
PRINT @(K)*64-63,"BREAK-EVEN POINT :  Y(";I;"-"J+I;")=";
Y(I,J+I);"  X(";I;"-"J+I;")=";X(I,J+I); : NEXT J,I
550 Q$=INKEY$ : IF P$="Y" THEN Q$="111"
560 IF Q$="" THEN 550  ELSE IF P$="N" THEN 20
570 T=1.7*SF*MY : REM BEGINING OF PRINTER GRAPHICS
580 TP=T/38
590 S$="######.## "
600 FOR D=2 TO 41 STEP2
610 HH=T-(D-2)*TP
620 IF HH<0 THEN LET HH=0
630 LPRINT USING S$; HH;
640 FOR I= 18 TO 109 STEP 1.6
650 IF POINT(I,D) THEN LPRINT"*"; : GOTO 670
660 LPRINT " ";
670 NEXT I
680 LPRINT " "
690 NEXT D
700 LPRINT TAB(8)0;TAB(26)MX/3;TAB(42)MX*(2/3);TAB(61)MX
710 LPRINT "              OUTPUT,    SALES  OR PRODUCTION"
720 Q$=INKEY$ : IF Q$="" THEN 720  ELSE P$="N" : GOTO 540
```


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SUMMARY

Break-even analysis is a good preliminary analysis finanical decision making tool. Our program takes advantage of the simplicity of the technique and produces the additional graphics which makes break-even so powerful. The technique has limitations; however, as a first preliminary screening method, it can be an outstanding tool.

The original version of this program was published in this magazine's March 1980 issue. It was very simple to use but could only handle two cases.

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University of South Alabama
Mobile, Alabama 36688

Leo M. Conrad
Imagineering Concepts
P.O. Box 9843
Mobile, Alabama 36691-0843 ■

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"powerful" and "user friendly.")

The manual for GRAMMATIK is better than average. The general text and the explanations are thorough, detailed, and concise. Obviously the theories of GRAMMATIK have been applied, and the author knows the subject extremely well (English Composition), and how GRAMMATIK operates with its subject. This is eminently clear in the text — there are no spelling errors, and only one typographical error — a superfluous "the" that because of its position would not be caught by either GRAMMATIK or a spelling check program (which only proves that Homo sapiens is still needed).

Production of the manual is by offset press from sharp printing, probably by an impact type printer. If not, then an excellent dot matrix printer has been used. There are 32 pages of text, center stapled within a blue card stock paper cover; the outside size is 5 1/2 by 8 1/2 inches. For the amount of text, the production is adequate. Give this manual a "7."

When the program was "test run" on some old articles of mine still on disk, I was embarrassed by some of the overworked, wordy, or trite phrases that I had used. Nevertheless, I had to agree with what GRAMATIK was saying, and vow to avoid these pitfalls in the future.

This is one of the most interesting and useful programs that I have had the pleasure to review. All functions operated as stated with no problems, or even a hint of a problem. And no guessing was required about exactly what some of the directions implied. As I have mentioned in the above review, anyone involved with word processing in any way, whether writing manuals, letters, brochures, newscopy, reports, etc. is encouraged to get this exceptional program. There are many lessons and reminders of English Composition to be learned from it — unless you are William Manchester, or someone as astute as he in the field of writing.

GRAMMATIK Model I, III (min. 32k 1 Drive) — $59.00.
Model II (64k 1 Drive) — $99.00.
CP/M ™ (2.2, 48k) — 8 in. single density
: Aspen Sofware Company, Tijeras, NM 87059. ■

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(Beware: some DOSs, such as NEWDOS/80, use another address for the DOS high memory pointer.) The printer driver simply intercepts data intended for the line printer and sends it to the UART. This program assumes a disk system and 48K RAM. We can change the driver address to 7F78H for a 16K system or BF78H for 32K, and change the return to TRSDOS (402DH) to a return to BASIC "Ready" by changing THE ADDRESS 402DH TO 1A19H.

SERIAL PRINTER PROGRAM

```
00100 ;SERIAL PRINTER DRIVER PROGRAM
00110 LPADR   EQU     4026H           ;DRIVER ADDRESS
00120 MEMSIZ  EQU     40B1H           ;MEM SIZE POINTER
00130 TRSDOS  EQU     402DH           ;RETURN TO DOS
00140 ;
00150 MODEM   EQU     232             ;RS232 PORTS
00160 CONFIG  EQU     233
00170 STATUS  EQU     234
00180 DATA    EQU     235
00190 ;
00200         ORG     5200H
00210 SERIAL  LD      HL,DRIVER       ;SET DRIVER ADDRESS
00220         LD      (LPADR),HL      ;save in dcb
00230         LD      (MEMSIZ),HL     ;SET MEMORY SIZE
00240         CALL    RSINIT          ;INITIALIZE RS232
00250         JP      TRSDOS          ;RETURN TO DOS
00260 ;CHANGE ABOVE TO 'JP 1A19H' FOR NON-DISK BASIC
00270         ORG     0FF78H
00280 ;DRIVER ENTERED WITH BYTE IN C
00290 DRIVER  CALL    RSOUT           ;SEND TO RS232
00300         CP      13              ;CR?
00310         RET     NZ              ;NO
00320         LD      C,10            ;SEND LF
00330         JR      RSOUT           ;RETURN FROM THERE
00340 ;
00350 ;SUBROUTINES
00360 ;INITIALIZE UART
00370 RSINIT  OUT     (MODEM),A       ;RESET UART
00380         LD      A,77H           ;1200 BAUD
00390         OUT     (CONFIG),A      ;SET BAUD
00400         LD      A,0A4H          ;CONFIG
00410 ;EVEN PARITY ON, 7 BITS, 1 STOP BIT
00420         OUT     (STATUS),A
00430         RET
00440 ;TRANSMIT CHARACTER
00450 RSOUT   IN      A,(STATUS)      ;CHECK STATUS
00460         BIT     6,A             ;READY?
00470         JR      Z,RSOUT         ;NO
00480         LD      A,C             ;GET CHAR IN A
00490         OUT     (DATA),A        ;TRANSMIT IT
00500         RET
00510         END     SERIAL
```

You may be wondering why we had to locate this line printer driver at FF78H when it occupies less than 32 bytes. The reason is that TRSDOS destroys locations FF98-FFFF as it loads BASIC into memory. We could actually use those locations later, but then we would have to POKE the program into memory. This way we can simply type "SERIAL" under the DOS and forget about it, although we will also have to set memory size to 65400. ■

continued from page 25

Although it is possible to compute the length of a CP/M variable-record-length file (by converting physical lengths to logical lengths), it is generally easier to keep track of this manually).

This problem regarding LOF if actually a bug in MBASIC. It is possible that it will be corrected in a future release.

LEAVING SPACES IN PROGRAMS

The newest version of MBASIC (release 5.21) permits the use of 5-letter variables. As a result, it is necessary to leave a space between every keyword in a BASIC program. For example, suppose you had to convert the following TRSDOS program:

```
10 FORI=1TO10
20 PRINTTAB(I)I
30 NEXTI
```

An equivalent MBASIC 5.21 program would be:

```
10 FOR I = 1 TO 10
20 PRINT TAB (I) I
30 NEXT I
```

Adding spaces into a program is an ideal chore for a word processor. By using a global search and replace, you can, for instance, replace every occurence of 'PRINT' with "PRINT".

(NOTE: When adding spaces into a program, it may sometimes occur that a line exceeds the maximum characters permissible for one line. In such a case, it is necessary to break up this line into two or more statements.)

FIVE-LETTER VARIABLES

Under TRSDOS, the variables TE and TEST represent the same variable, since the TRSDOS version of BASIC recognizes only the first two letters of a variable. CP/M MBASIC, however, recognizes the first 5 characters of a variable. (Actually, only version 5.21 or newer recognizes 5 characters).

Thus, let's say you had the following TRSDOS program:

```
10 RE-RE+1
20 REL=RE+1
30 RE=RE+1
```

Essentially, it is necessary to utilize only the first two characters of your TRSDOS variable. If you use more than two under CP/M, the additional characters will be significant, and you will be referring to the wrong variable.

This concludes this month's tips on program conversion. If you have a specific topic you would like to see discussed, or if you have successfully converted a program and would like to share your experiences with our readers, write and let me know. All correspondence is welcomed. Simply write to Richard Kaplan, c/o H & E Computronics. ■

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Let your Computer put its Ear to the Ground

(Part 1 of 2)

If you remember last time, our hero had finally managed to get his telecommunications system up and running. The problems were not insurmountable, and with patience, intelligence, and, of course, endurance, his TRS-80 became a terminal. Return with us now to those often trying times of yester(day)-year when the lowly TRS-80 becomes SMART TERMINAL!

Hi! Welcome back to Beginner's Corner. In the last issue, I was talking about problems we as beginners often face, usually alone. The anecdote I told you revealed the problems I faced getting my system together for the purpose of telecommunications. It seems to me that telecommunications is likely to become an important subject in the future, and I have no doubt that, as equipment and facilities become cheaper and more reliable, you are going to see a profound change in your life as the result.

I have been following this subject for quite some time, in this magazine and other periodicals as well. Recently I have noticed that local newspapers have written about these trends. I remember a recent mention of an apartment house that had a terminal as a standard equipment appliance. Now, with Ma Bell having become deregulated, there are some rumors about additional services becoming available. *Readers Digest* has also gotten into the telecommunications business by means of purchasing "The Source." All these events and items point to a substantial change about to occur, and you, as a home computerist, will benefit.

The advantages, or at least the coming advantages, have been written about by many. Some say the future of the publishing business is entangled with telecommunications. If big business is looking toward this as an alternative toward "spreading the news," then what's in it for us? The possibilities have only begun to rise to the surface. Ideas such as library data bases, banking from home services, retrieval of information on any subject by calling up a central information number, etc. are appearing. The telephone company wants to put the white and yellow pages on dial up service. The list goes on.

I am sure that several questions come to mind as you consider this growing oppertunity to "link up" with the outside world. How do you get started? What kinds of equipment are available or absolutely necessary? More important, once you have a system up, what do you do then? I'll review some of the information I spoke about last time and elaborate a bit more on what is available.

The pieces of equipment required by TRS-80 users are: (1) A computer. (2) For the Model I, an expansion interface and RS-232-C board. (3) Enough memory for the software and perhaps room enough for any programs that you might copy over the phone, and (4) a modem of some type. The software required must be a smart terminal program. There are several on the market which are quite good and offer various degrees of sophistication.

One of the necessary pieces of equipment is the modem. There a two kinds: the acoustic coupler modem, which is the cheaper of the two, and the direct connect modem, which is the more reliable of the two.

The acoustic coupler modem uses the head piece of the telephone to transmit information on the lines. You must place your telephone receiver into the two rubber cups on the modem, You must be careful that the modem you choose will fit your phone, considering all the styles of phones around today. Acoustic couplers cost around $100.00 and up.

The direct connect modem doesn't use the head piece but allows for a modular jack to plug into it. The same kind of modular jack that the phone company uses is required. If you do not have the modular jacks on your phones, the telephone company will change them for you for free when they make a service call. Direct connect modems cost about $200.00 and up.

Once you have all the necessary items and the software required to make it work, what then? This leads me to the next step in our investigation of "where does a beginner go to get some information around here."

Lets suppose you're like me and you've got your system working. What are you going to do now? Who are you going to call, and what do you expect to happen? That is what this installment is about. In the second half of this series I will have a listing of several hundred names and numbers that you can call, all across the country (provided that you can afford it).

The term for these local networks are "bulletin boards." The purposes of these bulletin boards vary. The types of systems that make them work also vary, as do the formats that they present to you when you log on to them. Logon is computerese for hook-up-to.

Here's the way it works. You dial the number of the board you want to connect with and listen for the carrier signal. This signal is a high pitched tone. When you hear this tone, you either place your phone in your modem, or your modem will automatically respond (determined by the kind of modem and quality of your device). Hit return (ENTER) a few times until the system (the board) responds with a message similar to examples 1a and 1b.

Once the system responds you can get a listing which looks something like example 2 and continues from there. Many boards offer a wide range of services varying from selling of programs to the "buying and selling" of used hardware. I have found it helpful in getting contacts for clubs in my area and help for all kinds of other problems related to my computer. You can also meet quite a few nice people that way too.

The listings in this article were downloaded (copied from) from the Bryan Boyle Bronx Bulletin Board (212-933-9459). Much of the information and programs that he has available

were retrieved fom other boards. That's how the electronic grapevine works.

Signing on to the system is the first step in getting on to it. Some systems have an auto logon feature that saves some time and effort for the user. Your software must have this capability to allow you to use this feature. What it does is to send automatically the basic information about you, such as your name and location, as well as your account number (if required), etc.

Once you are connected to the system and the carrier signal is established you are usually asked about the type of machine you have. For example IF YOU ARE USING A TRS-80 HIT ENTER, ELSE HIT ANY OTHER KEY . If your are not using a TRS-80 then you will be asked some specific questions about standards your system uses to access other bulletin boards.

```
CHECKING FOR AUTO-LOGON.....

AUTO LOGON ENGAGED
A CONNECTION-80 SYSTEM 300/1200 BAUD
ONLINE SINCE 15 NOVEMBER 1980

WELCOME TO BRYAN BOYLE'S BRONX BULLETIN BOARD
A CONNECTION-80 SYSTEM 300/1200 BAUD
ONLINE SINCE 15 NOVEMBER 1980
PLEASE HIT <ENTER> IF YOU ARE A TRS-80
ANY OTHER KEY IF YOU ARE NOT ------->

Hit "X' to skip opening billboard -->
Hit "S' to Stop, "P' to Pause
```

Example 1A: Sign-on message from Bryan Boyle's Bronx Bulletin Board

```
WELCOME TO
Bryan Boyle's Bronx Bulletin Board

Message-80 BBS System
300/1200 Baud

Online 6AM to 1AM
7 Days a Week

Special section of Broadcast Engineering programs and other
media oriented information in the download section. This
BBS system is for public use and all information contained
herein is public domain.


Your last name is? KOENIG
Your first name is? SPENCER
Searching user files.......
Where are you calling from? QUEENS

Name - SPENCER KOENIG
Calling from - QUEENS
Is this correct SPENCER? Yes
You are caller number 19702

System Printer off line.
Leave messages for SYSOP on BBS

Hit <ENTER> to continue -> ?
```

Example 1B: Dialogue from a session with a Bulletin Board.

continued on page 53

5,000,000/20,000,000 BYTES

From Micro Mainframe

10 MEGABYTE HARD DISK DRIVES, with REMOVABLE Cartridges, For Models I / II / III ($5,995/$8990).

SERIES III H. Model III with 5,000,000 byte hard disk drive(s) ($6,995/$9,095) or add to your Model I/III ($3,795).

SERIES III F. Model III with a controller board (available separately) and operating system which allows you to start with, or move up to, dual-headed or eight-inch floppys.

From AT-80

GL80 — $149 — Radio Shack General Ledger 1.1 with over 30 added features; including a general ledger, classified balance sheet, check register and options to use an "automatic" account number or re-do an entry or document.

AR80 — $199 — Radio Shack Accounts Receivable 1.2 with automatic posting of standard monthly amounts.

GL/M1 — $49 — Convert your General Ledger 1.1 to GL80. Typical user comment: "Takes half as much time."

AR/M1 — $49 — Convert your Accounts Receivable 1.2 to AR80. Typical user comment: "Saves hours."

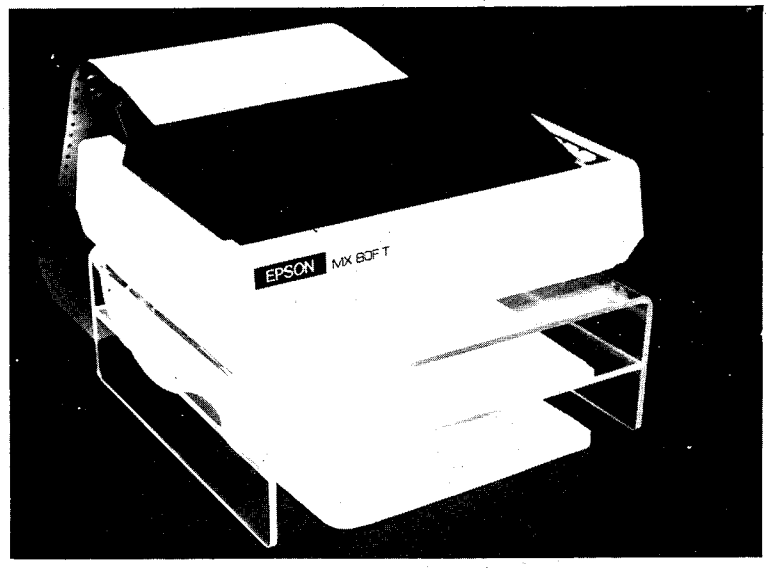
GL/M1 and AR/M1 require proof of purchase of the original programs, or, send a disk copy of the original programs for conversion at no additional charge. Documentation (apply to purchase) — $5.00 each.

FTDEMO80 — $12 — Displays and Executes the NEWDOS/80 Appendix A programs/keyboard entries. Requires 32K.

NEWDOS/80 - $135 LDOS - $135 EPSON MX-70/80/FT - $Call

AT-80 3827 Dismount Dallas, Texas 75211 (214) 339-0498

MX-80/100 OWNERS



PRINTER STANDS

End the mess of paper from your desktop printer. Paper is fed from under the printer and allowed to stack neatly behind your machine. Made from the highest quality clear plexiglass, this is a handsome addition to home or office. Available in two sizes - Regular for printers such as MX-80, Microline80, etc. or Large for printers such as MX-100, DataRoyal, DWII etc. Available with extra shelf for quick and easy forms change.

Regular (300010) **29.95**
Regular w/shelf (300011) **44.95**
Large (300020) **34.95**
Large w/shelf (300021) **49.95**

MX-80 RELOADS

Reload your own MX-80 & MX-100 Ribbon Cartridges, and save money. These endless loop Silver Dollar Ribbon packs load into your worn cartridge easily, saving you money. Now available in **Blue** and **Red.**

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Red (500010) ..... **4.95 ea.**
Blue (500020) ..... **4.95 ea.**

Black (500001) ..... **$39.50 doz.**
Red (500011) ..... **49.95 doz.**
Blue (500021) ..... **49.95 doz.**

MX-80 RIBBON CARTRIDGE

Same as original cartridge, with the additional feature of "Mobis" loop which turns the ribbon 180° after each run through the cartridge extending ribbon life. As you know MX-80 cartridges cost $15.00 from most sources, but these are only $10.95 each or save even more by buying 3 at $29.95.

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3 pack (500051) **$29.95**

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'The Universal Terminal Program'

The FIRST and ONLY terminal program for both the Model I and Model III TRS-80 computers. Written by Pete Roberts, this program will soon become the standard of terminal software. Unique features includes a Handsome binder with over 75 pages of instructions and examples. Free upgrade policy using local Bulletin Boards and MicroNET. Expanded functions such as 'Type to buffer', 'Display Buffer', Define Auto logon, polling, signon, and connect messages! Requires 32K disk system. Only **$79.95**

ST80III, OMNITERM, SMART80, SMARTIII owners!!! Upgrade to 'UNITERM'! Send your ORIGINAL program disk and receive 'UNITERM' for only **$29.95!!**

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Run your own Computer Bulletin Board. This software package when combined with your Model I or Model III TRS-80 and an Auto Answer Modem will convert your computer into a mini-times share system. Functions include message leaving, both public and private, message retrieving, Bulletins, Downloading, merchandise, product ordering, chat, etc. This is a full feature system, and well known for excellence among modem users. Only **$199.95**

NEWDOS/80 OPERATING SYSTEM

The Hottest Disk Operating System for the TRS-80 Model I and III. Version 2.0 with full single and double density support, allows the use of and combination of disk drives types and densities. Full Double density support when used with a Doubler. On the Model I, you can read and write Model III compatible data disks. On the Model III, you can write Model I single or double density data disks for use on the Model I. Includes: Expanded directories, dynamic basic merge and delete, selective variable clearing, enhanced basic editing, Enhanced chaining functions, Superzap utility, Disk enhanced editor assembler and disassembler, and much more. Special Price, **$139.95**

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This is the most powerful Editor Assembler for the TRS-80 ever written. Features a full screen editor, a menu driven asembler, and an interactive linker which allows the linking of /CMD and /RLD files. Files can be loaded to Disk or Tape! Assembly Language programs like Dick Balcom, and Pete Robert claim that this is the best Editor Assembler on the market! Special Price, **$129.95**

THE COPYRIGHT KIT

A self-instruction booklet on copyrighting the computer software you write. Includes step by step instructions, sample forms, as well as discussions of copyrights, patents and trade secrets, your rights secured by copyrights, legal remedies upon infringements, material not copyrightable and MUCH MORE! Written by Attorneys. Published by National Attorneys Publications and distributed exclusively through B.T. Enterprises. IF YOU EVER WROTE A COMPUTER PROGRAM, YOU NEED THIS BOOK! **$12.95**

COPY III

This Model III Utility, written by Dick Balcom, allows you to load system tapes into your computer at either 500 or 1500 Baud and then copy them onto a new tape at either 500 or 1500 Baud. Includes 10 page instruction manual, **$9.95**

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The CASOP utility by Paul Spoltore allows you to copy system tapes, find load locations, check for hidden messages, modify program blocks, relocate program blocks, and merge two tape programs together. A sort of 'SUPERZAP' for tape users, **$24.95.**

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Clear Cases for your model I disk drives, complete with power supply for 5-1/4 inch disk drives.

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A microclock for your TRS-80 Model I. Gives your computer the correct time and date on powerup. Clock is maintained on a lithium battery for long life. Plugs onto the I/O Buss of the TRS-80 Model I and does not require any modifications for most computers. Complete with extensive documentation and a disk with utilities. SPECIAL NOW AVAILABLE IN KIT FORM!

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This is a handy 3 ring binder that folds flat for easy use. Complete with 10 plastic pages to store your disks. (Each page holds 2 disks.) Makes transporting your disks as easy as picking up a book!

Binder and Pages (Limited time special) **$9.95**
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This kit is all that you need for easy installation of an additional 16K or 32K in your Model III. Complete with 8 page instruction book that has been hailed as '. . . The best instructions we have ever seen . . .'. High quality 150ns memory chips make this the best kit available.

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COINS

Gordon Speer

This month we are going to be a little more ambitious than usual with this column. Greg Zeigler, one of our local coin experts, wrote a program for a disk-based system to keep an inventory of his coins. If you have any things to inventory, you might like to adapt his program to your own use. The program makes use of sub-sectored random files, and includes a sort routine which sorts from bottom to top, so that newly added items (bottom) will sort in one pass. One of the unique features of the program is the use of a count-byte at the end of the last sector in each file, which tells how many records there are in that sector.

We have arranged the random file handling routines in the form of separate subroutines which are called in sequence to do their various tasks. If you are a novice to random files, you might like to use them in this form. We keep thinking this may lead to a universal set of subroutines which will handle the random files for any program.

One common technique which is not included in this program is the conversion of numerical data to string for storage, and its subsequent recovery. All the data in this program are handled in string form. Coin data are input as called for, sorted in order by date, and stored in separate files by coin denomination. Every time the program is run, all data are displayed, and deletions and additions may be made.

```
100 '   COINS
110 CLS : CLEAR 10000 : DEFSTR C
120 DIM CA(100),CT(100),CG(100),CS(100),CP(100),CD(100)
130 PRINT TAB(26)"INVENTORY" : PRINT
140 PRINT "     (TO ABORT PROGRAM AT ANY TIME, ENTER 9 FOR COIN
DATE)"
150 DATA CENTS, NICKELS, DIMES, QUARTERS, HALVES, DOLLARS
160 DATA SETS, MISC, DONE
170 READ CF : IF CF="DONE" THEN END
180 PRINT TAB(31-LEN(CF)/2)CF  'CENTERS THE FILENAME
190 GOSUB 540                  'OPEN AND MEASURE FILE
200 IF N=0 THEN R=0 : GOTO 310 'N=NUMBER OF RECORDS
210 FOR R=1 TO N               'R=CURRENT RECORD NUMBER
220 GOSUB 640                  'GET RECORDS
230 NEXT R
240 R=R-1                      'CORRECT THE COUNTER
250 GOSUB 700                  'DISPLAY RECORDS
260 '
              DELETE ROUTINE
270 L=0 : INPUT "      LINE NUMBER TO DELETE (ENTER=SKIP)";L
280 IF L=0 THEN 310            'EXIT THE ROUTINE
290 CA(L)="0000"               'ZERO DATE=DELETED RECORD
300 GOTO 270
310 '
              ADD ROUTINE
320 Q$="" : INPUT "      DATE OF COIN TO ADD TO FILE
(ENTER=SKIP,9=QUIT)";Q$
330 IF Q$="" THEN 420          'EXIT THE ROUTINE
340 IF Q$="9" THEN CLOSE : END
350 R=R+1 : N=N+1 : CA(R)=Q$
360 INPUT "      DESCRIPTION";CT(R)
370 INPUT "            GRADE";CG(R)
380 INPUT "   PURCHASED FROM";CS(R)
390 INPUT "   PURCHASE PRICE";CP(R)
400 INPUT "PURCHASED(060182)";CD(R)
410 GOTO 310
420 GOSUB 840                  'SORT
430 GOSUB 1230                 'CLOSE
440 GOTO 170
450 END
460 '= = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
470 '
              DEFINITIONS SUBROUTINE
480 RS=4                       'RECORDS PER SECTOR
490 RB%=255/RS                 'BYTES PER RECORD
500 S=INT((R+RS-1)/RS)         'SECTOR NUMBER
510 SK%=R-RS*(S-1)-1           'SKIP HOW MANY RECORDS
520 FIELD 1, RB%*SK% AS XS$,6 AS CA,18 AS CT,5 AS CG,
22 AS CS,6 AS CP,6 AS CD
530 RETURN
540 '
              OPEN SUBROUTINE
550 OPEN "R",1,CF              'RANDOM FILE,BUFFER #1,FILENAME
560 GOSUB 470                  'DEFINE PARAMETERS
570 SF=LOF(1)                  'NUMBER OF SECTORS IN FILE
580 IF SF=0 THEN N=0 : GOTO 630  'VACANT FILE
590 FIELD 1, 255 AS XS$, 1 AS RL$
600 GET 1,SF                   'LAST SECTOR
610 RL=VAL(RL$)                '# OF RECORDS IN LAST SECTOR
620 N=4*(SF-1)+RL              '# OF RECORDS IN FILE
630 RETURN
640 '
              GET SUBROUTINE
650 IF R=0 THEN 690
660 GOSUB 470
670 GET 1,S
680 CA(R)=CA : CT(R)=CT : CG(R)=CG : CS(R)=CS : CP(R)=CP :
CD(R)=CD
690 RETURN
700 '
              DISPLAY SUBROUTINE
710 IF N=0 THEN 830            'VACANT FILE
720 FOR R=1 TO N               'RECORD NUMBER
730 PRINT USING"## ";R;
740 PRINT USING"%    % ";CA(R);
750 PRINT USING"%                % ";CT(R);
760 PRINT USING"%   % ";CG(R);
770 PRINT USING"%       % ";LEFT$(CS(R),10);
780 PRINT USING"####.## ";VAL(CP(R));
790 PRINT LEFT$(CD(R),2)"/"MID$(CD(R),3,2)"/"RIGHT$(CD(R),2)
800 IF R/12=INT(R/12) THEN INPUT"(ENTER) TO CONTINUE";Q$ : CLS
810 NEXT R
820 R=R-1                      'CORRECT THE COUNTER
830 RETURN
840 '
              SORT SUBROUTINE
850 CLS : PRINT TAB(27)"SORTING"
860 PRINT TAB(31-LEN(CF)/2)CF  'CENTER THE FILENAME
870 IF R < 2 THEN 1020         'NO SORTING NEEDED
```

MOD I/III SPEED MOD

The only resource you can't replace is TIME. **PLUG IN** A SPRINTER (by Holmes Engineering) and

TRIPLE THE SPEED of your TRS-80 MODEL I OR MODEL 3.

YES! A NEW Z-80B MICROPROCESSOR IS INCLUDED!
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YES! Automatic switch down to "normal" for disk I/O.
YES! IT IS ABSOLUTELY FANTASTIC and only 99.50 COMPLETE!!
Only the cream of the crop - - for you, from HACKS.

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How many times have you wished? Here 'tiz ON DISK 39.95

Need a SUPERFINE lowercase CHARACTER GENERATOR for your MOD 1? KSG Technology builds 'em, and we've got one just for you. Beautiful lowercase -FULL DECENDERS - All of the graphics, of course. INCLUDES the SPECIAL GRAPHICS for CHR$(0) thru CHR$(31) omitted in the later Radio Shack lower case chips. Ask for the CGA-2. You'll love it! Only 29.95

Did you ever bomb a disk? SUPER UTILITY (by Kim Watt) WILL AUTOMATICALLY RECOVER BOOT SECTIONS, GAT TABLES, READ AND COPY PROTECTED MEDIA, TRANSFER FROM ONE DOS TO ANOTHER, SINGLE OR DOUBLE DENSITY, and on, and on, and on . . . . You just wouldn't believe . . . Includes a hundred and some odd vital functions. The BEST (no doubt!) and very, very highly recommended for ANYONE that uses a TRS-80 MOD 1 or MOD 3 with any kind of DISK and any kind of DOS. You just got to use it to realize what you've got here! The name "SUPER UTILITY" is a gross under-statement. One use can easily pay for the program. 48K required. Specify 35tk, 40tk or 80 tk media for your Mod 1 or Mod 3. Absolutely professional! You need this! Don't get caught without it. 74.95

ALL HARDWARE **Model I Lowercase**
TRS-80 is a Trademark of Tandy Corp

DUALCASE
UPPER/lowercase, full time from power-up; **NO** software; Standard typewriter keyboard operation (shift to UPPER-CASE); Control characters can be displayed; 128 Total character set plus full graphics.
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```
880 FOR Y=1 TO (R-1)            'NUMBER OF TIMES
890 SW=0                        'SWITCH OFF
900 FOR Z=(R-1) TO Y STEP -1    'SCAN THE LIST, BACKWARDS
910 IF CA(Z) < CA(Z+1) THEN 990         'IN THE CORRECT ORDER
920 CZ=CA(Z) : CA(Z)=CA(Z+1) : CA(Z+1)=CZ  'EXCHANGE THEM
930 CZ=CT(Z) : CT(Z)=CT(Z+1) : CT(Z+1)=CZ
940 CZ=CG(Z) : CG(Z)=CG(Z+1) : CG(Z+1)=CZ
950 CZ=CS(Z) : CS(Z)=CS(Z+1) : CS(Z+1)=CZ
960 CZ=CP(Z) : CP(Z)=CP(Z+1) : CP(Z+1)=CZ
970 CZ=CD(Z) : CD(Z)=CD(Z+1) : CD(Z+1)=CZ
980 SW=1                        'SWITCH ON - STILL SORTING
990 NEXT Z                      'NEXT POSITION UP THE LIST
1000 IF SW=0 THEN 1020          'FINISHED IF SWITCH IS OFF
1010 NEXT Y                     'NEXT TIME THRU THE LIST
1020 CLOSE
1030 CLS
1040 PRINT "WRITING THE FILE - DON'T INTERRUPT!"
1050 KILL CF
1060 IF N=0 THEN PRINT "NOTHING IN THE "CF" FILE" : GOTO 1060
1070 OPEN "R",1,CF
1080 R=0                        'RESET RECORD NUMBER
1090 FOR Q=1 TO N
1100 IF VAL(CA(Q))=0 THEN 1130 '0000 DATE = DELETED RECORD
1110 R=R+1                      'RECORD NUMBER
1120 GOSUB 1160                 'PUT RECORD INTO FILE
1130 NEXT Q                     'FIND ANOTHER RECORD
1140 N=R                        'CORRECT THE COUNTER
1150 RETURN
1160 '
```

```
                PUT SUBROUTINE
1170 GOSUB 4700                 'SECTOR,SKIP,FIELD
1180 GET 1,S                    'ALWAYS GET BEFORE PUTTING
1190 LSET CA=CA(Q) : LSET CT=CT(Q) : LSET CG=CG(Q)
1200 LSET CS=CS(Q) : LSET CP=CP(Q) : LSET CD=CD(Q)
1210 PUT 1,S
1220 RETURN
1230 '
                CLOSE SUBROUTINE
1240 SF=LOF(1)                  'NUMBER OF SECTORS IN FILE
1250 IF SF=0 THEN 1320
1260 RL=N-4*(INT(N/RS))         'RECORDS IN LAST SECTOR
1270 IF RL=0 THEN RL=4          '(1-4, NOT 0-3)
1280 FIELD 1,255 AS XS$, 1 AS RL$
1290 GET 1,SF
1300 LSET RL$=CHR$(48+RL)       'THE LAST BYTE IN THE LAST
1310 PUT 1,SF                   'SECTOR IS THE NUMBER OF
1320 CLOSE                      'RECORDS IN THE SECTOR
1330 RETURN
1340 '
1350 ' GREG ZEIGLER
1360 ' GORDON SPEER
1370 ' STERLING, IL
```


Gordon Speer
3304 Woodland Road
Sterling IL 61081 ■

COLOR COMPUTER CORNER

Joseph Rosenman

This Month: TALKING TO MODEL ONES, TAKING THE BUS, AND COMMUNICATING

I have been writing for *Computronics* for well over a year now and have received many letters from our readers, on many different topics. Although I don't usually have the time to answer all the letters I receive, I want all of our readers to know that I read and value their suggestions and comments. Your suggestions often influence topics that I choose to write about, and help me to determine what subjects require "extra" attention. Please keep the letters coming, and a heartfelt thank you!

Recently, I have been thinking about the way I have criticized Radio Shack. Don't misunderstand me — I meant what I said! At the same time, Radio Shack has been producing a small but steady flow of software for the Color Computer. While some of the programs "don't quite make it," others are very useful and of high quality. Therefore, I expect to see a run on "Radio Shack Rom Packs for the Color Computer" reviews in the near future. If any one from Tandy Towers is watching (reading?), take note: we want our Color Computers to be supported!

This month, I had planned to write about a special topic. Unfortunately, my Color Computer had other ideas. My home computer system includes a fully expanded Model 1 and a 16K Extended Basic Color Computer. Since my printer uses the standard parallel interface, it can only be connected to my Model 1. I have been thinking of purchasing a serial to parallel interface for my Color Computer, to allow my printer to be used with both microcomputers, but then, an idea occured to me: since the Color Computer uses a serial port, I should be able to send the DATA from the Color Computer into the RS-232-C interface on my Model 1. A quick check through the Color Computer technical reference manual indicated that it should be no problem at all. So I bought a 4 pin DIN patch cord from Radio Shack and a female DB-25 connector from a local electronics supply store. I cut the DIN cord in two, stripped the wires, and soldered them to the DB-25. Unfortunately, I couldn't get the Color Computer to 'do its thing" with the LLIST command. And what's more, 'm not at all sure why. I will continue to research this problem and will publish the explanation once I've found it. f I can get BASIC to LLIST from the Color Computer to the Model 1, the next step would be to use the disk storage of he Model 1 to save Color Computer programs and to re-oad them into the Color Computer.

What is this business of RS-232-C communication anyway? Communication is a major topic in computer operations, and is becoming even more important as new echnologies (and computer systems) emerge. If you want, ou could conceive of a computer as a big "black box". It has screen, so that you can see what it is doing. It has a eyboard, so that you can tell it what to do. It even has a printer, to keep a record of the "answers". It has a cassette or lisk, to save your programs or data. What goes on inside this "black box" is "not my problem". Somehow, the computer manages to get whatever information is relevant to the screen, from the keyboard, to the disk, or whatever. How does it do it inside the computer (inside the "black box")? Well, that's what all the wires are for, right?

Actually, that is right. Computers are usually put together in one of two ways: on a general purpose Bus or directly on circuit boards. The TRS-80 computers all use the second approach. A (generally large) board is designed to contain all of the necessary parts to form a working microcomputer. The Model 1 is contained on two boards (one in the keyboard, the other in the Expansion Interface). If you want a computer with only "half" of the potential features, you can use a Model 1 without the Expansion Interface. Both the Color Computer and the Model 3 use a single board. (I'm not sure about the Model 2, although I suspect it uses a Bus as described below.) All of the necessary connections are on the board itself, or are "jumpered" to and from the second board.

What about the Bus? (We missed it again!) Many other microcomputers use something known as a "Bus structure". The Bus is really just a collection of wires and slots that conform to a uniform pattern. In other words, a specific Bus might be designed to contain (say) 106 different connections. Wire 1 might be the ground, wire 2 might be +5 volts. Wires 10-17 might be the 8 bits of the DATA BYTE. Wires 20-35 might be the 16 bits of the ADDRESS, and so on. Each wire is designated to have a specific use. The Bus will then be in a box (often called a "motherboard") that has several "slots" where computer boards can be "plugged in". Each slot will use the same pattern of wire functions, and each board will be connected to each other via the "common Bus". The Bus will (most likely) be connected to a power supply. When I say connected, I mean that the appropriate wires (Ground, -12 volts, +5 volts, +12 volts, and whatever else is needed) that are used to supply power to the various computer boards, are "tied into" the bus and are available to all the boards.

So, we have a Bus. (Only computer users can take this Bus to work!) What makes this Bus different from all other Buses? Actually, there are several different Bus systems around. The two most important by far, are the S-100 Bus and the Multi-Bus. In general, Multi-Bus is used in higher priced business systems, and the S-100 Bus is used in the more moderatly priced personal systems. The two Bus structures ARE NOT at all compatible, even though they both do similar things. Now, we just need something to plug into our Bus.

One thing that we will want will be a microcomputer card. This card will contain the actual CPU chip(s), along with certain "support" circuitry. Another thing we will want would be RAM card(s). In the "old days," each card would contain 4K of RAM. These days, 64K RAM cards are becoming

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commonplace. The technology of the IC (Integerated Circuit chip) has now progressed to the point where a 64K byte chip will be commercially available in the near future. This means that a single board with 16 RAM chips could contain one Megabyte of memory! Other boards would include a general purpose I/O board, Video generation boards, Disk Controller boards, and MANY other special purpose boards. If you wanted to expand your system, or add a new feature, just plug in the desired board.

So why didn't Radio Shack make the TRS-80s according to a standard Bus? They had several excellent reasons, some good and some not so good. The best reason they had was cost. Providing a general purpose Bus based microcomputer does not come cheaply. So one of the reasons you HAVE your TRS-80 to wonder about is that Radio Shack chose the less expensive approach. (Would you have your Color Computer if it cost $5000 instead of $500?). What are the "not so good" reasons? Since there is no common Bus, you can't go out and by a cheaper "Brand X" memory card in place of Radio Shack's (rather expensive) Ram upgrade. I guess that Tandy wants to keep the business "all in the family". Considering the Tandy prices, is it any surprise that my Model 1 includes an Epson Printer, Vista and Aerocomp disk drives, Garcia's lower case modification, and self-installed memory chips?

I started off by talking about communications. Actually, I am planning a special series on computer communications, to be presented sometime in the future (prehaps by the end of 1982). The Color Computer has a large potential as a "communications" micrcomputer, and many of you might want to experiment with some of these features. Usually, the computer works "inside" in parallel, and "outside" in serial. What this means is that if the CPU wants to send a number (a byte) to a memory address, it would first put all sixteen bits of the address onto the address Bus, and then put all eight bits of the DATA byte onto the DATA bus. Both numbers would placed on the proper Buses "all at once". When information is going to a disk or a cassette, it is sent out one bit at a time. When something is transmitted or received one bit at a time, it is known as serial communication. When the entire number is transmitted or received at the same time, it is known as parallel communication.

One type of communication has to do with the computer talking to "itself". Another type of communication has to do with the computer talking to other computers. The way this usually works is that the computer sends and receives information serially to and from a MODEM (Modulator/Demodulator). The MODEM will change the "bit values" into either sounds or voltages (depending on the type of MODEM). The resultant signal will then travel over a special wire to another MODEM, and then to the target computer. There is a large number of different "communication systems". The differences are too complex to discuss in this column. What I will mention is the "baud" factor. Communication usually occurs somewhere between 110 "bits per second" and 9600 "bits per second". When regular telephone lines are used, the "speed" is usually 300 Baud (Bits per second), which translates into (roughly) 30 characters per second.

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POCKET COMPUTER CORNER
BREAK-EVEN AND PAYBACK PERIOD ANALYSIS ON THE TRS-80 POCKET COMPUTER

Steven M. Zimmerman, Ph.D. and L. M. Conrad

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As initial indicators of the value of an investment, the break-even and payback period evaluations are both good first steps. Break-even analysis in particular is often performed graphically. Payback period analysis should also be graphical but often is not. Graphic evaluation is very difficult to do on a computer with a single 24 character line of output. On the other hand it is difficult to fit a TRS-80 Model I or Model III into a pocket of one's shirt.

The assumption in using a break-even chart is all costs may be classified as either fixed or variable. Fixed costs are those costs which do not change as the level of activity changes. Variable costs are those which change in a direct manner as the level of output changes.

Examples of fixed costs are investment costs such as the dollars spent to buy a building or piece of production equipment in the first place. In the case of a taxi business the fixed costs are those costs necessary to purchase the vehicles.

Variable costs, in the case of a taxi cab, are such items as gasoline, oil and labor which increase as the level of business increases.

The idea behind a business or revenue break-even analysis is to find the point or the number of miles, where the revenue is equal to the cost of investment plus the cost of operation per mile. Note:It is expected the cost of operation per mile is less than the revenue generated per mile. If this is not true you will get a negative break-even point.

The payback period approach attempts to identify the number of time units in the future when the break-even point will be reached. If you divide the number of miles which represents the break-even point by the number of revenue miles generated per year you will have a break-even point in terms of years. This is defined as the payback period.

There are two types of break-even evaluations covered by the program. The first type is the revenue type just reviewed. The second type is when two alternative methods are being compared. For example; which of two machines or cars should be purchased from a costs point of view? In this case the break-even point is that point where the costs of the two alternatives are the same. If volume is greater than the break-even point then the alternative with the higher fixed costs should be selected, otherwise the alternative with the lower fixed costs should be selected.

RUNNING THE PROGRAM

The program will run in the DEFineable MODE by hiting SHFT and then SPC. Alternatively you may type RUN and hit ENTER in the RUN MODE. Also, if you have a printer, now is the time to turn it on. The first thing you will see after starting the program is the main menu which is as follows:

1-METHODS, 2-REVENUE?

You as the user may select to do a REVENUE type of analysis or to compare two alternative methods. Assume you selected 2 for the revenue case. Type 2, hit ENTER and you will see the following:

REVENUE?

This is a question to which you must answer the income generated per mile, or per some other unit of output you are working with. Assume you earn $0.75 per mile. Type .75, hit ENTER and you will see:

ALTERNATIVE 1

Simply hit ENTER to continue:

FIXED COST?

Answer this question with 5000 and hit ENTER for an investment of $5,000.

VAR.?

Now enter the variable cost per unit of output. For the example use .40 for $.40 per mile and hit ENTER.

BREAK-EVEN 14285

The above output indicates the break-even point is 14,285 miles. This means you will be earning a profit after you sell 14,285 revenue miles. Now hit ENTER to continue:

USE/YR?

This is a question asking for the number of miles per year you expect to use the cab. Assume this cab is driven 75,000 miles per year. Type 75000 and hit ENTER:

PAYBACK 0.19 YRS

This means in .19 years or in 2.28 months the investment starts earning dollars. This is an ideal application of the payback period.

If you hit ENTER again you will return to the main menu. At this time select 1 and hit ENTER:

ALTERNATIVE 1

Now hit ENTER and you will see on the display:

FIXED COST?

Input 10000 for an investment in an expensive car and hit ENTER.

VAR.?

This question asks for the variable cost of alternative 1. Input .50 for $0.50 per mile and hit ENTER.

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ALTERNATIVE 2

must now go througn the fixed cost, variable cost questions for the second alternative. Input 5000 for fixed costs and 1.30 for variable cost.

BREAK-EVEN 6250

The answer or break-even point is 6,250 miles. If you get a negative answer do not worry. When both sets of costs in one case is greater than the two costs in a second case you have a situation where one alternative dominates the other. You will get a negative break-even point.

If you hit ENTER again and input 5000 miles per year as your expected use you can solve for the payback period.

PAYBACK 1.25 YRS

Hitting ENTER again will return you to the main menu.

SUMMARY

This program is effective in providing a first approximation to many business problems. Some investors depend on this technique only. This is not recommended. The techniques are limited and leave out some important considerations. You must decide when they are of value and when to seek more complex and detail procedures for decision making.

If you are interested in further information and programs for the Trs-80 or the Sharp PC 1211 pocket computers, look for our new books at your favorite store. One has just been published by Wm. C.Brown Company Publishers and is titled "Learning To Use Your Pocket Computer". Our second book will be out shortly from the same publisher titled "Practical Programs For Your Pocket Computer."

PROGRAM LISTING

```
70:"B=2:INPUT "1-METHODS,2-REVENUE?";X:GOTO 10X+70
80:USING"##":FOR I=1 TO Z:PRINT "ALTERNATIVE ";I:
   INPUT "FIXED COST?";A(I):J=I+2:INPUT "VAR.?";A(J):NEXT I
81:Z=(A(1)-A(2))/(A(4)-A(3)):USING "########":
   PRINT "BREAK-EVEN ";Z:INPUT "USE/YR?";U:Z=Z/U
82:USING "########.##":PRINT "PAYBACK ";Z;" YRS":GOTO 70
90:Z=1:INPUT "REVENUE?";A(4):A(2)=0:GOTO 80
91:END
```


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FIVE BASIC PROGRAMS

Jim J. Jordan

CHASE

CHASE is a game in which five robots are chasing you. Your only chance is to maneuver the robots into each other or into a high voltage post. If you attempt to move out of the playing area, you will be destroyed by a high voltage barrier fence!

```
10 DATA 5,0,0,0,0,0
90 REM INTRODUCTION LEADER
100 Y=0 : X=-6
105  FOR J=1 TO 25
110 CLS : PRINT @ 411+X+16*Y, "C H A S E"
115 X=X-Y/2 : Y=Y+3*X/2
120 FOR I=1 TO 150 : NEXT I : NEXT J
1000  REM INSTRUCTIONS
1010 CLS : PRINT @ 90, "*  CHASE  *"
1020 PRINT @ 195, "5 Robots are chasing you!  As you move, the
Robots take the"
1025 PRINT "shortest path toward you.  Your only chance is to
maneuver the"
1030 PRINT "Robots into each other or into a high voltage post.
   If you"
1035 PRINT "attempt to move out of the playing area, you will
be destroyed"
1040 PRINT "by a high voltage barrier fence.
  GOOD  LUCK !!!............."
1045 PRINT CHR$(21)
1065 PRINT @ 601, CHR$(253); " = Robot"
1070 PRINT @ 665, CHR$(170); " = Post" : PRINT @ 729, CHR$(196);
" = You"
1080 PRINT : PRINT CHR$(244); CHR$(245); CHR$(246); "  To
continue,  press any key."
1090 C$=INKEY$ : IF LEN(C$)=0 THEN 1090
1100 RANDOM : DEFINT A : DIM A(45)
2000 REM **Initialize for start of game**
2005 CLS : PRINT "One moment please while I set-up the playing
field"
2010 READ R,D,N,S,E,W
2020 RESTORE
2030 A(1)=RND(18) : A(2)=RND(8)
2040 FOR I=3 TO 41 STEP 2
2050 A(I)=RND(18) : A(I+1)=RND(8)
2060 FOR J=1 TO I-2 : IF (A(J)=A(I))*(A(J+1)=A(I+1)) THEN 2050
2070 NEXT J : NEXT I
2100 REM PRINT SCREEN
2110 CLS : PRINT @ 92, "*  CHASE  *":PRINT"":PRINT"Direction Key"
2115 PRINT "(1) Northwest"
2120 PRINT "(2) North" : PRINT "(3) Northeast" : PRINT "(4) West"
2125 PRINT "(5) East" : PRINT "(6) Southwest" : PRINT "(7) South"
2130 PRINT "(8) Southeast"
2135 FOR I=64 TO 512 STEP 64
2140 PRINT @ 208+I, ". . . . . .";
2145 NEXT I
2150 IF R<>1 PRINT @ 501 ,"There are";: PRINT @ 564, R; " Robots";
2170 IF R=1 PRINT @ 502, "There is";: PRINT @ 565, "one Robot";
2190 PRINT @ 629, "left.";
2300 REM  **If Robots are destroyed,  print message**
2310 PRINT @ 848, ""; : I=RND(3) : IF D<2 THEN 2350
2315 ON I GOTO 2320,2330,2340
2320 PRINT "Wow !  You just destroyed"; D; "Robots !!" : GOTO 2350
2330 PRINT @ 847, D; "Robots just bit the dust !!" : GOTO 2350
2340 PRINT @ 840, "What's going on ?! "; D; "Robots were
electrocuted !!"
2350 IF D<>1 THEN 2400
2360 ON I GOTO 2370,2380,2390
2370 PRINT @ 852, "Play TAPS for one Robot." : GOTO 2400
2380 PRINT @ 848, "One  Robot  less !!" : GOTO 2400
2390 IF R=4 THEN 2370
2395 PRINT "Another Robot down-the-tubes !"
2400 D=0
2500 REM **Display Robots, Posts, and Player**
2510 B$=CHR$(170) : FOR I=1 TO 41 STEP 2 : IF I=31 B$=CHR$(253)
2520 IF A(I)=0 NEXT I
2525 IF A(I)=0 NEXT I
2530 IF I=41 B$=CHR$(196)
2540 PRINT @ 206+A(I)+A(I)+64*A(I+1), B$; : NEXT I
2550 REM END OF GAME MESSAGE
2560 IF R<>0 THEN 2610
2570 A$="YOU  WIN!!"
2580 FOR I=1 TO 19 : PRINT @ 92, A$ : FOR J=1 TO 125 : NEXT J
2590 PRINT @ 92, STRING$(11," ") : FOR J=1 TO 125 : NEXT J :
NEXT I : PRINT CHR$(21)
2595 CLS : PRINT "To  continue ,  press  any  key." : F$=INKEY$
: IF  LEN(F$)=0 THEN 2595
2598 PRINT CHR$(21) : GOTO 2005
2600 REM INPUT DIRECTION AND UPDATE (Y)
2610 PRINT @ 192, "WHAT DIRECTION (1 TO 8)"; : INPUT A
2615 A=INT(A)
2620 IF(A>0)*(A<9) THEN 2650
2630 PRINT @ 912, "" : GOTO 2610
2650 IF A<4 A(42)=A(42)-1
2660 IF A>5 A(42)=A(42)+1
2670 IF (A=1)+(A=4)+(A=6) A(41)=A(41)-1
2680 IF (A=3)+(A=5)+(A=8) A(41)=A(41)+1
2700 REM CHECK FOR MOVEMENT INTO FENCE
2710 IF (A(41)>0)*(A(41)<19)*(A(42)>0)*(A(42)<9) THEN 2810
2720 PRINT @ 843, "Congratulations,  you just hit the fence !!"
2730 A$="YOU LOSE!" : GOTO 2580
2800 REM CHECK FOR MOVEMENT INTO POSTS OR ROBOTS
2810 FOR I=1 TO 41 STEP 2 : IF (A(41)<>A(I))+(A(42)<>A(I+1))
NEXT I
2820 IF I<31 PRINT @ 848, "Good going,  you just hit a post !"
2825 IF I<31 GOTO 2730
2830 IF I<41 PRINT @ 844, "Ramming a Robot is hazardous to your
health !"
2840 IF I<41 GOTO 2730
2900 REM CALCULATE NEW ROBOT POSITIONS
2910 FOR I=31 TO 39 STEP 2 : IF A(I)=0 THEN 2950
2915 IF A(I)<A(41) A(I)=A(I)+1
2920 IF A(I)>A(41) A(I)=A(I)-1
2930 IF A(I+1)<A(42) A(I+1)=A(I+1)+1
2940 IF A(I+1)>A(42) A(I+1)=A(I+1)-1
2950 NEXT I
```

```
3000 REM CHECK TO SEE IF ROBOTS GOT TARGET
3010 FOR I=31 TO 41 STEP 2 : IF (A(41)<>A(I))+(A(42)<>A(I+1))
NEXT I
3020 IF I<41 PRINT @ 848, "     You've  been  caught !!  " :
GOTO 2730
3100 REM CHECK TO SEE IF ANY ROBOTS RAN INTO EACH OTHER
3110 FOR I=31 TO 37 STEP 2 : FOR J=I+2 TO 39 STEP 2
3120 IF (A(I)=A(J))*(A(I+1)=A(J+1))*(A(I)<>0)A(I)=0 : A(J)=0 :
D=D+2
3130 NEXT J : NEXT I
3200 REM CHECK TO SEE IF ROBOTS RAN INTO A POST
3210 FOR I=31 TO 39 STEP 2 : IF A(I)=0 THEN 3250
3230 FOR J=1 TO 29 STEP 2 : IF (A(J)=A(I))*(A(J+1)=A(I+1))A(I)=0:
D=D+1
3240 NEXT J
3250 NEXT I
3300 REM LOOP BACK TO UPDATE THE SCREEN
3310 R=R-D : GOTO 2110
3320 END
```

REACTION TIME

How fast do you think you are? This program will blank the screen for a random period of time. Then, without notice, it begins counting at the center of the screen. When it starts counting, press the SPACE BAR as soon as possible to stop the counting. You have ten chances to improve your score, after which time your average score for the ten attempts and your comparative speed rating are displayed.

```
5 T=RND(2000)
7 X=1
9 SUM=0
12 W=2000
15 AV=0
20 CLS : PRINT @ 5, "How fast do you think you are ?  I will
blank the screen"
30 PRINT "for a Random period of time.  Then ,  without notice ,
I will"
40 PRINT "begin counting  at  the  center  of the screen.  When
I start"
50 PRINT "counting, press the <SPACE BAR> quickly to stop the
counting.
60 PRINT "You have  10  chances  to  improve your score,  after
which  I"
70 PRINT "will display your average score for the  10  attempts
and your"
80 PRINT "comparative speed."
90 PRINT : PRINT : PRINT "To begin the count,  press any key."
105 IF INKEY$="" THEN 105
110 CLS : FOR N=1 TO 10
120 T=RND(2000) : FOR Z=1 TO T : NEXT Z
130 X$=INKEY$ : X=1
140 PRINT @ 478, X
150 IF INKEY$<>" "THEN X=X+1 : GOTO 140
160 SUM=SUM+X
170 FOR Z=1 TO W : NEXT Z : CLS : NEXT N
180 AV=SUM/10
190 PRINT "Your  Average  is: ";AV
```


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Up to six players *ride* the courses, compete against the clock and each other for points and the CHAMPIONSHIP! Three levels of play let you progress to expert rider.

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```
200 IF AV<=7 THEN 400
210 IF AV<8 THEN 400
220 IF AV<9 THEN 410
230 IF AV<10 THEN 420
240 IF AV<11 THEN 430
250 IF AV<12 THEN 440
260 IF AV<13 THEN 450
270 IF AV<15 THEN 460
280 IF AV>15 THEN 470
290 FOR Z=1 TO W : NEXT Z : GOTO 20
400 PRINT "The  FORCE  is with  you !!" : GOTO 290
410 PRINT "Greased  Lightning !!" : GOTO 290
420 PRINT "Faster  than  most  players !" : GOTO 290
430 PRINT "Average score !   Try  to improve." : GOTO 290
440 PRINT "Just a little below average score.  Try again." :
GOTO 290
450 PRINT "Get up and take a breather.  Then,  try again." :
GOTO 290
460 PRINT "Too slow.  You need more practice!" : GOTO 290
470 PRINT "It's  past your bed time !!" : GOTO 290
480 END
```

U. S. A.

This program simply draws a picture of the United States flag on the video display.

```
10 REM *** DRAWS A PICTURE OF THE UNITED STATES FLAG
12 REM *** PROGRAM WRITTEN FOR TRS-80 MODEL III
14 REM *** BY JIM J. JORDAN   1981
15 REM *** 6 HICKORY HALL LANE, CHARLESTON, S.C.  29408
30 CLS : PRINT TAB(7), "UNITED STATES OF AMERICA"
40 FOR X=0 TO 127
50 FOR J=0 TO 2
60 Y=J+3
70 SET(X,Y+40)
80 SET(X,Y+33)
90 SET(X,Y+27)
100 SET(X,6) : IF X<=63 THEN 160
110 SET(X,Y+21)
120 SET(X,Y+15)
130 SET(X,Y+9)
140 SET(X,Y+3)
160 NEXT J
170 NEXT X
180 FOR X=6 TO 56 STEP 10
190 SET(X,9)
200 SET(X,13)
210 SET(X,17)
220 SET(X,21)
230 SET(X,25)
240 IF X>=50 THEN 300
250 X1=X+5
260 SET(X1,11)
270 SET(X1,15)
280 SET(X1,23)
290 SET(X1,27)
300 NEXT X
310 FOR Y=6 TO 32
320 SET(62,Y) : SET(0,Y)
330 SET(63,Y) : SET(1,Y)
340 NEXT Y
350 IF INKEY$="" THEN 350
370 GOTO 30
375 END
```

SELLING PRICE

Determining the cost of goods and services is an on-going and very important function of any form of business practice. The economic mood is dynamic, creating variable costs of doing business and variable net percentage of profits.

The Cost of Doing Business represents overhead, taxes, sales commissions and other expenses and is based on a percentage of the final selling price. This program serves as a quick way to arrive at the proper Selling Price for any item or service produced for sale.

The primary effort behind development of this program was to maintain an orderly format and prevent the loss of information or display when processing operator errors.

```
10 CLS
20 CLEAR 200
30 FOR X=1 TO 3 : BD$=BD$+"A BUSINESS DECISION  " : NEXT
40 PRINT @ 0, BD$; : PRINT @ 1023-63, BD$;
50 PRINT @ 400, "$$   Selling  Price   $$"
60 FOR X=1 TO 2000 : NEXT
70 PRINT @ 404, CHR$(30)
80 PRINT @ 204, "1)  Item Cost"; STRING$(20,46)
90 PRINT @ 332, "2)  Cost of Doing Business (%)"; STRING$(4,46)
100 PRINT @ 460, "3)  Net % of Profit Desired"; STRING$(7,46)
110 PRINT @ 238, ""; : INPUT C$
120 I=INT(VAL(C$)) : Z=204 : IF I<1 : GOSUB 250 : PRINT @ Z, "1)
Item Cost"; STRING$(20,46) : GOTO 110
130 PRINT @ 366, ""; : INPUT E$
140 B=INT(VAL(E$)) : Z=332 : IF B<1 OR B>25 : GOSUB 250 :
PRINT @Z, "2)  Cost of Doing Business (%)"; STRING$(4,46) : GOTO
130
150 PRINT @ 494, ""; : INPUT P$
160 D=INT(VAL(P$)) : Z=460 : IF D<1 OR D>50 : GOTO 250 :
PRINT @ Z, "3)  Net %of Profit Desired"; STRING$(7,46) : GOTO 150
180 F=100-B-D
190 G=I/F
200 SP=G*100
210 PRINT @ 588, "Selling Price"; STRING$(21,46); "$";
USING "#####.##"; SP
220 PRINT @ 772, "Press <ENTER> to Continue.....'E' <ENTER>
to End"; : INPUT L$
230 IF L$="" : CLEAR 200 : PRINT @ 204, CHR$(30);:
PRINT @ 332, CHR$(30);: PRINT @ 460, CHR$(30);: PRINT @ 588,
CHR$(30);: PRINT @ 768, CHR$(30) : GOTO 70
240 IF L$="E" : CLS : END
245 IF L$<>"E" : L$="" : GOTO 220
250 PRINT @ Z, CHR$(30); "'ERROR' >>>>>  Please Re-enter"
260 FOR X=1 TO 800 : NEXT
270 PRINT @ Z, CHR$(30) : RETURN
280 'SELLING PRICE--A BUSINESS DECISION
290 'WRITTEN BY JIM J. JORDAN
300 'JANUARY,1981
310 END
```

LOAN PROCESSOR

This program computes various items about installment loans. First, it asks you for the amount of the loan you want to consider, the annual interest rate, and finally the number of payments (months) for the loan, and it computes the constant monthly payment for the loan on the terms specified. Then you are presented with an option table that allows you to compute the following items:

(1) Display Monthly Breakdown: this shows the amount of the principal and interest in each payment, and the remaining principal.

(2) Override Computed Monthly Payment: this allows you to specify a different value from the one computed by the program.

(3) Display Loan Summary: this option computes the amount financed, the annual percentage rate, the number of successive installments, monthly payment, final installment, finance charge, and the total of the payments.

(4) Restart Program: allows you to input another loan amount and start over.

(5) End program: self-explanatory.

```
1 GOTO 360
5 B=A*100 : P=FP*100 : TT=0 : TP=0 : F$="########.##  " : JT=0
10 FOR J=1 TO N : T=M*B : T=INT(T+.5) : IF J=N : P=B+T
15 TP=TP+P : B=B-P+T : TT=TT+T : Z=P-T : JT=JT+1
20 IF B<0 : P=P+B+T : TP=TP+B : B=0 : Z=P-T : N=J : J=N
30 PB=B/100 : PT=T/100 : T2=TT/100 : P2=Z/100
32 IF S=3 AND B>0 : NEXT
33 IF S=3 AND B=0 : J=JT : RETURN
35     PRINT USING "####"; J; : PRINT TAB(7);
40 PRINT USING F$; P2; PT; :
PRINT USING "    ########.##"; PB; T2
45 IF B=0 : L=0 : GOTO 52
50 L=L+1 : IF L<12 : NEXT
52 IF B=0 : INPUT "  Press <ENTER> For Option Table"; C : GOTO 65
55 INPUT "  Press <ENTER> to Continue Listing";C
65 IF B=0 : POKE 16916,0 : RETURN
70 CLS : L=0 : NEXT
75 RETURN
100 PRINT @ 85, CHR$(207); "   Loan   Terms   "; CHR$(207)
105 POKE 16916,3 : E$="####.##"
107 Q=15488 : Y=31
110 FOR X=Q TO Q+63 : POKE X,Y : NEXT : Z$=""
115 PRINT @ 266, "Amount of Loan"; STRING$(22,46);
118 INPUT Z$ : A=INT(VAL(Z$)) : A=ABS(A)
119 IF A<1 : PRINT @ 266, CHR$(30); "'ERROR'.....Please
Re-enter" : FOR K=1 TO 800 : NEXT : PRINT @ 266, CHR$(30) :
GOTO 115
120 IF A>100000000 : PRINT @ 266, CHR$(30); "Program Limit is
$100000000" : FOR K=1 TO 1000 : NEXT : PRINT @ 266, CHR$(30) :
GOTO 115
124 Z$=""
125 PRINT @ 394, "Annual Interest Rate"; STRING$(16,46);
126 INPUT Z$ : R=ABS(VAL(Z$))
127 IF R<1 OR R>40 : PRINT @ 394, CHR$(30); "'ERROR'.....
Please Re-enter" : FOR K=1 TO 800 : NEXT : PRINT @ 394, CHR$(30):
GOTO 125
128 M=R/1200
129 Z$=""
```

continued on page 55

IT'S EASY TO DO ANIMATION, DRAW PICTURES with TRS-80*

With ANIMATE ME you will be able to do animation with the ease of a light pen and save your animated pictures on cassette for later viewing. Watch your video display come to life with animated cartoons or designs that you created yourself.

Don't confuse this with other drawing programs now available. Some don't have the animation capabilities. With others ,drawing a circle can be a tedious chore and the results are crude at best. (see below)

With ANIMATE ME using a light pen is almost like drawing with a pencil. Nothing else available will allow you to do animation with such great ease and satisfaction. Look at the features.

› AUTOMATICALLY CONNECTS POINTS (if you wish)
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› Uses the LEAST EXPENSIVE type of LIGHT PEN available.It uses the cassette port (255) .Any similar light pen will work. See March 82 COMPUTRONICS, article titled "PERIPHERALS AND PARAPHERNALIA FOR THE TRS-80"

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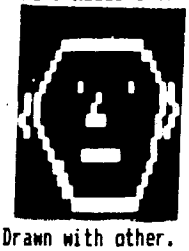

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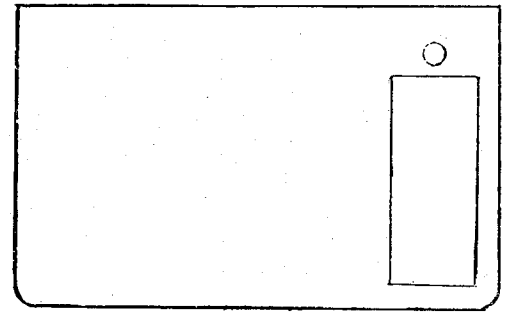

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NO STAR BASEBALL

Bradley Schickling

NO STAR BASEBALL, a game for one or two players, is a program written for the Radio Shack Model I (or III) Level II computer, which is like regular baseball with a few exceptions. The game features pitcher-batter confrontations which characterize baseball, with you as the player in command. One player selects the various pitches, while another controls the batter's swing. If there is just one player, the computer will act as the second player.

NO STAR BASEBALL is not a difficult game to play, but it does require a certain amount of skill, which will effect the outcome of the game. Basically, all that is involved in playing the game is selecting pitches and controlling the bat. The computer does the rest.

After entering the number of players and the players' name or names, the pitcher will be asked to make a pitch selection. The pitches are as follows:

6 - FAST BALL
7 - CHANGE-UP
8 - CURVE BALL
9 - SINKER

If no pitch is entered, the screen will display the pitches and their corresponding numbers. A pitch punched into the computer will not appear on the screen, since this particular program step is done using an INKEY statement. When the computer is playing, it chooses its own pitches randomly.

The pitcher on the screen will then wind up and throw the ball. It is not necessary to swing at every pitch, because the computer is programmed to call "balls" and "strikes". To swing at a pitch, depress the "S" key when the ball is in the strike zone. Not all pitches can be hit. Automatic "balls" and "strikes" are programmed into the computer and are selected randomly. Even if the "S" key is hit, the batter will never swing at a "ball". The ball comes into the plate on a timer. This means that pressing the "S" key too soon or too late will produce a "strike". The strike zone for a fast ball or change-up is across the batter's knees, and for a curve ball or sinker it is between the third base line and home plate. These instructions will be better understood when the game is played.

After the ball is hit, the computer takes over. The computer will make the put-outs and move the runners. The computer will always make the lead runner force out. For instane, if there are runners on first and third and a ball is hit to the shortstop, the runner moving to second would be out,leaving runners at first and third. In this game there are no sacrifices, and there is no stealing.

The game is a standard nine-inning game, with a scoreboard appearing each half-inning. In addition, the computer constantly displays who is pitching and who is batting, as well as the number of balls, strikes, outs, and the inning number. The game will go into extra innings and will go as long as the score as tied, even though the scoreboard can only accommodate twelve innings.

The statistics used in this game follow closely a regular baseball game. Two out of every five pitches can be hit. If a player takes a pitch, he has a fifty-fifty chance of getting a called ball or strike. The batting averages should hover around .300. Home runs, triples, doubles, and singles are all controlled randomly as well as by the timer used on each pitch, making singles the easiest hit and triples the hardest.

From past experience, I have noted that some people have difficulty in hitting the ball when they first play the game. Therefore, one must not be discouraged if at first they have trouble hitting the ball. I would also suggest that, if two people are playing the game, they switch chairs between half innings, since the pitch keys and swing key are on opposite sides of the keyboard. In this way, no hands will cross during the game.

I hope you enjoy the game. This is one of the few games in which you can play and still eat your peanuts and popcorn. The best part of this game is that there are no multi-million dollar contracts. The players cannot enter the free agent market, and, most importantly, they cannot go on strike. No player will ever be a star in this game—thus the name "NO STAR BASEBALL". Have fun, and PLAY BALL!

```
8Ø RANDOM : CLS : FOR X=1 TO 63: PRINT "#";: NEXT X:
DIM KX(2Ø,2):CD=1
1ØØ PRINT : PRINT @ 21,"  NO STAR BASEBALL  ": PRINT :
I=1: R1=Ø: R2=Ø: N2$="COMPUTER"
11Ø INPUT "1 OR 2 PLAYERS";L: IF L<1 OR L>2 THEN 11Ø: PRINT
115 IF L=2 THEN 12Ø ELSE 13Ø
12Ø INPUT "PLAYER'S NAME";N2$: IF N2$=""THEN12Ø
13Ø INPUT "PLAYER'S NAME";N1$: IF N1$=""THEN13Ø
145 O=Ø:F=Ø:D=Ø:N=Ø:R=Ø:P=Ø
15Ø B=Ø:K=Ø:S=Ø:SS=Ø:A$=""
155 CLS: GOSUB 5ØØØ
159 PRINT @1,"INNING:";: PRINT @67,"OUTS:";: PRINT @ 128,
"STRIKES:";: PRINT @ 194,"BALLS:";
16Ø PRINT @ 9,I;: PRINT @ 73,O;: PRINT @ 137,K;: PRINT @ 2Ø1,B;
17Ø IF I=INT(I) THEN GOSUB 2ØØØ ELSE GOSUB 2ØØ5
18Ø IF L=1 AND I<>INT(I) THEN 24Ø
19Ø FOR X=1 TO 7ØØ: PRINT @ 755,"PITCH?";: FOR Y=1 TO 7ØØ:
NEXT Y: A$=INKEY$: IF A$="" THEN 192: THEN 2ØØ: IF A$="6"
THEN 192: IF A$="7" THEN 192: IF A$="8" THEN 192: IF A$="9"
THEN 192: NEXT
192 PRINT @ 755,"        ";: IF A$<="5" THEN 2ØØ
195 IF A$="" THEN 2ØØ ELSE 245
2ØØ CLS: PRINT @ 41Ø,"6 = FASTBALL"
2Ø5 PRINT @ 474,"7 = CHANGE-UP"
21Ø PRINT @ 538,"8 = CURVEBALL"
215 PRINT @ 6Ø2,"9 = SINKER"
22Ø PRINT @ 728,"HIT 'ENTER' TO CONTINUE";:INPUTQ: GOTO 155
24Ø P=RND(8): FOR X=1 TO 1ØØØ: NEXT : PRINT @ 752,"SELECTING
PITCH";: FOR X=1 TO 8ØØ: NEXT : PRINT @ 752,"                ";
245 IF L=1 AND I=INT(I) THEN GOSUB 49ØØ
25Ø PP=RND(3ØØ)+3ØØ: FOR X=1 TO PP: NEXT :W=Ø: GOSUB 53ØØ:
GOSUB 3ØØØ
26Ø IF W>0 THEN 3ØØ
264 GOSUB 36ØØ
265 IF H<4 THEN 3ØØ
```

```
266 IF H>3 THEN GOSUB 5500: GOSUB 3650
267 IF S>0 THEN GOSUB 5200 ELSE GOTO 300
270 GOSUB 970
272 IF S<5 THEN GOSUB 4495 ELSE GOTO 277
276 GOTO 278
277 PRINT @ 405,"HIT 'ENTER' TO CONTINUE";: INPUT Q
278 IF S>4 THEN O=O+1
279 IF S>4 THEN 315
297 IF S<5 THEN 315
300 IF B<4 AND K<3 THEN 155
305 IF B>3 THEN GOSUB 5200
306 IF B>3 THEN GOSUB 1300
310 IF K>2 THEN GOSUB 6000
315 IF O<3 THEN 150
320 CJ=INT(I)
330 IF I<>INT(I) THEN KX(CJ,2)=R:R1=R1+R
331 IF I=INT(I) THEN KX(CJ,1)=R:R2=R2+R
340 GOSUB 1600:I=I+.5: IF I=INT(I) THEN CD=CD+1
345 IF I=INT(I) THEN 350 ELSE 145
350 IF I>9.5 AND R1=R2 THEN 145
360 IF I<10 THEN 145
370 END
970 Z=RND(3)
980 IF Z=1 AND S=1 THEN 1100
990 IF Z=2 AND S=1 THEN 1110
1000 IF Z=3 AND S=1 THEN 1120
1005 IF S=2 THEN 1130
1010 IF S=3 THEN 1140
1015 IF S=4 THEN 1150
1020 IF S=5 THEN 1160
1025 IF S=6 THEN 1170
1030 IF S=7 THEN 1180
1035 IF S=8 THEN 1190
1040 IF S=9 THEN 1200
1050 IF S=10 THEN 1210
1100 PRINT @ 115,"SINGLE";: GOTO 5730
1110 PRINT @ 115,"SINGLE";: GOTO 5740
1120 PRINT @ 115,"SINGLE";: GOTO 5750
1130 PRINT @ 115,"DOUBLE";: GOTO 5735
1140 PRINT @ 115,"TRIPLE";: GOTO 5755
1150 PRINT @ 111,"*** HOME RUN ***";: GOTO 5760
1160 PRINT @ 115,"GROUND OUT";: GOTO 5710
1170 PRINT @ 115,"FLY OUT";: GOTO 5730
1180 PRINT @ 115,"GROUND OUT";: GOTO 5700
1190 PRINT @ 115,"FLY OUT";: GOTO 5750
1200 PRINT @ 115,"GROUND OUT";: GOTO 5720
1210 PRINT @ 115,"FLY OUT";: GOTO 5740
1300 IF F=0 THEN 1500
1310 IF F=1 AND D=0 THEN 1510
1320 IF F=1 AND D=1 AND N=0 THEN 1520
1330 IF F=1 AND D=1 AND N=1 THEN 1530
1500 F=1:SET(43,45): GOTO 1540
1510 D=1:SET(44,28): GOTO 1540
1520 N=1: SET(7,29): GOTO 1540
1530 R=R+1: SET(8,44): FOR X=1 TO 50: NEXT : RESET(8,44):
GOTO 1540
1540 PRINT @ 115,"WALK";: PRINT @ 405,"HIT 'ENTER' TO
CONTINUE";: INPUT Q: RETURN
1600 CLS: FOR X=329 TO 382: POKE 15360+X,140: NEXT :
FOR X=585 TO 638: POKE 15360+X,140: NEXT : FOR X=457 TO 510:
POKE 15360+X,140: NEXT
1605 FOR X=329 TO 377 STEP 4: POKE 15360+X,188: NEXT : FOR X=585
TO 633 STEP 4: POKE 15360+X,143: NEXT : POKE 15742,188: POKE
15998,143
1610 FOR X=393 TO 441 STEP 4: POKE 15360+X,191: NEXT : FOR X=457
TO 505 STEP 4: POKE 15360+X,191: NEXT : FOR X=521 TO 569 STEP 4:
POKE 15360+X,191: NEXT
1615 POKE 15806,191: POKE 15870,191: POKE 15934,191
1620 E=394:M=522:A=1: FOR X=266 TO 310 STEP 4: PRINT @X,A;:
A=A+1: NEXT X: PRINT @ 316,"T";: PRINT @ 384,N2$;:
PRINT @ 512,N1$;
1623 IF I>12.5 AND I=INT(I) THEN PRINT @ 208,"PLEASE COMPLETE
THE BOTTOM HALF OF THE INNING";: GOTO 1645
1624 IF I>12.5 AND R1=R2 THEN PRINT @ 217,"TIED SCORE - CONTINUE
GAME";: GOTO 1645
1625 IF I>12.5 AND R1<>R2 THEN 1650
1630 FOR CJ=1 TO CD: PRINT @M,KX(CJ,2);: PRINT @E,KX(CJ,1);:
E=E+4:M=M+4: NEXT CJ
1636 IF I=INT(I) THEN KK=522+(4*CD)-4: PRINT @KK,"  ";
1641 IF I>9.5 AND I=INT(I) THEN 1645
1642 IF I>9 AND R1<>R2 THEN 1650
1645 PRINT @ 730,"HIT 'ENTER' TO CONTINUE";: INPUT Q: RETURN
1650 PRINT @ 442,R2;:PRINT @ 570,R1;:PRINT @ 730,"END OF GAME";:
RETURN
2000 PRINT @ 17,"PITCHING: ";N1$;: PRINT @ 82,"BATTING: ";N2$;:
RETURN
2005 PRINT @ 17,"PITCHING: ";N2$;: PRINT @ 82,"BATTING: ";N1$;:
RETURN
3000 C=1:T=0:Y$="":V=0:H=RND(10)
3010 Y$=INKEY$
3020 IF Y$="S" THEN RETURN
3025 IF SS=C THEN RETURN
3030 C=C+1:T=T+1
3040 IF T/3=INT(T/3) THEN 3060
3050 GOTO 3010
3060 V=V+1
3061 IF P=1 OR P=8 THEN 3070
3062 IF P=2 OR P=7 THEN 3080
3063 IF P=3 OR P=6 THEN 3090
3064 IF P=4 OR P=5 THEN 3100
3065 IF A$="6" THEN 3070
3066 IF A$="7" THEN 3080
3067 IF A$="8" THEN 3090
3068 IF A$="9" THEN 3100
3070 ON V GOTO 3200,3205,3210,3215,3220,3225
3080 ON V GOTO 3250,3255,3260,3265,3270,3275,3280,3285,3290,
3295,3300
3090 ON V GOTO 3305,3310,3315,3320,3325,3330,3335,3340,3345,
3350,3355,3360
3100 ON V GOTO 3400,3405,3410,3415,3420,3425,3430,3435,3440,
3445,3450,3455
3200 RESET(108,3): SET(81,13): GOTO 3010
3205 RESET(81,13): SET(56,22): GOTO 3010
3210 RESET(56,22): SET(34,30): GOTO 3010
3215 RESET(34,30): SET(23,34): GOTO 3010
3220 RESET(23,34): SET(7,40): GOTO 3010
3225 RESET(7,40): GOTO 3500
3250 RESET(108,3): SET(94,8): GOTO 3010
3255 RESET(94,8): SET(81,13): GOTO 3010
3260 RESET(81,13): SET(67,18): GOTO 3010
3265 RESET(67,18): SET(56,22): GOTO 3010
3270 RESET(56,22): SET(42,27): GOTO 3010
3275 RESET(42,27): SET(34,30): GOTO 3010
3280 RESET(34,30): SET(28,32): GOTO 3010
```

```
3285 RESET(28,32): SET(23,34): GOTO 3Ø1Ø
3290 RESET(23,34): SET(16,37): GOTO 3Ø1Ø
3295 RESET(16,37): SET(7,4Ø): GOTO 3Ø1Ø
33ØØ RESET(7,4Ø): GOTO 35ØØ
33Ø5 RESET(1Ø8,3): SET(94,8): GOTO 3Ø1Ø
3310 RESET(94,8): SET(81,13): GOTO 3Ø1Ø
3315 RESET(81,13): SET(67,18): GOTO 3Ø1Ø
3320 RESET(67,18): SET(56,22): GOTO 3Ø1Ø
3325 RESET(56,22): SET(47,26): GOTO 3Ø1Ø
3330 RESET(47,26): SET(39,3Ø): GOTO 3Ø1Ø
3335 RESET(39,3Ø): SET(35,33): GOTO 3Ø1Ø
3340 RESET(35,33): SET(32,36): GOTO 3Ø1Ø
3345 RESET(32,36): SET(29,4Ø): GOTO 3Ø1Ø
3350 RESET(29,4Ø): SET(27,43): GOTO 3Ø1Ø
3355 RESET(27,43): SET(25,47): GOTO 3Ø1Ø
3360 RESET(25,47): GOTO 35ØØ
34ØØ RESET(1Ø8,3): SET(94,8): GOTO 3Ø1Ø
3405 RESET(94,8): SET(81,13): GOTO 3Ø1Ø
3410 RESET(81,13): SET(67,18): GOTO 3Ø1Ø
3415 RESET(67,18): SET(56,22): GOTO 3Ø1Ø
3420 RESET(56,22): SET(47,26): GOTO 3Ø1Ø
3425 RESET(47,26): SET(39,3Ø): GOTO 3Ø1Ø
3430 RESET(39,3Ø): SET(35,33): GOTO 3Ø1Ø
3435 RESET(35,33): SET(32,36): GOTO 3Ø1Ø
3440 RESET(32,36): SET(28,38): GOTO 3Ø1Ø
3445 RESET(28,38): SET(21,41): GOTO 3Ø1Ø
3450 RESET(21,41): SET(13,44): GOTO 3Ø1Ø
3455 RESET(13,44): GOTO 35ØØ
35ØØ W=RND(8): FOR X=1 TO 5Ø: NEXT : IF W<5 THEN 4ØØØ
35Ø5 IF W>4 THEN 4Ø1Ø
36ØØ IF H<4 THEN 4Ø1Ø ELSE RETURN
365Ø IF H>7 THEN 4ØØØ
3655 IF H>3 AND H<8 THEN 366Ø
366Ø IF A$="6" THEN 367Ø ELSE 371Ø
367Ø IF C<12 OR C>16 THEN 4ØØØ
3675 IF C=12 THEN 4Ø2Ø
368Ø IF C=16 THEN 4Ø2Ø
3685 IF C>12 AND C<15 THEN 41ØØ
369Ø IF C=16 THEN 42ØØ
37ØØ IF C=15 THEN 43ØØ
371Ø IF A$="7" THEN 372Ø ELSE 375Ø
372Ø IF C<24 OR C>29 THEN 4ØØØ
3725 IF C=24 THEN 4Ø2Ø
373Ø IF C=29 THEN 4Ø2Ø
3735 IF C=25 THEN 41ØØ
374Ø IF C>26 AND C<29 THEN 42ØØ
3745 IF C=26 THEN 43ØØ
375Ø IF A$="8" THEN 376Ø ELSE 379Ø
376Ø IF C<26 OR C>31 THEN 4ØØØ
3765 IF C=26 THEN 4Ø2Ø
377Ø IF C=31 THEN 4Ø2Ø
3775 IF C=27 THEN 41ØØ
378Ø IF C<31 AND C>28 THEN 42ØØ
3785 IF C=28 THEN 43ØØ
379Ø IF C<26 OR C>32 THEN 4ØØØ
3795 IF C=26 THEN 4Ø2Ø
38ØØ IF C=32 THEN 4Ø2Ø
38Ø5 IF C>26 AND C<29 THEN 41ØØ
381Ø IF C>29 AND C<32 THEN 42ØØ
3815 IF C=29 THEN 43ØØ
4ØØØ PRINT @ 54Ø,"STRIKE!";:K=K+1: GOTO 4Ø3Ø
4Ø1Ø PRINT @ 54Ø,"BALL";:B=B+1: GOTO 4Ø3Ø
4Ø2Ø PRINT @ 54Ø,"FOUL BALL";: IF K<2 THEN K=K+1: GOTO 4Ø3Ø
4Ø3Ø FOR X=1 TO 8ØØ: NEXT : PRINT @ 54Ø,"          ":RETURN
41ØØ G=RND(6)
411Ø IF G<3 THEN S=5
412Ø IF G=3 THEN S=1
413Ø IF G=4 THEN S=2
414Ø IF G>4 THEN S=6
415Ø RETURN
42ØØ G=RND(6)
421Ø IF G<3 THEN S=7
422Ø IF G=3 THEN S=1
423Ø IF G=4 THEN S=3
424Ø IF G>4 THEN S=8
425Ø RETURN
43ØØ G=RND(6)
431Ø IF G<3 THEN S=9
432Ø IF G=3 THEN S=1
433Ø IF G=4 THEN S=4
434Ø IF G>4 THEN S=1Ø
435Ø RETURN
4495 IF S=1 THEN 4497 ELSE 451Ø
4497 IF N=1 THEN 4665
45ØØ IF D=1 THEN 4685
4502 IF F=1 THEN 47Ø5
4505 GOTO 4725
4507 GOTO 4537
451Ø IF S=2 THEN 4512 ELSE 4525
4512 IF N=1 THEN 466Ø
4515 IF D=1 THEN 468Ø
4517 IF F=1 THEN 47ØØ
452Ø GOTO 472Ø
4522 GOTO 4537
4525 IF S=3 THEN 4527 ELSE 454Ø
4527 IF N=1 THEN 4655
453Ø IF D=1 THEN 4675
4532 IF F=1 THEN 4695
4535 GOTO 4715
4537 PRINT @ 4Ø5,"HIT 'ENTER' TO CONTINUE";: INPUT Q: RETURN
454Ø IF N=1 THEN 465Ø
4542 IF D=1 THEN 467Ø
4545 IF F=1 THEN 469Ø
4547 GOTO 471Ø
455Ø PRINT @ 4Ø5,"HIT 'ENTER' TO CONTINUE";: INPUT Q: RETURN
4575 PRINT @ 4Ø5,"HIT 'ENTER' TO CONTINUE";: INPUT Q: RETURN
465Ø R=R+1: RESET(7,29): FOR X=1 TO 3ØØ: NEXT : SET(8,44):
FOR X=1 TO 3ØØ: NEXT : RESET(8,44):N=Ø: GOTO 4542
4655 R=R+1: RESET(7,29): FOR X=1 TO 3ØØ: NEXT : SET(8,44):
FOR X=1 TO 3ØØ: NEXT : RESET(8,44):N=Ø: GOTO 453Ø
466Ø R=R+1: RESET(7,29): FOR X=1 TO 3ØØ: NEXT : SET(8,44):
FOR X=1 TO 3ØØ: NEXT : RESET(8,44):N=Ø: GOTO 4515
4665 R=R+1: RESET(7,29): FOR X=1 TO 3ØØ: NEXT : SET(8,44):
FOR X=1 TO 3ØØ: NEXT : RESET(8,44):N=Ø: GOTO 45ØØ
467Ø R=R+1: RESET(44,28): FOR X=1 TO 3ØØ: NEXT : SET(7,29):
FOR X=1 TO 3ØØ: NEXT : RESET(7,29): FOR X=1 TO 3ØØ: NEXT :
SET(8,44): FOR X=1 TO 3ØØ: NEXT : RESET(8,44):D=Ø: GOTO 4545
4675 R=R+1: RESET(44,28): FOR X=1 TO 3ØØ: NEXT : SET(7,29):
FOR X=1 TO 3ØØ: NEXT : RESET(7,29): FOR X=1 TO 3ØØ: NEXT :
SET(8,44): FOR X=1 TO 3ØØ: NEXT : RESET(8,44):D=Ø: GOTO 4532
468Ø R=R+1: RESET(44,28): FOR X=1 TO 3ØØ: NEXT : SET(7,29):
FOR X=1 TO 3ØØ: NEXT : RESET(7,29): FOR X=1 TO 3ØØ: NEXT :
SET(8,44): FOR X=1 TO 3ØØ: NEXT : RESET(8,44):D=Ø: GOTO 4517
4685 R=R+1: RESET(44,28): FOR X=1 TO 3ØØ: NEXT : SET(7,29):
FOR X=1 TO 3ØØ: NEXT : RESET(7,29): FOR X=1 TO 3ØØ: NEXT :
SET(8,44): FOR X=1 TO 3ØØ: NEXT : RESET(8,44):D=Ø: GOTO 45Ø2
```

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4690 R=R+1: RESET(43,45): FOR X=1 TO 300: NEXT : SET(44,28):
FOR X=1 TO 300: NEXT : RESET(44,28): FOR X=1 TO 300: NEXT :
SET(7,29): FOR X=1 TO 300: NEXT
4692 RESET(7,29): FOR X=1 TO 300: NEXT : SET(8,44):
FOR X=1 TO 300: NEXT : RESET(8,44):F=0: GOTO 4547
4695 R=R+1: RESET(43,45): FOR X=1 TO 300: NEXT : SET(44,28):
FOR X=1 TO 300: NEXT : RESET(44,28): FOR X=1 TO 300: NEXT :
SET(7,29): FOR X=1 TO 300: NEXT
4697 RESET(7,29): FOR X=1 TO 300: NEXT : SET(8,44):
FOR X=1 TO 300:NEXT: RESET(8,44):F=0: GOTO 4535
4700 N=1: RESET(43,45): FOR X=1 TO 300: NEXT : SET(44,28):
FOR X=1 TO 300: NEXT : RESET(44,28): FOR X=1 TO 300: NEXT :
SET(7,29):F=0: GOTO 4520
4705 D=1: RESET(43,45): FOR X=1 TO 300: NEXT : SET(44,28):F=0:
GOTO 4505
4710 R=R+1: SET(43,45): FOR X=1 TO 300: NEXT : RESET(43,45):
FOR X=1 TO 300: NEXT : SET(44,28): FOR X=1 TO 300: NEXT :
RESET(44,28): FOR X=1 TO 300: NEXT
4712 SET(7,29): FOR X=1 TO 300: NEXT : RESET(7,29): FOR X=1
TO 300: NEXT : SET(8,44): FOR X=1 TO 300: NEXT : RESET(8,44):
GOTO 4550
4715 N=1: SET(43,45): FOR X=1 TO 300: NEXT : RESET(43,45):
FOR X=1 TO 300: NEXT : SET(44,28): FOR X=1 TO 300: NEXT :
RESET(44,28): FOR X=1 TO 300: SET(7,29): GOTO 4537
4720 D=1: SET(43,45): FOR X=1 TO 300: NEXT : RESET(43,45):
FOR X=1 TO 300: NEXT : SET(44,28): GOTO 4522
4725 F=1: SET(43,45): GOTO 4507
4900 IF A$="6" THEN SS=RND(9)+9
4905 IF A$="7" THEN SS=RND(10)+20
4910 IF A$="8" THEN SS=RND(9)+23
4915 IF A$="9" THEN SS=RND(10)+23: RETURN
5000 FOR X=15 TO 783 STEP 64: POKE 15360+X,191: NEXT :
FOR X=256 TO 270: POKE 15360+X,131: NEXT : FOR X=976 TO 1022:
POKE 15360+X,131: NEXT
5005 POKE 16268,170: POKE 16269,131: POKE 16206,176:
POKE 16207,191: POKE 16208,144: POKE 16272,130: POKE 16273,164:
POKE 16335,140: POKE 16334,140: POKE 16333,140: POKE 16332,138
5010 SET(109,7): POKE 15543,174: POKE 15544,175: POKE 15545,143:
POKE 15546,173
5015 POKE 15607,137: POKE 15608,156: POKE 15609,160:
POKE 15610,134
5020 POKE 15670,184: POKE 15671,131: POKE 15672,160:
POKE 15673,190: POKE 15674,189
5025 POKE 15733,190: POKE 15734,175: POKE 15735,160:
POKE 15736,190: POKE 15737,135: POKE 15738,170
5030 POKE 15796,142: POKE 15797,161: POKE 15798,134:
POKE 15799,142: POKE 15800,145: POKE 15801,131: POKE 15802,171
5035 POKE 15860,160: POKE 15861,133: POKE 15862,160:
POKE 15863,134: POKE 15864,149: POKE 15866,154
5040 POKE 15925,165: POKE 15926,130: POKE 15927,148:
POKE 15928,130: POKE 15929,148: POKE 15930,170
5050 POKE 15985,176: FOR X=626 TO 636: POKE 15360+X,188:
NEXT : POKE 15997,176: FOR X=688 TO 702: POKE 15360+X,131: NEXT
5052 POKE 15988,190: POKE 15989,191: POKE 15990,191:
POKE 15991,189: POKE 15992,191: POKE 15993,191: POKE 15994,191
5055 POKE 15748,139: POKE 15749,180: POKE 15752,158:
POKE 15753,143: POKE 15754,175: POKE 15755,173: POKE 15756,140
5060 POKE 15813,130: POKE 15814,173: POKE 15815,144:
POKE 15816,137: POKE 15817,144: POKE 15818,136: POKE 15819,156:
POKE 15820,129: POKE 15878,184: POKE 15879,159: POKE 15880,183:
POKE 15883,131: POKE 15884,188
5065 POKE 15878,184: POKE 15879,159: POKE 15880,183:
POKE 15883,131: POKE 15884,188
5070 POKE 15942,154: POKE 15943,139: POKE 15944,142: POKE
15945,173: POKE 15946,156: POKE 15947,142: POKE 15948,151
5075 POKE 16006,167: POKE 16007,131: POKE 16008,131: POKE
16009,163: POKE 16010,131: POKE 16011,131: POKE 16012,164
5080 POKE 16071,165: POKE 16073,170: POKE 16074,137: POKE
16075,144: POKE 16077,165
5085 POKE 16135,149: POKE 16136,160: POKE 16137,135:
POKE 16139,149: POKE 16140,160: POKE 16141,134
5086 POKE 16199,141: POKE 16200,142: POKE 16201,140
5090 POKE 16203,131: POKE 16204,131: POKE 16205,131
5100 RETURN
5200 CLS: FOR Y=30 TO 43: SET(8,Y): SET(9,Y): SET(42,Y):
SET(43,Y): NEXT Y: FOR X=10 TO 41: SET(X,29): SET(X,44):
NEXT
5205 FOR Y=3 TO 28: SET(8,Y): SET(9,Y): NEXT Y: FOR X=44
TO 105: SET(X,44): NEXT
5210 POKE 16308,143: POKE 16244,176: POKE 16245,143: POKE
16181,188: POKE 16182,131: FOR X=502 TO 758 STEP 64: POKE
15360+X,191: NEXT 5215 POKE 15365,176: POKE 15366,176:
FOR X=7 TO 10: POKE 15360+X,140: NEXT : FOR X=11 TO 30:
POKE 15360+X,131: NEXT : FOR X=31 TO 34: POKE 15360+X,140:
NEXT
5220 POKE 15797,191: POKE 15732,188: POKE 15731,131: POKE
15667,176: POKE 15666,140: POKE 15665,131
5225 POKE 15601,176: POKE 15600,140: POKE 15599,131: POKE
15534,176: POKE 15533,140: POKE 15532,140
5230 POKE 15531,131: POKE 15466,176: POKE 15465,176: POKE
15464,140: POKE 15463,140: POKE 15462,131
5235 POKE 15461,131: POKE 15396,176: POKE 15395,176: POKE
16106,176: POKE 15650,140: POKE 15502,176
5240 POKE 16279,179: POKE 16153,131: POKE 15885,140: POKE
15942,179: POKE 16323,131: POKE 16140,131
5245 IF F=1 THEN SET(43,45)
5250 IF D=1 THEN SET(44,28)
5255 IF N=1 THEN SET(7,29)
5260 RETURN
5300 POKE 15796,128: POKE 15797,128: POKE 15797,160: POKE
15733,128: POKE 15734,128: POKE 15734,170: POKE 15670,168:
FOR X=1 TO 20: NEXT
5310 POKE 15739,144: POKE 15803,139: POKE 15804,132:
FOR X=1 TO 20: NEXT
5320 POKE 15739,128: POKE 15803,128: POKE 15804,128:
FOR X=1 TO 20: NEXT
5330 POKE 15675,140: POKE 15676,140: POKE 15677,140:
POKE 15678,140: POKE 15679,132: FOR X=1 TO 20: NEXT
5335 POKE 15675,128: POKE 15676,128: POKE 15677,128:
POKE 15678,128: POKE 15679,128: FOR X=1 TO 20: NEXT
5340 POKE 15547,158: POKE 15548,129: POKE 15484,176:
FOR X=1 TO 20: NEXT
5350 POKE 15547,128: POKE 15548,128: POKE 15484,128:
FOR X=1 TO 20: NEXT
5360 POKE 15480,191: FOR X=1 TO 20: NEXT : SET(108,3)
5370 POKE 15480,128: FOR X=1 TO 20: NEXT
5380 POKE 15670,189: POKE 15669,139: POKE 15605,180:
POKE 15604,171: POKE 15540,144: POKE 15539,160: POKE 15540,144:
FOR X=1 TO 20: NEXT
5390 POKE  15670,128: POKE 15670,168: POKE 15669,128:
POKE 15605,128: POKE 15604,128: POKE 15540,128:
POKE 15539,128: FOR X=1 TO 20: NEXT
5400 POKE 15670,184: POKE 15734,175: POKE 15733,190:
POKE 15797,161: POKE 15796,142
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541Ø RETURN
55ØØ POKE 15748,128: POKE 15749,128: POKE 15813,128:
POKE 15814,128: POKE 15815,128: POKE 15878,184:
POKE 15879,158: POKE 1588Ø,135: FOR X=1 TO 3: NEXT
551Ø POKE 15944,14Ø: POKE 15945,156: POKE 15877,18Ø:
POKE 15876,14Ø: POKE 15875,139: POKE 15874,131:
POKE 1581Ø,144: POKE 158Ø9,176: POKE 158Ø8,172:
FOR X=1 TO 3: NEXT
552Ø POKE 15877,128: POKE 15876,128: POKE 15875,128:
POKE 15874,128: POKE 1581Ø,128: POKE 158Ø9,128:
POKE 158Ø8,128: FOR X=1 TO 3: NEXT
553Ø POKE 15945,14Ø: POKE 15946,14Ø: FOR X=583 TO 576
STEP -1: POKE 1536Ø+X,14Ø: NEXT : POKE 15942,154:
FOR X=1 TO 3: NEXT
554Ø FOR X=576 TO 583: POKE 1536Ø+X,128: NEXT :
POKE 15943,139: POKE 15942,154: FOR X=1 TO 3: NEXT
555Ø POKE 15945,188: POKE 15946,14Ø: POKE 15944,19Ø:
POKE 15943,187: POKE 16ØØ5,142: POKE 16ØØ4,156: POKE
16ØØ3,176: POKE 16ØØ2,16Ø: POKE 16Ø66,131:
POKE 16Ø65,135: POKE 16Ø64,14Ø: FOR X=1 TO 3: NEXT
556Ø POKE 15944,14Ø: POKE 15943,139: FOR X=642 TO 645: POKE
1536Ø+X,128: NEXT : FOR X=7Ø4 TO 7Ø6: POKE 1536Ø+X,128: NEXT :
FOR X=1 TO 3: NEXT
557Ø FOR X=585 TO 777 STEP 64: POKE 1536Ø+X,17Ø: NEXT :
FOR X=586 TO 778 STEP 64: POKE 1536Ø+X,149: NEXT : FOR X=1 TO 3:
NEXT
559Ø FOR X=585 TO 777 STEP 64: POKE 1536Ø+X,128: NEXT :
FOR X=586 TO 778 STEP 64: POKE 1536Ø+X,128: NEXT :
POKE 15945,138: POKE 15946,133: POKE 16ØØ9,163:
POKE 16Ø1Ø,131: POKE 16Ø73,17Ø: POKE 16Ø74,137: POKE 16137,135:
FOR X=1 TO 3: NEXT
56ØØ POKE 15947,16Ø: POKE 15948,16Ø: POKE 16Ø13,131:
POKE 16Ø14,139: POKE 16Ø16,172: POKE 16Ø17,176:
POKE 16Ø82,131: POKE 16Ø83,131: POKE 15947,142: POKE 15948,183:
POKE 15949,144: FOR X=1 TO 3: NEXT : RETURN
57ØØ X=1Ø: FOR Y=43 TO 36 STEP -.175: SET(X,Y): FOR J=1 TO 2Ø:
NEXT J: RESET(X,Y):X=X+1: NEXT Y: RETURN
571Ø X=1Ø: FOR Y=43 TO 25 STEP -1: SET(X,Y): FOR J=1 TO 2Ø:
NEXT J: RESET(X,Y):X=X+1: NEXT Y: RETURN
572Ø X=1Ø: FOR Y=43 TO 36 STEP -.5: SET(X,Y): FOR J=1 TO 2Ø:
NEXT J: RESET(X,Y):X=X+1: NEXT Y: RETURN
573Ø X=1Ø: FOR Y=43 TO 8 STEP -1.94: SET(X,Y): FOR J=1 TO 25:
NEXT J: RESET(X,Y):X=X+1: NEXT Y: RETURN
5735 X=1Ø: FOR Y=43 TO 2 STEP -4.55: SET(X,Y): FOR J=1 TO 5Ø:
NEXT J: RESET(X,Y):X=X+1: NEXT Y: FOR Y=2 TO 8 STEP .667:
SET(X,Y): FOR J=1 TO 1Ø: NEXT J: RESET(X,Y):X=X+1: NEXT Y:
RETURN
574Ø X=1Ø: FOR Y=43 TO 13 STEP -.517: SET(X,Y): FOR J=1 TO 1Ø:
NEXT J: RESET(X,Y):X=X+1: NEXT Y: RETURN
575Ø X=1Ø: FOR Y=43 TO 35 STEP -.11: SET(X,Y): FOR J=1 TO 8:
NEXT J: RESET(X,Y):X=X+1: NEXT Y: RETURN
5755 X=1Ø: FOR Y=43 TO 39 STEP -.Ø421: SET(X,Y): FOR J=1 TO 1Ø:
NEXT J: RESET(X,Y):X=X+1: NEXT Y: FOR Y=39 TO 35 STEP -.19:
SET(X,Y): FOR J=1 TO 1Ø: NEXT J:RESET(X,Y):X=X-1: NEXT Y: RETURN
576Ø X=1Ø: FOR Y=43 TO 3 STEP -.526: SET(X,Y): FOR J=1 TO 1Ø:
NEXT J: RESET(X,Y):X=X+1: NEXT Y: RETURN
6ØØØ CLS:0=0+1: POKE 1632Ø,13Ø: POKE 16321,129: POKE 16257,16Ø:
POKE 16258,176: POKE 16259,152: POKE 1626Ø,14Ø
6ØØ5 POKE 16261,131: POKE 16262,131: POKE 16198,16Ø:
POKE 16199,176: POKE 162ØØ,156: POKE 162Ø1,142:
POKE 162Ø2,131: POKE 16139,176: POKE 1614Ø,152
6Ø1Ø POKE 16141,14Ø: POKE 16142,131: POKE 16143,129:
POKE 16Ø79,16Ø: POKE 16Ø8Ø,176: POKE 16Ø81,14Ø
6Ø15 POKE 16Ø82,14Ø: POKE 16Ø83,131: POKE 16Ø84,13Ø:
POKE 16Ø2Ø,186: POKE 15957,149: POKE 15893,17Ø
6Ø2Ø POKE 15829,17Ø: POKE 15765,15Ø: POKE 157Ø2,15Ø:
POKE 15638,17Ø: POKE 15574,165: POKE 155Ø9,164
6Ø25 POKE 155Ø8,13Ø: POKE 15444,16Ø: POKE 15445,14Ø:
POKE 15446,14Ø: POKE 15447,14Ø: POKE 15448,14Ø
6Ø3Ø POKE 15449,176: POKE 15514,137: POKE 15515,164:
POKE 1558Ø,149: POKE 15644,133: POKE 15643,16Ø
6Ø35 POKE 157Ø7,138: POKE 157Ø8,144: POKE 15772,131:
POKE 15773,131: POKE 15774,131: POKE 15775,131
6Ø4Ø POKE 15712,176: POKE 15713,176: POKE 15714,14Ø:
POKE 15715,14Ø: POKE 15716,131: POKE 15717,131
6Ø45 POKE 15718,131: POKE 15655,176: POKE 15656,176:
POKE 15657,176: POKE 15658,176: POKE 15659,176
6Ø5Ø POKE 1572Ø,176: POKE 15721,156: POKE 15722,134:
POKE 15723,131: POKE 15724,131: POKE 15725,173
6Ø55 POKE 15781,152: POKE 15782,14Ø: POKE 15783,131:
POKE 15788,176: POKE 15789,178: POKE 1579Ø,14Ø
6Ø6Ø POKE 15791,176: POKE 15792,144: POKE 15843,168:
POKE 15844,131: POKE 15845,137: POKE 15846,144
6Ø65 POKE 15848,16Ø: POKE 15849,176: POKE 1585Ø,14Ø:
POKE 15851,131: POKE 15856,17Ø: POKE 15857,176
6Ø7Ø POKE 159Ø7,13Ø: POKE 159Ø8,14Ø: POKE 159Ø9,156:
POKE 1591Ø,135: POKE 15911,167: POKE 15912,129
6Ø75 POKE 15915,16Ø: POKE 15916,176: POKE 15917,14Ø:
POKE 15918,14Ø: POKE 15919,131: POKE 15920,129
6Ø8Ø POKE 15922,131: POKE 15923,148: POKE 15973,137:
POKE 15974,14Ø: POKE 15975,156: POKE 15976,173
6Ø85 POKE 15977,134: POKE 15978,131: POKE 15979,129:
POKE 15983,176: POKE 15984,176: POKE 15984,176
6Ø9Ø POKE 15985,14Ø: POKE 15986,14Ø: POKE 15987,165:
POKE 16Ø38,138: POKE 16Ø39,176: POKE 16Ø4Ø,176:
POKE 16Ø41,185
6Ø95 POKE 16Ø42,176: POKE 16Ø43,14Ø: POKE 16Ø44,14Ø:
POKE 16Ø45,131: POKE 16Ø46,131: POKE 16Ø49,176
61ØØ POKE 16Ø5Ø,176: POKE 16Ø51,176: POKE 16Ø52,133:
POKE 161Ø5,165: POKE 161Ø6,178: POKE 161Ø7,18Ø
61Ø5 POKE 161Ø8,152: POKE 161Ø9,14Ø: POKE 1611Ø,131:
POKE 16111,131: POKE 16112,163: POKE 16113,144
611Ø POKE 16114,134: POKE 16115,131: POKE 16172,176:
POKE 16173,152: POKE 16174,14Ø: POKE 16175,131
6115 POKE 16176,129: POKE 16235,131: POKE 16234,14Ø:
POKE 16233,176: POKE 16232,176: POKE 16295,131
612Ø POKE 16294,131: POKE 16293,14Ø: POKE 16292,14Ø:
POKE 16291,176: POKE 1629Ø,176: POKE 16289,176
6125 POKE 16352,131: POKE 16351,131: POKE 1635Ø,135:
POKE 16349,14Ø: POKE 16348,14Ø: POKE 16347,14Ø
613Ø POKE 16346,176: POKE 16286,176: POKE 16285,176:
POKE 16284,14Ø: POKE 16283,137: POKE 16282,131
6135 POKE 16217,176: POKE 16216,14Ø: POKE 16215,131:
POKE 1615Ø,18Ø: POKE 16149,13Ø: POKE 16Ø85,148
614Ø PRINT @ 667,"YOU'RE";: PRINT @ 732,"OUT!";:
FOR X=1 TO 12ØØ: NEXT :RETURN
```

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ASSEMBLY LANGUAGE FOR BEGINNERS (PART 4)

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In the last issue I talked about the use of Flags as indicators of the CPU Status (yes, I notice the surrender flags raised up in the audience). Each flag is a specific bit in the F register and has a specific meaning associated with it. In a CPU, the operations of the flags are determined by the physical design of the computer. In other words, we can't change the use and location of these flags. On the other hand, we can determine and control the use of flags in our own programs as we see fit. Since flags *indicate* whether a certain event or condition has occurred, they are often used to control the operations of programs. Control? Well, consider the question this way: a program is going to DO something. It will either move something (numbers or text), search for something (a specific value), calculate something (arithmetic and logical operations), and/or wait for something (interrupts or conditions). As this series on Assembly Language continues, we will explore each of these possibilities. The setting or clearing of the flag indicates whether or not the desired (or undesired!) condition has occured. Somewhere along the way, the program will examine the flag and decide which "direction" to take (based on the "condition" of the flag). By "direction", I mean to execute code "A" or code "B". What this means is that the computer will do one thing until the flag changes, at which point the computer will begin another task. This is one of the ways that a computer program makes a decision.

Why am I talking about flags and bits now? The reason is that I want to introduce the SHIFT and ROTATE operations. Shift and rotate are things that are done to bit patterns. Shift means to move everything over one bit (either to the left or to the right). Rotate is a kind of shift, where the bit that is "knocked-out" is brought over to the opposite side. It might sound confusing, but it really isn't. Just look at these examples:

```
ØØØØ Ø11Ø      Shift Left     ØØØØ 11ØØ
1Ø1Ø 1Ø1Ø      Shift Left     Ø1Ø1 Ø1ØØ
ØØØØ 1111      Shift Left     ØØØ1 111Ø

ØØØØ Ø11Ø      Shift Right    ØØØØ ØØ11
1Ø1Ø 1Ø1Ø      Shift Right    Ø1Ø1 Ø1Ø1
ØØØØ 1111      Shift Right    ØØØ1 111Ø
```

These are examples of Logical shifts (of one bit). Of course, you could continue to shift the same byte several times. Watch what happens if we shift the first example 4 times:

```
ØØØØ Ø11Ø      Shift Left (1)  ØØØØ 11ØØ

ØØØØ 11ØØ      Shift Left (2)  ØØØ1 1ØØØ
ØØØ1 1ØØØ      Shift Left (3)  ØØ11 ØØØØ
ØØ11 ØØØØ      Shift Left (4)  Ø11Ø ØØØØ
```

Notice that the left starting nybble (underlined) has been moved into the right ending nybble. Before I continue with the amazing traits of the lowly SHIFT, I had better formally describe the different types of shifting operations available.

```
Starting Pattern    Operation                Result

1ØØØ Ø1Ø1           Logical Shift Left       ØØØØ 1Ø1Ø
1ØØØ Ø1Ø1           Logical Shift Right      Ø1ØØ ØØ1Ø
1ØØØ Ø1Ø1           Arithmetic Shift Left    ØØØØ 1Ø1Ø
1ØØØ Ø1Ø1           Arithmetic Shift Right   11ØØ ØØ1Ø
1ØØØ Ø1Ø1           Rotate Left              ØØØØ 1Ø11
1ØØØ Ø1Ø1           Rotate Right             11ØØ Ø1ØØ

1111 ØØØØ           Logical Shift Left       111Ø ØØØØ
1111 ØØØØ           Logical Shift Right      Ø111 1ØØØ
1111 ØØØØ           Arithmetic Shift Left    111Ø ØØØØ
1111 ØØØØ           Arithmetic Shift Right   1111 1ØØØ
1111 ØØØØ           Rotate Left              111Ø ØØØ1
1111 ØØØØ           Rotate Right             Ø111 1ØØØ

1111 ØØØØ           Rotate Left (1)          111Ø ØØØ1
111Ø ØØØ1           Rotate Left (2)          11ØØ ØØ11
11ØØ ØØ11           Rotate Left (3)          1ØØØ Ø111
1ØØØ Ø111           Rotate Left (4)          ØØØØ 1111
```

Logical Shift: all the bits are moved over one place to the left or the right. One bit is "lost", and a bit is added (from opposite ends). The added bit is always a zero.

Arithmetic Shift: the same as the logical shift, except that whenever a Right Shift is performed, the leftmost bit BEFORE the shift is duplicated. In other words, if the left most bit was a zero, a zero will be added on the left side. If the left most bit was a one, then a one will be added to the left side. This insures that the "sign" of the number remains the same. Remember, the left most bit is a sign bit (positive or negative) in the two's complement notation.

Rotate: just like a Shift, except whatever bit is lost on one side is inserted from the other. In the last example presented above, the low and high order nybbles were completely reversed using four rotates.

Remember the CARRY FLAG bit? Well, you had better! There are certain SHIFT/ROTATE operations that make use of the CARRY bit. A byte has eight bits. In certain operations, the carry bit acts like a ninth high order bit. So:

```
Carry - Byte      Operation      Carry - Byte
Ø  11ØØ ØØ11      Shift Left     1  Ø1ØØ Ø11Ø
```

would result from a "SHIFT LEFT with CARRY". I couldn't possibly disappoint our (loyal) readers by leaving out a few problem examples.

```
1)  ØØØ1 111Ø        2)  11ØØ 11ØØ
3)  Ø11Ø 1ØØ1        4)  1ØØ1 Ø11Ø
5)  Ø1Ø1 Ø1Ø1        6)  1Ø1Ø 1Ø1Ø
```

and four problems with the Carry bit

```
7)  1 Ø11Ø 111Ø      8)  1 11ØØ Ø1ØØ
9)  Ø 1ØØ1 11ØØ     1Ø) Ø Ø111 1ØØ1
```

Take each example and perform:

2 Logical Shifts Left
2 Logical Shifts Right
2 Arithmetic Shifts Left
2 Arithmetic Shifts Right
2 Rotates Left
2 Rotates Right

So if I gave you the pattern 1111 0000, I should get back:

```
1111 0000 = 1110 0000, 1100 0000    (LSL)
1111 0000 = 0111 1000, 0011 1100    (LSR)
1111 0000 = 1110 0000, 1100 0000    (ASL)
1111 0000 = 1111 1000, 1111 1100    (ASR)
1111 0000 = 1110 0001, 1100 0011    (RL)
1111 0000 = 0111 1000, 0011 1100    (RR)
```

LSL stands for "Logical Shift Left". I'm sure you can figure out the rest! If you are debating whether or not to "do it", then DO IT. A little practice now will dramatically help you in two or three months time (that's a promise).

We are getting dangerously close to the point where we will actually learn some assembly language code! In fact, the next issue will begin the introduction of the mnemonics (special codes) used in assembly language. In this issue, I want to describe the format of assembly language: what kinds of statements there are, how to set them up, etc. Remember, every computer program or language will have a specific format that has to be used. For instance, BASIC statements always begin with line numbers (that are in sequence). Each statement must begin with either a command (like PRINT, CLEAR, POKE), or an assignment (A=A+1, C=SGN(B), or G=1023). Assembly language also has a special format. There are four fields in each assembly language statement:

(1) Label field
(2) Command field
(3) Argument field
(4) Comment field

The LABEL field always begins in column 1. It is an optional field, and sometimes contains a symbol that identifies the LOCATION of the statement. You will read more about labels in the next issue, so hang in there.

The COMMAND field is the primary field, and usually begins in column 8 or 10. This is the field where the INSTRUCTION would be (for example, shift a number in a register, or add the contents of two registers together).

The ARGUMENT field usually begins in column 16 or 20. It indicates what the COMMAND will operate on. The argument field might contain the memory address, or the target register.

The COMMENT field begins after the ARGUMENT field ends (with at least one blank separating the fields). In the Z80 Assembly language, it always begins with a semi-colon (;). This field is optional, and can contain any notes you consider helpful in describing what the program is doing. Even though this field is optional, it is IMPORTANT. Sometimes, the comments in this field are the only chance you will have in understanding what you coded the day before!

In Assembly language, there are two kinds of statements. One is the Assembly Language Mnemonic, and is converted into a machine language code. The other type of statement is called a DIRECTIVE. Directives are instructions to the Assembler that tell it how to go about its business. *Directives do not generate machine code!* There are two Directives I will introduce today: ORG and END. ORG tells the Assembler where (in memory) this program should start. END tells the Assembler that (what else) it has reached the end of the code.

Where in memory? Well, pick an address. Remember that the valid addresses in most microcomputers range from 0 to FFFFH. But are all addresses created equal? Yes and no. From the point of view of the CPU, an address is an address. No single address is better or worse then any other. But your TRS-80 is not just a CPU. In addition to the CPU, there are I/O devices (such as the keyboard, CRT, cassette, disk, RS-232C). There is also the Level 2 ROM.

The Level 2 ROM "resides" in addresses 0 to 2FFFH. Since there is ROM at these addresses, you can't write a program there. (The ROM contains the routines that allows the TRS-80 to decide whether or not it is a disk/non-disk system, and the I/O routines for the keyboard, CRT, and cassette. Of course. It also contains the Level 2 BASIC interpreter.) Actually, the ROM is a program that can't be erased. Addresses 3000 to 3FFF are also unavailable. Some of this area is blank. Other parts contain very special RAM used by the TRS-80 system.

For example, addresses 3C00 to 3FFF contains RAM. 3FFF-3C00=3FF (3FFH=1023). Oddly enough, 16*64=1024. What does 16 and 64 have to do with anything? Try "16 lines by 64 columns" for size. The CRT screen! Anything that goes in this special area (addresses 3C00 to 3FFF) automatically appears on the screen. (What do you think all of the IC chips are in there for?). Wait, I see a question. 3FFH equals 1023, not 1024. Trying to pull a fast one, right? The answer is that 0 is also a valid address. If you really want to know the size of 3C00 to 3FFF, you need to say "Size = (3FFFH - 3C00H) + 1, and the result is 400H (which equals 1024).

If you think that you can use any address from 4000 on up, you are partially correct. In disk systems, addresses 4000 to 6FFF are reserved. Actually, addresses 4000-51FF are always used by the DOS (Disk Operating System). Addresses 5200 to 6FFF constitute an "overlay" area. You can often use this area, but not all the time. So everything from 7000H on up is useable, right? Right! Well, two problems. Problem 1: how much memory do YOU have? 16K RAM users will only have memory up to address 7FFFH. This means that if you have a 16K disk TRS-80, you only have 1000H bytes free for programs. Actually, with memory available for as little as $25 for each 16K, I think there are only 3 16K disk users (no, make that 2) left. So the first problem is memory size. The second is "reserved high memory". Sometimes, special "extra" programs are placed at the highest portions of memory. These programs run along with the DOS (like a "printer driver", or a special "keyboard driver"). For now, I doubt any of you have such a special program. Later on, we will actually write such programs!

To summarize the valid ORG addresses for different systems:

	Non-disk	Disk	
16K	4000H-7FFFH	7000H-7FFFH	(GET MORE MEMORY!)
	Size = 16K	Size = 4K	
32K	4000H-0BFFF	7000H-0BFFFH	
	Size = 32K	Size = 20K	
48K	4000H-0FFFFH	7000H-0FFFFH	
	Size = 48K	Size = 36K	

All systems larger then 16K, whether disk or non-disk, require the Expansion Interface (on the Model 1).

If you don't have EDTASM, this is the time to get it! In the next issue, we will use EDTASM to create, assemble, and execute Assembly Language programs.

Joseph Rosenman
35-91 161 Street
Flushing, New York 11358 ■

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If you have doubts about what your machine or software requires to work properly, then by all means consult your software and machine owners' manuals.

After this, you will sometimes be asked if you want to use the "e'X'pert" user mode. This mode skips some of the introductory material and also gives you short form lists of user menus. If you don't want the expert mode, simply hit ENTER, and the system will continue with questions and menus that are more clearly spelled out.

Either way, the system will ask you for identification (unless you used auto logon) and ask if the information it received was correct. If the information was correct then the system continues, otherwise it asks for the information again. Once you are accepted onto the system, the computer will send your name to a printer and see if there is any mail for you (too bad it doesn't get your pipe and slippers also), or messages about changes on the sytem that you should know about.

If you think that at any point you want to change the information you entered during the initial logon procedure, you can do so by hitting the 'O' key. You will be returned to the master menu where you can begin again.

The master menu is the core of the whole BBS program that allows you to control where you branch on the system. Some of the choices are: leaving messages, scanning messages, or downloading programs. There are many more options available. The master menu for the Bronx Board is in Example 2 intact for you to examine. Some boards' menus are slightly different.

```
MASTER MENU

THE LIST OF MASTER MENU FUNCTIONS IS AS FOLLOWS:

R....RETRIEVE MESSAGES
L....LEAVE MESSAGES FOR OTHERS TO SEE
S....SCAN THE MESSAGES THAT ARE IN THE SYSTEM
T....SIGN OFF THE SYSTEM, WITH THE ABILITY TO LEAVE MSGS FOR
     SYSOP
K....KILL A MESSAGE, IF YOU KNOW THE PASSWORD
I....SYSTEM INFORMATION
U....LISTS THE USERLOG
B....BULLETIN OR MAGAZINE SECTION
E....ELAPSED TIME ON THE SYSTEM, HANDY FOR LONG-DISTANCE
C....CHAT WITH THE SYSOP (IF HE/SHE IS AVAILABLE)
M....MERCHANDISE REVIEW, FOR THOSE THAT HAVE IT
P....PURCHASE MERCHADISE LISTED IN MERCHANDISE SECTION
D....DOWNLOAD SECTION
X....EXPERT USER MODE
```

Example 2: Master Menu for Bryan Boyle Bronx Bulletin Board

Most of the choices on the menu are self-explanatory and will not be explained here. Besides, I think I should leave a few mysteries for you to explore on your own. The first choice is retrieval of messages.

(R)etrieval of messages

This is accomplished by pressing the 'R' key, which then places you in the retrieval mode of the master menu. This then places you in a subsection or submode menu offering the following:

(I)ndividual
This allows you to read specific messages.

(F)orward multiple
This allows you to read lots of messages one after the other, by first asking you what number you want to begin with and where you want to end. The system tells you what numbers the messages are numbered and how many there are.

(R)everse multiple
You can start backwards too.

(S)elective retrieval
This allows you to do a search based on subject. If you want to see a message that has a specific title, you can use this option. The string search doesn't have to be specific but can be approximately accurate in spelling. You can also select a group of messages from a beginning number to an ending number and just see that block.

(N)EW MESSAGES
This allows you to look only at the latest messages put on the system.

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NEW FLIP-N-PRINT NEW
FLIP-N-PRINT ends the problems with constantly changing printer cables. FLIP-N-PRINT allows you to connect two printers to the line printer port on your ModI/III. Simply flip the switch to select either printer. Complete $54.95
TRS-80/RS-232 ADAPTER: Connect RS-232 Printer to line printer port on ModI/III. NO SOFTWARE DRIVER REQUIRED. Leaves TRS-80 RS-232 port free for modem use. Set at 1200 baud, or specify rate (300-9600) Model TU-8014 Complete $79.95
VIRGINIA MICRO SYSTEMS, 14415 Jeff Davis Hwy
Woodbridge VA 22191, (703)491-6502
Add $2.00 for Shipping VA Residents add 4%

SOFTWARE REVIEWS

SMART TERMINAL from HOWE SOFTWARE

Elliott Forman

"Smart Terminal" is a communications program for the TRS-80 Models 1, 2, and 3, from Howe Software. There are three versions available (for the three different TRS-80 models). The differences between the models are slight, and are explained in the users manual. This review is based on my use of Smart Terminal on a Model 1 TRS-80. It is about the 1982 release of Smart Terminal, which incorporates many significant improvements over the 1980 version. There are several other communication programs around, but Smart Terminal is (in my opinion) the best, and certainly the best buy.

A terminal program allows your TRS-80 to communicate with another computer. This means that whatever you type on your TRS-80 will appear on the other computer, and the information typed from the other computer appears on your TRS-80. Two TRS-80s could be used together to transfer letters, articles, and even programs. A TRS-80 with a terminal program could be used to communicate with a large time-sharing computer. All of the above applications (and more) can be easily accomplished with the Smart Terminal program.

Some of the highlights of the Smart Terminal Program include:

(1) Both Disk and/or Cassette file Save/Retrieve.
(2) Easily customized control keys and RS-232-C options.
(3) RS-232-C test upon power-up and during reinitialization.
(4) Ability to save a customized version of the Smart Terminal program
(5) Limited text editing functions.
(6) Automatic transmission of files.
(7) Transmission and reception of files with verification.
(8) Sub-system menu that displays current options.
(9) Ability to read and write both Electric Pencil files on either cassette or disk.
(10) Complete and thorough users manual.

That's quite an impressive list! Let me offer some additional details. Smart Terminal will save the file contained in the text buffer to either the disk or cassette. (The text buffer is a large area in memory used to save incoming files, or to stage the transmission of files. Although this buffer is very large, to a maximum of 38K, larger files cannot be spooled on to or off of the disk.) Unlike other programs I've seen, Smart Terminal allows you to specifiy the entire name and drive number (if using a disk based system).

The Smart Terminal sub-system menu includes many special options for customizing the Smart Terminal system. In fact, all of the dip switch settings on the RS-232-C board (contained in the top panel of the Expansion Interface) can be modified by the program. What is more, these settings can be modified at any time. These values don't have to be set when the program is initializing, but can be changed whenever desired. There is a command to reset the RS-232-C values, and a separate command to change the Baud rate. DC codes can be enabled or disabled.

If you have used other terminal packages, you probably know what it is like to have your system fail due to RS-232-C problems. Often, you can't exactly tell what is causing your system to fail, and you have to exit (or re-boot), then run dianostic software to try to isolate the problem (remember the System Diagnostic program?). Smart Terminal incorporates a complete RS-232 test routine. If the RS-232 is not functioning normally during program initialization, Smart Terminal enters a "test loop". When (or if) the problem is corrected, the program will then complete its initialization and enter normal communication mode. This same process occurs when a "Command-T" is issued, causing the program to re-initialize.

Smart Terminal has other options besides the RS-232-C settings. Smart Terminal provides for a set of control keys that range from Cntrl-A to Cntrl-Z (with values of 01 to 26). Ah, but what about 27, 28, and so on? Smart Terminal only permits 26 control keys, but you can select their values. For some of the work I do, I need to have the values 1BH and 7FH. Since both of these values are beyond the "standard" range, I map the value 1BH onto Cntrl-Q, and the value 7FH onto Cntrl-H. Of course, I could have placed those values on any other Control key if I had wanted to. When modifying a control key, the map of all the current values is displayed. In addition to the control keys, the prompt string value can be changed. The prompt string can be anywhere between one and five characters long. The string can be comprised of any valid ASCII characters, including control characters. If the characters are displayable (i.e., an alphanumeric or standard special character), the prompt string will appear in the sub-system menu. If the string includes control characters, the control characters will appear as blanks. After setting the parameters of Smart Terminal, it is possible to save a special version of the program with the customized parameter settings. If I decided to call this customized version MYSTERM, I would then (after saving it to disk or tape) only need to execute "MYSTERM". When the program is loaded and running, all of the parameters would be preset to my specifications. It is possible to save as many different versions of Smart Terminal on the diskette or cassette tape as there is room available. Just remember to give each one a different (and hopefully meaningful) name.

Not only does Smart Terminal provide a sizable text buffer, it allows a limited amount of text modification. The buffer can be filled with different "lines", each terminating with a carraige return (ASCII 13, or Cntrl-M). You can set the cursor to the first or last line, or to forward space or backward space the cursor by one line. You can also type directly into the buffer at the current cursor location. Of course, you can also clear the entire buffer. Smart Terminal always displays the current cursor location, number of bytes nsed, and number of bytes free (this display is a part of the sub-system menu). Needless to say, it is possible to create or edit a file using a word processor (like the Electric Pencil), prior to

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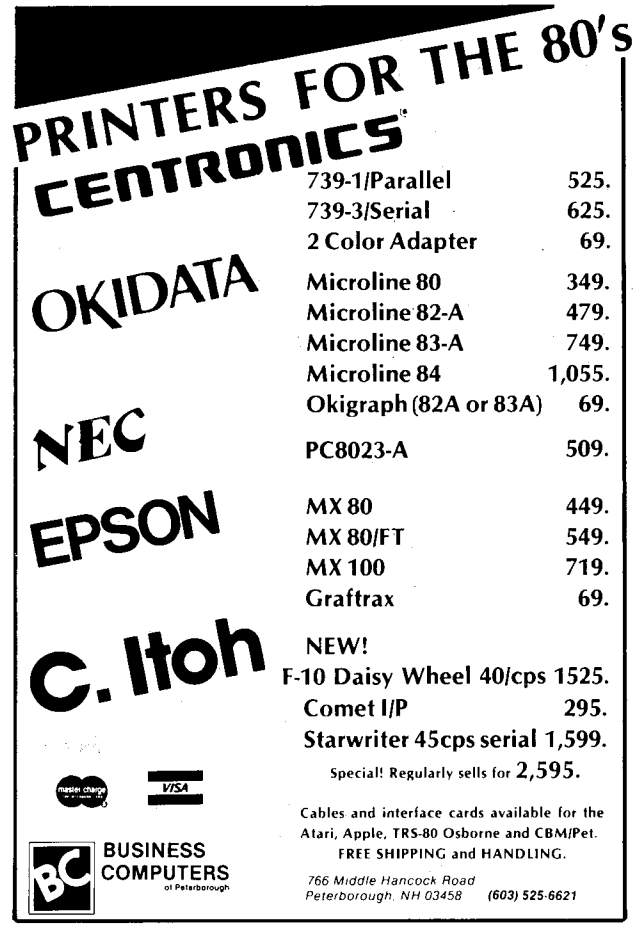
```
13Ø PRINT @ 522, "Term of Loan (months)"; STRING$(15,46);
132 INPUT Z$ : N=ABS(VAL(Z$))
134 IF N<1 : PRINT @ 522, CHR$(3Ø); "'ERROR'.....
Please Re-enter" : FOR K=1 TO 8ØØ : NEXT : PRINT @ 522, CHR$(3Ø):
GOTO 13Ø
135 W=(1+M)>N : P=(A*M*W)/(W-1) : P=INT(P*1ØØ+.99) : P=P/1ØØ :
FP=P
14Ø PRINT @ 647, A$; "Computed Monthly Payment"; STRING$(12,46);
USING E$; P
145 FOR X=1 TO 5ØØ : NEXT : PRINT @ 647, STRING$(3,128)
15Ø PRINT @ 896, A$; "Press <ENTER> To Continue"; : INPUT C
155 POKE 16916,Ø : CLS
16Ø PRINT @ 9Ø, "Option  Table"
165 PRINT @ 2Ø9, "1)  Display Monthly Breakdown"
17Ø PRINT @ 273, "2)  Override Computed Mo. Pymt."
175 PRINT @ 337, "3)  Display Loan Summary"
18Ø PRINT @ 4Ø1, "4)  Restart Program"
185 PRINT @ 465, "5)  End Program"
19Ø PRINT @ 768, CHR$(196); "  Your Selection";
2ØØ INPUT S : IF S<1 OR S>5 : GOTO 19Ø
2Ø5 ON S GOTO 21Ø, 24Ø, 25Ø, 39Ø, 35Ø
21Ø CLS : POKE 16916,3
215 PRINT @ 1Ø, "Applied"; @ 24, "Monthly"; @ 4Ø, "Remaining";
@ 56, "Interest";
22Ø PRINT "Pymt.#"; @ 74, "Principal"; @ 88, "Interest"; @ 1Ø4,
"Balance"; @ 12Ø, "To-Date"
225 Q=15488 : Y=31 : FOR X=Q TO Q+63 : POKE X,Y : NEXT
23Ø PRINT : GOSUB 5
235 CLS : POKE 16916,Ø : GOTO 16Ø
24Ø CLS : P=Ø : INPUT "Prefered Monthly Payment"; P : FP=P : CLS:
GOTO 16Ø
25Ø POKE 16916,Ø : CLS : PRINT @ 4Ø4, "COMPUTING  SUMMARY"
255 GOSUB 5 : CLS
26Ø PRINT @ 17, "$$  Loan  Summary  $$"
265 Q=15424 : Y=31
27Ø FOR X=Q TO Q+63 : POKE X,Y : NEXT X
275 PRINT @ 128, A$;
278  PRINT "   Amount Financed.....$"; USING F$; A
28Ø PRINT @ 128, STRING$(3,128)
285 PRINT @ 192, A$;
288 PRINT "   Annual Percentage Rate.....$"; R; "%"
29Ø PRINT @ 192, STRING$(3,128)
295 PRINT @ 256, A$;
298 PRINT "   Successive Installments.....";J
3ØØ PRINT @ 256, STRING$(3,128)
3Ø5 PRINT @ 32Ø, A$;
3Ø8 PRINT "   Monthly Payment.....$"; USING F$; FP
31Ø PRINT @ 32Ø, STRING$(3,128)
315 PRINT @ 384, A$;
318 PRINT "   Final Installment.....$"; USING F$; P/1ØØ
32Ø PRINT @ 384, STRING$(3,128)
325 PRINT @ 448, A$;
328 PRINT "   Finance Charge.....$"; USING F$; T2
33Ø PRINT @ 448, STRING$(3,128)
335 PRINT @ 512, A$;
338 PRINT "   Total of Payments.....$"; USING F$; TP/1ØØ
339 PRINT @ 512, STRING$(3,128) : FOR X=1 TO 2ØØ : NEXT
34Ø PRINT @ 896, A$; STRING$(3,128);
342 INPUT "Press <ENTER> for Option Table";C
345 POKE 16916,Ø : CLS : P=FP : GOTO 16Ø
35Ø CLS : PRINT CHR$(21) : POKE 16419,176 : POKE 16396,2Ø1 : END
36Ø CLS : CLEAR 5ØØ
365 DEFINT A-Z : X=Ø : PRINT CHR$(21)
37Ø FOR X=1 TO 4 : LP$=LP$+"LOAN PROCESSOR  " : NEXT
38Ø PRINT @ Ø, LP$; : PRINT @ 96Ø-64, LP$;
385 PRINT @ 4ØØ, "Constant  Level  Payments" : FOR X=1 TO 2ØØØ :
NEXT
39Ø CLEAR 1ØØ
395 CLS : DEFINT J,L,N : DEFDBL A-F, M, P-V, Z : A=Ø
4ØØ A$="### "
4Ø1 DATA 244,245,246
4Ø2 H=PEEK(VARPTR(A$)+2)*256+PEEK(VARPTR(A$)+1)
4Ø3 FOR I=Ø TO 2 : READ J
4Ø4 POKE H+I,J
4Ø5 NEXT I
4Ø6 POKE 16396,175 : POKE 16397,2Ø1
41Ø POKE 16419,128 : GOTO 1ØØ
411 'LOAN PROCESSOR
412 'BY JIM J. JORDAN, 6 HICKORY HALL LANE, CHARLESTON, S.C.
  294Ø8
413 'DECEMBER 198Ø
414 'THIS PROGRAM WAS DEVELOPED FOR THE TRS-8Ø, 16K LEVEL II,
      MODEL III AND WILL NOT FUNCTION, AS DESIGNED, ON THE TRS-
     8Ø MODEL I OR II.
415  END
```

Note: The LOAN PROCESSOR program was developed explicitly for the TRS-80 Model III, and will not function, as designed, on the TRS-80 Model I or II. (It uses the special characters and POKES of the Model III.) All the other programs will run wither on the Model I or Model III. ■



A TWENTY-FIRST CENTURY REMINISCENCE

OR "I REMEMBER THE TRS-80"

Michael Herbert Shadick

Yes, I can imagine myself telling my grandchildren-to-be, "I can remember when personal computers — coms — were so big that they actually had to *sit* somewhere — like, on a desk."

"*Honest,* Grandpa."

"That's a fact, kids. None of this newfangled wear-it-on-your wrist stuff!"

"What were the coms like, back when you were little?"

"Well, when I was *little,* there weren't any! At least, not that you could afford to own for yourself. The only places you found coms back then, were at the big 500 companies. Corporations, we used to call 'em. The very first computer — at least the first one in America — was called a Univac. Sounds like a vacuum cleaner, doesn't it?"

"A what?"

"That's — never mind. Anyway, the Univac was what they called an *analog* computer. It worked by — well, it was slower than the coms we have today. A lot slower. And a lot bigger, too."

"As big as a VL (Laservision, or Videola)?"

"On my, yes! The first Univac took up two full stories of a big skyscraper — an up-and-down building — and part of a third."

"Why did they make it so big? It musta used lots of gens (energy units)."

"Indeed it did. And it wasn't very smart, either. By your — our — standards today, I guess you'd say it was pretty darn dumb."

"Betcha had to talk slow to it, right?"

"You might not believe this, but you couldn't talk to it at *all.* I mean, it couldn't *hear* you!"

"Then how did it work?"

"It had what we called a keyboard. Sort of like a T-pad, except you had to touch the keys with your fingers. You've seem L-views of a typewriter, haven't you?"

"Yeah, they had a real one in school once. It was made out of metal."

"Well, the Univac had keys, like a typewriter. That's how you communicated with it. You wrote a message to it, using the keys, in a special language."

"Didn't it know American?"

"Yes — and no. You had to be able to use its language, in order to communicate with it. Because it wasn't smart enough to know yours!"

"Like 'Speranto, or something?"

"No, it spoke, I mean it *knew* a special language which only the people who worked with computers knew how to use. And back then, that was far from everybody! One of the special languages which computers knew was known as COBOL."

"That's a funny name. Wasn't that the name of a bomb?"

"Not quite!. COBOL stands for *Computer Operator's Binary Output Language.* Another language was called FORTRAN. I never have known what *that* stands for! And then there was PASCAL. PASCAL was a language developed by NASA."

"I know what NASA stands for! That's the old National Aero-nau-tics and Space Admin. I *think.*"

"You're right. If you remember, they're the ones who sent the first manned space ship — Voran — to the moon."

"That was in — in nineteen hundred and sixty-nine."

"Say, you're pretty good with your history. But, getting back to PASCAL, it later became very popular with people who had some of the first *personal* coms."

"Could you talk to *them?*"

"Not at first. Not *verbally,* that is. Yet they were lots, lots smarter than the Univac. But they still required a keyboard."

"I'll bet they couldn't talk back either, could they?"

"They had a viewscreen, somewhat like the ones yours have, but they displayed words, mostly."

"How were they linked?"

"They weren't! Not when you got 'em. To link them, you had to have something else, something called a modem."

"A modem let your computer communicate with others, over the telephone. Back then, telephones were mostly connected to each other by wires. Satcomes and fibops (fiber optic conduits) were just coming in."

"What was the first com that you had like?"

"Well, it was called a TRS-80. It was the first computer for a lot of people."

"Did it know many good jokes?"

"Not unless you told them to it first! It didn't have — let's see, how can I explain it so you'll understand — it didn't really have a *personality* — not like the ones your coms have."

"Then what could it do?"

"You had to *program* it, before it could do anything. That's like — like the cards you buy for your coms.
Except most of the programs for the old '80's were either on what they called cassettes, or on floppy disks."

"Floppy. That's funny! Why'd they call 'em that?"

"Because they were flexible — sort of like laserdiscs, only even more — well, *floppy!* The hard discs were just coming into personal use."

"Were they better or something?"

"They could hold a lot more data than the floppies. Megabytes, instead of just kilobytes."

"You sure know a lot of funny words, grandpa!"

"I guess you'd probably say that my '80 *looked* funny, too. And if you wanted hard output — prouts — you had to buy extra hardware."

"You mean your com didn't even have a *print?*"

"Not built-in, no."

"Gee, the olden days must have been hard."

"Well, they were sure exciting! I remember when I mastered my first computer language. It was called BASIC, which stands for — well, I'm probably boring you kids to death with all this old computer talk."

"No you aren't, grandpa! What did BASIC stand for?"

"----- ----- ----- ----- -----. It was the first *good* personal computer language. And it was also the first *popular* one, in the sense that a lot of people learned it, not just the professional computer programmers."

"Programmers? What did *they* do?"

"Well, they were the ones who told the computers what to do, becore the coms could figure it out for themselves."

"Bet it was rough, having to learn a special language just so you could talk to your com."

"Not really. It was *fun* — if you can imagine that. You kids take your coms for granted. We sure didn't!"

"Grandpa, do you wish you were back in those olden days?"

"Not on your life! I wouldn't want to miss seeing what we have today. But I wouldn't have missed what you call the olden days, either, not for all the — not for the world. Why, if it hadn't been for the TRS-80 and other computers like 'em, the ones we have today would never be!"

"That would be *awful.*"

"Y'know, kids — I do believe you're right!"

"TRS-80. And you know what?"

"What?"

"I've still got it. It's up in the attic!"

"Can we see it? Huh? Can we?"

"Sure, if you'd like. It even works — if we can find sombody who has an outlet."

"A *what,* Grandpa."

Michael Herbert Shadick
Cedar Square West, Apt. E-414
1515 South Fourth Street
Minneapolis, MN 55454 ■

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When the Color Computer prints something (assuming you have a printer), the information is serially transmitted to the printer at 600 Baud (roughly 60 characters per second). This is an example of local communication, since it is between the computer and a peripheral (connected via a short cable). If you are using your Color Computer with Videotext or CompuServe, then you will connect the Color Computer to a Modem. The information will be sent and received over a telephone line, and is known as remote communication. In general, telephone communication usually occurs at 300 Baud. More recently, more expensive and faster Modems are permitting data transmission rates of 1200 Baud. Of course, it is possible to communicate at even faster speeds. There is a problem, however: the telephone lines normally provide a "degree of purity" that is sufficient for "voice communication" (that is, talking on the phone). Using a computer communication system over the phone at rates between 110 and 1200 Baud is usually possible (the faster the transmission speed, the more errors occur). When using any transmission rate faster than 1200 over regular phone lines, the error rate becomes unacceptably high. There is a way out. For a (rather large) fee, the phone company will lease you a private phone line. These leased lines can insure the integrity of data communications at faster speeds. (Of course, they also offer "conditioning".

continued on page 62

FREE
business software directory

- Radio Shack's Model I, II, III.
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- CPM: Xerox, Alto...
- IBM Personal Computer

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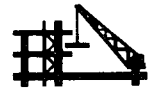

Micro Architect, Inc.
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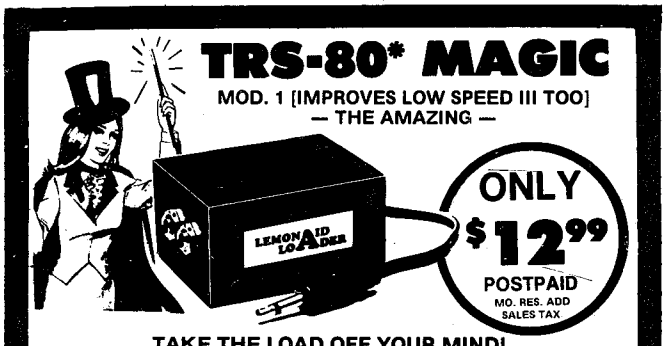

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* TRS-80 Is Trademark Tandy Corp.
**KWICOS Is Trademark KWIK Software

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loading it into Smart Terminal (or following the receipt of the file from another computer).

Smart Terminal can be set to save everything that "comes or goes" in the text buffer. This feature is handy if you want to save the "dialogue" involved in performing a certain task. This "scenario" could then be saved as a file and/or printed for later analysis. Smart terminal can also transmit entire files from start to finish without any operator intervention. This facility is known as "Automatic Transmission". Basically, all you need to do is load the file, tell the other system to "get ready to receive", and start transmission. Automatic transmission can be started from the sub-system, or by a special command while in communication mode.

The problem with all of the currently available transmission schemes, is that nothing is verified. Any spurious "line noise" will result in nasty errors. I have seen files transmitted that are so garbled by the time they are received that they are unrecognizable. Smart Terminal has an answer! The more advanced communication systems use special protocols to control and verify data transmissions. One such protocol is known as the IBM Binary Synchronous Communication protocol (an industry standard). Receive and transmit with verify use a (rough) variant on this protocol (of course, communication is still Asynchronous). This works by using special control codes to start and stop the transmission of blocks. Each block generates a special block check character. If the characters compare, the block is verified and the next block is transmitted. If the verify fails, the previous block is re-transmitted. The block check character is calculated using the CRC-16 method (Cyclic Redundancy Check). This is the same method used to verify the integrity of data on the floppy disks. There is only one problem: in order to use this feature, both computers must use the same protocol. Therefore, verified transmission with Smart Terminal can only be used by two TRS-80s running Smart Terminal. (Just tell your friends to buy a copy too!)

All of the features mentioned above are controlled from the sub-system. To enter the sub-system, you just type Command-C. (Smart Terminal designates a specific key as a control key, and another key as the command key. In the Model 1 version, the up-arrow is the command key, and the down-arrow is the control key.) The sub-system is the key to using the special features of Smart Terminal that make it a "Smart" terminal program. One of the most significant improvements of this version over the earlier version, is that the current status of options are now displayed in the sub-system menu.

Of course, no program is complete without a good users manual. I am happy to say that this often overlooked aspect of a software package has not been forgotten. The users manual is both comprehensive and easy to use. Of course, the manual does not include all of the technical information about data communications, but it is perfectly adequate for ordinary users. Except for technical questions, I would be hard pressed to find any information needed to make effective use of this program lacking. That isn't to say that you can master all of the features in five minutes or less. A program of this scope and flexibility will necessarily require some practice and experimentation. It will be time well spent.

A Final note: Smart Terminal is designed to run with TRSDOS. There is a slight incompatibility with Apparat's NEWDOS80. The manual includes instructions on changing the program to run under NEWDSO80 (the change involves altering the value of one byte). If desired, HOWE SOFTWARE will sell the NEWDOS80 version rather then the TRSDOS version. In my opinion, it is to the credit of the programs author that the manual includes such seemingly trivial (yet important) details.

I found Smart Terminal to be a well designed and extremely useful program, with many excellent features. I can, without any reservations, recommend this program to any TRS-80 user who needs a terminal program. Smart Terminal is fully compatible with other terminal programs, as long as certain special features are not used (such as verified transmission). Once the basic commands are learned, Smart Terminal becomes very easy to use.

Smart Terminal by Howe Software, 14 Lexington Road, New City, New York 10956. Model 1 and Model 3 versions $69.95 ($74.95 on disk), Model 2 (CP/M) version $79.95. Available through H & E Computronics. ■

---

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(M)ARKED RETRIEVAL
This is accomplished after a scanning of the messages. When you scan you can put a marker on those messages that interest you. Scanning messages displays a short heading declaring what the main body of the message is about.

S)canning messages
This lets the user get a brief account of the full message. This is sometimes a two word blurb such as "hardware cheap." You can scan forwards or backwards depending on how you answer the prompts at the beginning of the option. In the scanning mode you can set a marker that you can use to see specific messages.

(K)illing messages
This is something you do if you want to delete a message left for you and is no longer of interest. To do this you hit a 'K' in the master menu. you will then be asked which message you wish to delete. The message heading will be displayed (to make certain), and you will then be asked for the proper password. (you didn't think they were just going to let you run rampant were you?) If your password is correct, or the message is to you or from you, the system will delete the message for you, after you hang up. The only other choice is to leave a message for the sysop (system operator) to delete the message for you.

This about covers the most important parts on how to use the bulletin boards. The other options such as downloading will be discussed in the second half, on bulletin boards. Included in that part will be a listing of telephone numbers throughout the country you can call covering all subjects, interests, and life styles. Until next time, good computing!

Spencer Koenig
153-27 73 Avenue
Flushing NY 11367 ■

™TRS80 color

From the January 1981 issue of the CSRA Computer Club newsletter:

There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical informations on the TRS-80 color computer™. Devoted to SS-50 6800 and 6809 machines up to now, 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

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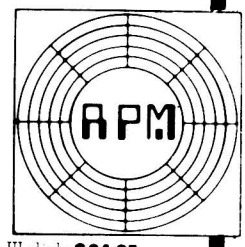

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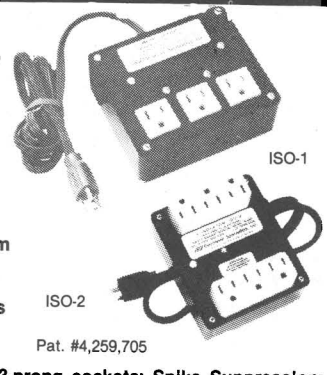

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METRIC CONVERSIONS

Jack Willett

This program is a metric conversion calculator. It has one main menu and six submenus. It asks you which type of conversion you want and then sends you to the appropriate submenu. Then you input the number you want converted, and the answer is displayed in large type. At the end it asks you if you want another conversion.

```
10 CLS : REM  *** PROGRAMED BY JACK S. WILLETT ***
20 PRINT : PRINT : PRINT STRING$(7," "); "METRIC EQUIVALENTS
OF U.S. CUSTOMARY
30 PRINT STRING$(14," "); "MEASURES AND WEIGHTS"
40 PRINT : PRINT TAB(20) "MAIN MENU"
50 PRINT STRING$(18," "); "1 = LENGTH"
60 PRINT STRING$(18," "); "2 = AREA"
70 PRINT STRING$(18," "); "3 = VOLUME"
80 PRINT STRING$(18," "); "4 = CAPACITY"
90 PRINT STRING$(18," "); "5 = WEIGHT"
100 PRINT STRING$(18," "); "6 = PRESSURE"
105 PRINT STRING$(18," "); "7 = END
110 INPUT A
120 ON A GOTO 200, 400, 600, 800, 1000, 1200, 1400
200 CLS : PRINT : PRINT : PRINT TAB(23) " LENGTH MENU"
210 PRINT TAB(20) "1 = CM      TO  IN"
220 PRINT TAB(20) "2 = METER   TO FEET"
230 PRINT TAB(20) "3 = METER   TO YARDS"
240 PRINT TAB(20) "4 = KM      TO MILE"
250 PRINT TAB(20) "5 = INCHES  TO CM"
260 PRINT TAB(20) "6 = FEET    TO METER"
265 PRINT TAB(20) "7 = YARDS   TO METERS"
270 PRINT TAB(20) "8 = MILE    TO KM"
272 PRINT TAB(20) "9 = MAIN MENU"
275 INPUT B
280 ON B GOTO 300, 310, 320, 330, 340, 350, 360, 370, 10
300 CLS : PRINT @ 320, "" : INPUT "CM"; A : D$="CM" :
C=0.3937 : E$="INCH" : B=A*C : GOSUB 10000 : GOTO 200
310 CLS : PRINT @ 320, : INPUT "METER";A : D$="METER" :
C=3.281 : E$="FOOT" : B=A*C : GOSUB 10000 : GOTO 200
320 CLS : PRINT @ 320, "" : INPUT "METER"; A : D$="METER" :
C=1.0936 : E$="YARD" : B=A*C : GOSUB 10000 : GOTO 200
330 CLS : PRINT @ 320, "" : INPUT "KM"; A : D$="KM" :
C=0.6214 : E$="MILE" : B=A*C : GOSUB 10000 : GOTO 200
340 CLS : PRINT @ 320, "" : INPUT "INCH"; A : D$="INCH" :
C=2.5400 : E$="CM" : B=A*C : GOSUB 10000 : GOTO 200
350 CLS : PRINT @ 320, "" : INPUT "FOOT"; A : D$="FOOT" :
C=0.3048 : E$="METER" : B=A*C : GOSUB 10000 : GOTO 200
360 CLS : PRINT @ 320, "" : INPUT "YARD"; A : D$="YARD" :
C=0.9144 : E$="METER" : B=A*C : GOSUB 10000 : GOTO 200
370 CLS : PRINT @ 320, "" : INPUT "MILE"; A : D$="MILE" :
C=1.6093 : E$="KM" : B=A*C : GOSUB 10000 : GOTO 200
400 CLS : PRINT : PRINT : PRINT TAB(20) " AREA MENU"
410 PRINT TAB(20) "1 = SQ CM   TO SQ INCHES"
420 PRINT TAB(20) "2 = SQ M    TO SQ FEET"
430 PRINT TAB(20) "3 = SQ KM   TO SQ MILE"
440 PRINT TAB(20) "4 = SQ IN   TO SQ CM"
450 PRINT TAB(20) "5 = SQ FT   TO SQ M"
460 PRINT TAB(20) "6 = SQ MILE TO SQ KM"
470 PRINT TAB(20) "7 = MAIN MENU"
480 INPUT C
490 ON C GOTO  500, 510, 520, 530, 540, 550, 10
500 CLS : PRINT @ 320, "" : INPUT "SQ CM"; A : D$="SQ CM" :
C=0.1550 : E$="SQ INCH" : B=A*C : GOSUB 10000 : GOTO 400
510 CLS : PRINT @ 320, "" : INPUT "SQ M"; A : D$="SQ M" :
C=10.764 : E$="SQ FEET" : B=A*C : GOSUB 10000 : GOTO 400
520 CLS : PRINT @ 320, "" : INPUT "SQ KM"; A : D$="SQ KM" :
C=0.3861 : E$="SQ MILE" : B=A*C : GOSUB 10000 : GOTO 400
530 CLS : PRINT @ 320, "" : INPUT "SQ INCH"; A :
D$="SQ INCH" : C=6.4516 : E$="SQ CM" : B=A*C : GOSUB 10000 :
GOTO 400
540 CLS :PRINT @ 320, "" : INPUT "SQ FOOT"; A : D$="SQ FOOT" :
C=0.0929 : E$="SQ M" : B=A*C : GOSUB 10000 : GOTO 400
550 CLS : PRINT @ 320, "" : INPUT "SQ MILE"; A : D$="SQ MILE" :
C=2.590 : E$="SQ KM" : B=A*C : GOSUB 10000 : GOTO 400
600 CLS : PRINT : PRINT : PRINT TAB(20) " VOLUME MENU"
610 PRINT TAB(20) "1 = CU CM       TO CU IN"
620 PRINT TAB(20) "2 = CU M                      TO  CU FT"
630 PRINT TAB(20) "3 = CU IN       TO  CU CM"
640 PRINT TAB(20) "4 = CU FT       TO  CU M"
650 PRINT TAB(20) "5 = MAIN MENU"
660 INPUT D
670 ON D GOTO 700, 710, 720, 730, 10
700 CLS : PRINT @ 320, "" : INPUT "CU CM"; A : D$="CU CM" :
C=0.06102 : E$="CU INCH" : B=A*C : GOSUB 10000 : GOTO 600
710 CLS : PRINT @ 320, "" : INPUT "CU M"; A : D$="CU M" :
C=35.31 : E$="CU FOOT" : B=A*C : GOSUB 10000 : GOTO 600
720 CLS : PRINT @ 320, "" : INPUT "CU INCH"; A : D$="CU INCH" :
C=16.387 : E$="CU CM" : B=A*C : GOSUB 10000 : GOTO 600
730 CLS : PRINT @ 320, "" : INPUT "CU FOOT"; A : D$="CU FOOT" :
C=0.02832 : E$="CU M" : B=A*C : GOSUB 10000 : GOTO 400
800 CLS : PRINT : PRINT : PRINT TAB(20) "CAPACITY MENU"
810 PRINT TAB(20) "1 = LITER   TO  CU INCH"
820 PRINT TAB(20) "2 = LITER   TO  CU FOOT"
830 PRINT TAB(20) "3 = LITER   TO  GAL (U.S)"
835 PRINT TAB(20) "4 = LITER   TO BUSHEL (U.S)"
840 PRINT TAB(20) "5 = CU IN   TO  LITER"
850 PRINT TAB(20) "6 = CU FT   TO  LITER"
860 PRINT TAB(20) "7 = GAL     TO  LITER"
870 PRINT TAB(20) "8 = BU      TO  LITER"
875 PRINT TAB(20) "9 = MAIN MENU"
880 INPUT E
890 ON E GOTO 900, 910, 920, 930, 940, 950, 960, 970, 10
900 CLS : PRINT @ 320, "" : INPUT "LITER"; A :  D$="LITER" :
C=61.024 : E$="CU INCH" : B=A*C : GOSUB 10000 : GOTO 800
910 CLS : PRINT @ 320, "" : INPUT "LITER"; A : D$="LITER" :
C=0.0353 : E$="CU FOOT" : B=A*C : GOSUB 10000 : GOTO 800
920 CLS : PRINT @ 320, "" : INPUT "LITER"; A : D$="LITER" :
C=0.2642 : E$="GAL(U.S.)" : B=A*C : GOSUB 10000 : GOTO 800
930 CLS : PRINT @ 320, "" : INPUT "LITER"; A : D$="LITER" :
C=0.0284 : E$="BU (U.S.)" : B=A*C : GOSUB 10000 : GOTO 800
940 CLS : PRINT @ 320, "" : INPUT "CU INCH"; A : D$="CU INCH" :
C=0.0164 : E$="LITER" : B=A*C : GOSUB 10000 : GOTO 800
950 CLS : PRINT @ 320, "" : INPUT "CU FOOT"; A : D$="CU FOOT" :
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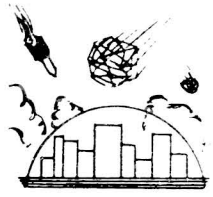

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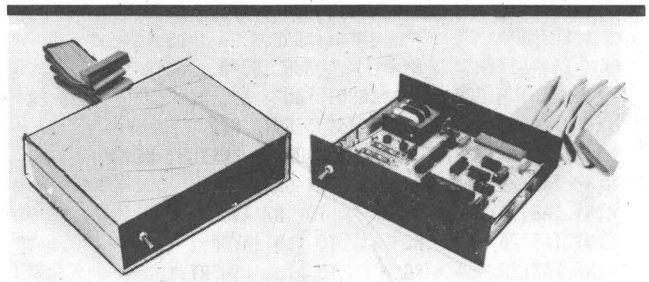

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```
C=28.32 : E$="LITERS" : B=A*C : GOSUB 10000 : GOTO 800
960 CLS : PRINT @ 320, "" : INPUT "GAL."; A : D$="GAL." :
C=3.785 : E$="LITERS" : B=A*C : GOSUB 10000 : GOTO 800
970 CLS : PRINT @ 320, "" : INPUT "BU"; A : D$="BU" : C=35.24 :
E$="LITERS" : B=A*C : GOSUB 10000 : GOTO 800
1000 CLS : PRINT : PRINT : PRINT TAB(20) "WEIGHT MENU"
1010 PRINT TAB(20) "1 = GRAM    TO  GRAIN"
1020 PRINT TAB(20) "2 = GRAM     TO  OZ AVDP"
1030 PRINT TAB(20) "3 = KG      TO  LB (AVDP)"
1040 PRINT TAB(20) "4 = KG      TO  TON (SHORT)"
1050 PRINT TAB(20) "5 = GRAIN   TO  GRAM"
1060 PRINT TAB(20) "6 = OZ AVDP TO  GRAM"
1070 PRINT TAB(20) "7 = LB AVDP TO  KG"
1080 PRINT TAB(20) "8 = TON SHT TO  KG"
1085 PRINT TAB(20) "9 = MAIN MENU"
1090 INPUT F
1095 ON F GOTO 1100, 1110, 1120, 1130, 1140, 1150, 1160, 1170, 10
1100 CLS : PRINT @ 320, "" : INPUT "GRAM"; A : D$="GRAM" :
C=15.4324 : E$="GRAINS" : B=A*C : GOSUB 10000 : GOTO 1000
1110 CLS : PRINT @ 320, "" : INPUT "GRAM"; A : D$="GRAM" :
C=0.03532 : E$="OZ (AVDP)" : B=A*C : GOSUB 10000 : GOTO 1000
1120 CLS : PRINT @ 320, "" : INPUT "KG"; A : D$="KG" : C=2.2046:
E$="LB (AVDP)" : B=A*C : GOSUB 10000 : GOTO 1000
1130 CLS : PRINT @ 320, "" : INPUT "KG"; A : D$="KG" :C=0.00110:
E$="TON (SHT)" : B=A*C : GOSUB 10000 : GOTO 1000
1140 CLS : PRINT @ 320, "" : INPUT "GRAIN"; A : D$="GRAM" :
C=0.0648 : E$="GRAM" : B=A*C : GOSUB 10000 : GOTO 1000
1150 CLS : PRINT @ 320, "": INPUT "OZ (AVDP)";A: D$="OZ (AVDP)":
C=28.35 : E$="GRAM" : B=A*C : GOSUB 10000 : GOTO 1000
1160 CLS: PRINT @ 320, "": INPUT "LB (AVDP)"; A: D$="LB (AVDP)":
C=0.4536 : E$="KG" : B=A*C : GOSUB 10000 : GOTO 1000
1170 CLS: PRINT @ 320, "": INPUT "TON (SHT)"; A: D$="TON (SHT)":
C=907.2 : E$="KG" : B=A*C : GOSUB 10000 : GOTO 1000
1200 CLS : PRINT : PRINT : PRINT TAB(20) "PRESSURE MENU"
1210 PRINT TAB(10) "1 = KG PER SQ CM   TO   LB PER SQ INCH"
1220 PRINT TAB(10) "2 = LB PER SQ INCH TO   KG PER SQ CM"
1230 PRINT TAB(10) "3 = KG PER SQ M    TO   LB PER SQ FT"
1240 PRINT TAB(10) "4 = LB PER SQ FT   TO   KG PER SQ M"
1250 PRINT TAB(10) "5 = KG PER SQ CM   TO   NORMAL ATMOSPHERE"
1260 PRINT TAB(10) "NORMAL ATMOSPHERE = 1.0332 KG PER SQ CM"
1270 PRINT TAB(28) "= 1.0133 BARS"
1280 PRINT TAB(28) "= 14.696 LB PER SQ INCH"
1290 PRINT TAB(10) "6 = MAIN MENU"
1296 INPUT G
1297 ON G GOTO 1300, 1310, 1320, 1330, 1340, 10
1300 CLS : PRINT @ 320, "" : INPUT "KG/SQ CM"; A: D$="KG/SQ CM":
C=14.223 : E$="LB/SQ IN" : B=A*C : GOSUB 10000 : GOTO 1200
1310 CLS : PRINT @ 320, "" : INPUT "LB/SQ IN"; A: D$="LB/SQ IN":
C=0.7703 : E$="KG/SQ CM" : B=A*C : GOSUB 10000 : GOTO 1200
1320 CLS : PRINT @ 320, "" : INPUT "KG/SQ M"; A : D$="KG/SQ M" :
C=0.2048 : E$="LB/SQ FT" : B=A*C : GOSUB 10000 : GOTO 1200
1330 CLS : PRINT @ 320, "" : INPUT "LB/SQ FT"; A: D$="LB/SQ FT":
C=4.882 : E$="KG/SQ M" : B=A*C : GOSUB 10000 : GOTO 1200
1340 CLS : PRINT @ 320, "" : INPUT "KG/SQ CM"; A: D$="KG/SQ CM":
C=0.9679 : E$="NORM ATMOS" : B=A*C : GOSUB 10000 : GOTO 1200
1400 CLS : END
10000 PRINT CHR$(23) : PRINT @ 384, A; D$ ; " =" B; E$
10010 PRINT @ 514, "CONVERSION FACTOR = "C
10020 PRINT @ 906, "HIT 'ENTER' TO CONT."
10030 A$=INKEY$ : IF A$="" THEN 10030 ELSE RETURN
10040 END
```

Jack Willett
14089 Buckner Drive
San Jose, CA 95127 ■

continued from page 57

When a line is "conditioned," it becomes even more reliable and "clean". Yes, there is an additional charge for this service.)

Don't worry, you won't need to lease a phone line for your Color Computer. You can use your Color Computer as a "remote terminal". This means that your computer can act as an Input/Output station for another computer. Whatever you type into the keyboard will go to the "host" computer (which could be in another City, State, or even Country). The result of your entry will be displayed on the TV screen. Radio Shack has provided a special package to permit this type of activity. In the next issue, I will review the Color Computer Videotex/CompuServe package. For those of you who can't wait, you will need a Modem and a special cable to use the Videotex package.

One last point. I have been finding that certain Radio Shack stores have been specializing in the TRS-80 computers, while "all of the others" have reduced their computer inventory. In fact, one store manager confessed to me that the "non-computer" stores will only stock the "big sellers". This makes sense to me, so I suggest you locate the nearest computer center. Such items as the Color Computer RS-232-C to DB-25 cable (needed when using a standard Modem) will most probably only be found at the computer centers.

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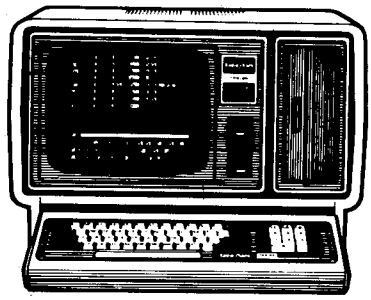

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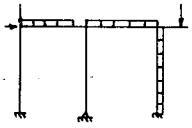

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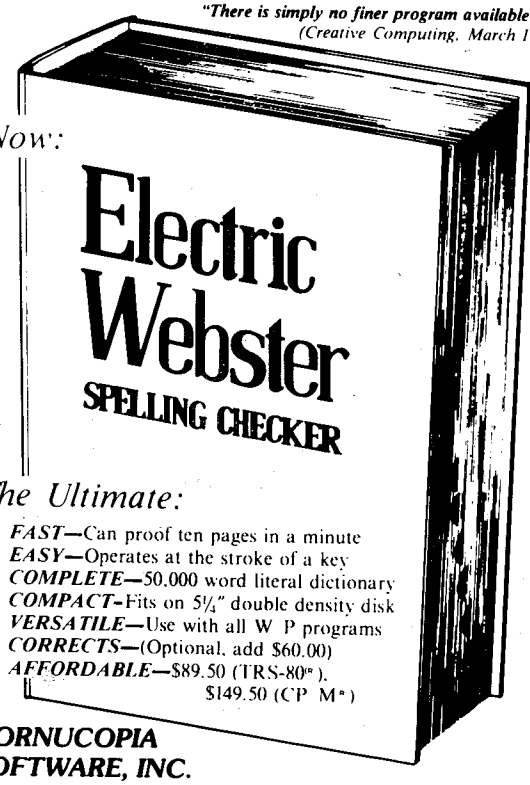

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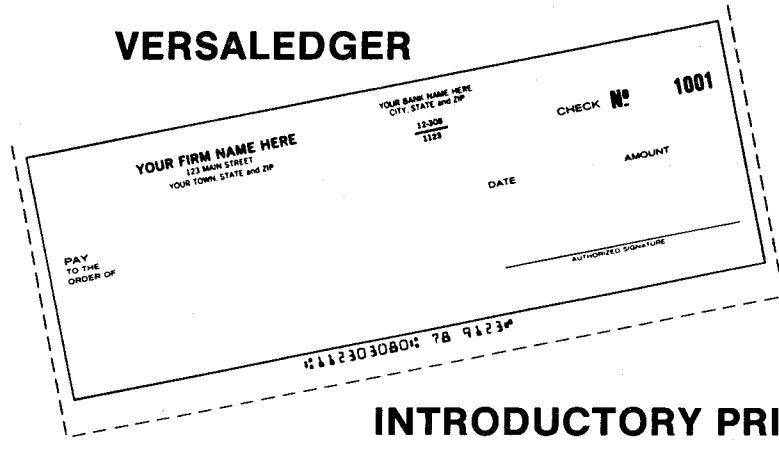

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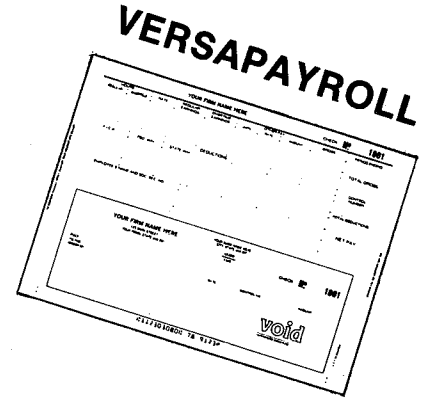

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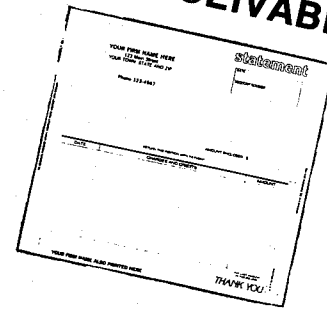

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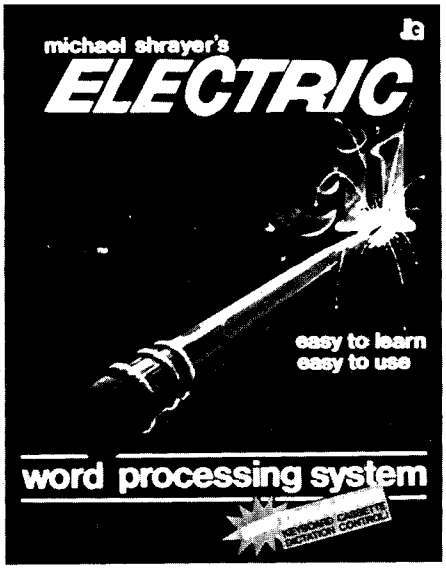

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- ☐ Cursor to top of screen
- ☐ Cursor to beginning of line
- ☐ Delete and insert characters
- ☐ Delete and insert lines
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- ☐ Selective (wild card) search and replace
- ☐ Selective (wild card) search without replace
- ☐ Search and replace carriage return and form feed
- ☐ Repeat command
- ☐ Hard Space character
- ☐ Concatenation of long lines
- ☐ Upper and lower case shift key lock
- ☐ Exit any command with a single keystroke
- ☐ Automatically displays free memory
- ☐ Automatically displays words in file
- ☐ Selection of cursor speeds
- ☐ Selective clearing of memory
- ☐ Set your own power-up configuration
- ☐ Warm start command
- ☐ Optional automatic titling
- ☐ Optional automatic page numbering
- ☐ Right justification
- ☐ Left margin may be set from 0 to 255 spaces
- ☐ Line length may be set from 1 to 255 characters
- ☐ Line spacing may be set from 1 to 255 lines
- ☐ Page length may be set from 1 to 255 lines
- ☐ Page spacing may be set from 0 to 255 lines
- ☐ Starting page number may be from 1 to 65535
- ☐ Optional print length may be set to print partial files
- ☐ Multiple printing of text files
- ☐ Single page printing
- ☐ Printer configuration control:
  - carriage return on/off
  - line feed on/off
- ☐ All options may be changed at any time
- ☐ Loads any ASCII file
- ☐ Compatible with all files created by previous releases
- ☐ Easy backup - no fancy protection features
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FILE CAPACITY & FORMAT					
Maximum # of disks per file	1	N/A	4	31	4
Maximum # of records per file	2450	Note 1	32,767	10,199	65,535
Maximum record length	249	254	800	255	255
Maximum # of characters per field	249	254	40	254	255
Maximum # of fields	24	20	20	127	153
Maximum # of characters per field label	15	16	19	12	765
Variable length records (pack sectors)	No	Note 2	Yes	No	No
FIELD TYPES					
Alphanumeric	Yes	Yes	Yes	Yes	Yes
Numeric	Yes	Yes	Yes	Yes	Yes
Fixed decimal numeric	Note 4	Yes	Yes	No	No
Date (MM/DD/YY)	Yes	No	Yes	No	No
Extended date (MM/DD/YYYY)	No	No	Yes	No	No
Calculated equation	Note 5	Yes	Yes	No	No
Permanent fields	Yes	No	No	No	No
SORTING					
Machine language assisted	No	Yes	Yes	Note 7	Yes
Sort by any field	Yes	Yes	Yes		No
Number of Sort Key files	1	Note 6	5		1
Numeric sort	Yes	Yes	Yes		No
Ascending sort	Yes	Yes	Yes		Yes
Descending sort	Yes	Yes	Note 11		Yes
Sort within a selected range	No	Note 12	Yes		No
Sort multiple fields simultaneously	Yes	Yes	Yes		No
FILE MAINTENANCE					
Fixed length input fields	Yes	Yes	Yes	Yes	Yes
Single key entry of common data	No	No	Yes	No	No
Single field EDIT selection	Yes	Yes	Yes	Yes	Yes
Skip record (next or previous)	Yes	Yes	Yes	No	Yes
Search & EDIT record	No	Yes	Yes	No	Yes
Search & DELETE record	No	Yes	Yes	No	No
Auto rejection of alphanumeric data in numeric field	Yes	Yes	Yes	No	No
RECORD SELECTION TECHNIQUES					
Record number	Yes	N/A	Yes	Yes	No
Binary search (high speed)	No	No	Yes	No	No
Maximum # of simultaneous keys	1	4	10	31	1
RELATIONAL COMPARISONS					
Equal	No	Yes	Yes	Yes	Yes
Not equal	No	Yes	Yes	No	Yes
Greater than	No	Yes	Yes	Yes	Yes
Less than	No	Yes	Yes	Yes	Yes
Instring	Yes	Note 13	Yes	Yes	No
AND/OR	No	Note 14	Yes	Yes	No
Wild card masking	No	Note 13	Yes	No	No
PRINTING					
User specified page title	Note 8	Yes	Yes	No	Note 10
User specified column headings	No	Note 13	Yes	No	Yes
Automatic page numbering	Yes	Yes	Yes	Yes	Yes
Right justification	No	Yes	Yes	No	No
User defined column widths	Yes	Note 13	Yes	Yes	Yes
User defined column separators	No	No	Yes	No	No
Keyboard entered columnar values	No	No	Yes	No	No
Merge data into form letters	No	Note 13	Yes	No	No
Form filling applications	No	Yes	Yes	No	No
Columnar totals	Yes	Yes	Yes	No	No
Columnar subtotals generated upon change in a specific field	Yes	Yes	Yes	No	No
Built in screen print	No	Note 13	Yes	No	No
MISCELLANEOUS					
Cost	$75.00	$109.90	$99.95	$99.00	$79.95
Punctuation allowed within data fields	Yes	No	Yes	Yes	Yes
Upper/Lower case	Note 3	Yes	Yes	Note 3	Note 3
Built in RS-232-C driver	Note 3	Note 3	Yes	Note 3	Note 3
Built-in TRS-232 driver	Note 3	Note 3	Yes	Note 3	Note 3
Programmer's interface	Note 9	Note 9	Yes	No	Note 9
Sample DATA disk	No	Yes	Yes	No	No
Documentation (# of pages)	?	65	180	38	29

NOTE 1 Total sort & update capability dependant on memory size. File size limited by DOS.
NOTE 2 Sequential files only.
NOTE 3 User must apply own driver routine.
NOTE 4 Hard copy print out only.
NOTE 5 Four functions (+ – * /) only.
NOTE 6 Data records physically re-ordered in memory only.
NOTE 7 Available as a separate program for $99.95.
NOTE 8 120 character maximum.
NOTE 9 Data structures defined in manual.
NOTE 10 132 characters maximum.
NOTE 11 User option (files can be read from ascending or decending order).
NOTE 12 Range selection performed outside of sort.
NOTE 13 Limited.
NOTE 14 And is available.

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