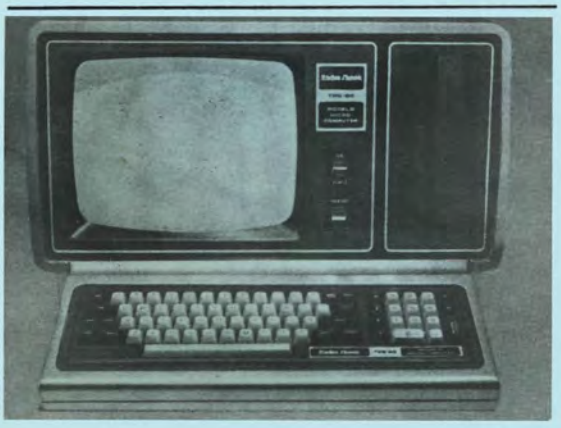
RADIO SHACK COMPUTER OWNERS

TRS-80 MODEL I AND MODEL II

TRS-80™ MONTHLY NEWSLETTER



ISSUE NUMBER 12
JUNE, 1979

- PRACTICAL APPLICATIONS
- BUSINESS
- GAMBLING • GAMES
- EDUCATION
- PERSONAL FINANCE
- BEGINNER'S CORNER
- NEW PRODUCTS
- SOFTWARE EXCHANGE
- MARKET PLACE
- QUESTIONS AND ANSWERS
- PROGRAM PRINTOUTS

. . . . AND MORE

- D.O.S. SHORTCUTS
- NEW TRS-80 MODEL II
- ASSEMBLY FOR BEGINNERS
- DOUBLE PRECISION ROUTIN'
- REDUCE FRACTIONS

©1979 H & E COMPUTRONICS INC.

PRICE $2.00

H & E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

Box 149
New City, New York 10956
(914) 425-1535

NEWSLETTER INFORMATION

THE **TRS-80 MONTHLY NEWSLETTER** IS PUBLISHED BY H & E COMPUTRONICS INC.

THE **TRS-80 MONTHLY NEWSLETTER** IS NOT SPONSORED, NOR IN ANY WAY OFFICIALLY SANCTIONED BY RADIO SHACK.

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

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

THE **TRS-80 MONTHLY NEWSLETTER** ENCOURAGES COMMENTS, QUESTIONS AND SUGGESTIONS. WE PUBLISH ARTICLES AND PROGRAMS WRITTEN BY OUR READERS. COMPUTRONICS INC. WILL PAY CONTRIBUTORS FOR ARTICLES AND PROGRAMS PUBLISHED IN THE NEWSLETTER.

SUBSCRIPTIONS ARE $24 PER YEAR ($28 PER YEAR -CANADA AND MEXICO, $36 PER YEAR OUTSIDE OF THE UNITED STATES, CANADA AND MEXICO-AIR MAIL). BACK ISSUES ARE AVAILABLE ($2 PER ISSUE).

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

LOCAL TRS-80 CLUBS

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

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

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

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

TRS-80 USER'S GROUP OF SANTA ANA - Contact Arnold Vagts, 3713 S. Parton Street, Santa Ana, California 92707 or call (714) 549-7021.

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

ADVERTISING IN THE TRS-80 MONTHLY NEWSLETTER

$150 PER PAGE . . . $75 PER HALF PAGE . . . $40 PER QUARTER PAGE . . . $20 PER EIGHTH PAGE.

THESE PRICES ARE VALID FOR ISSUES 12 and 13 **ONLY**. ADS MUST BE SUBMITTED BY THE 10th OF EACH MONTH IN ORDER TO APPEAR IN THE FOLLOWING MONTHS ISSUE.

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

BITS AND PIECES

BY

HOWARD Y. GOSMAN

HAPPY FIRST ANNIVERSARY!

With this issue, we have become the first TRS-80 PUBLICATION to last a year. We have become the largest publication devoted to a single computer (over 16,000). The size of our publicaton has gone from 16 to 32 pages. Our staff has increased from 1 to 14. Judging by our subscription renewal rate, we have satisfied the needs and expectations of most subscribers.

We have many plans for the next 12 months. Our 48 page SOFTWARE CATALOG #3 will be available on August 1 (in time for the NEW YORK COMPUTER SHOW). The TRS-80 MONTHLY NEWSLETTER is expected to increase in size (and should reach 48 pages by the 24th ISSUE). By the way, for those who haven't noticed it, although the Newsletter has been 32 pages for the last several months, its size has increased by 18% (we are now using smaller type). Our FULL PAGE ads in all of the major computer magazines should insure our continued growth. The TRS-80 MONTHLY NEWSLETTER will be expanded to include articles and information related to both the TRS-80 and the NEW TRS-80 MODEL II.

YOUR SUBSCRIPTION HAS EXPIRED...IF THE NUMBER (ABOVE YOUR NAME) AFTER THE DASH ON YOUR MAILING LABEL IS 12 (OR LESS). THE NUMBER FOLLOWING THE DASH TELLS YOU THE LAST ISSUE THAT YOU WILL RECEIVE. For example, if your subscription number is 16428-12, your subscription expires with this issue (ISSUE #12).

THE NEW TRS-80 MODEL II

Run down to your local RADIO SHACK store and get a copy of the new TRS-80 MODEL II ad. The front of the ad says "THE NEW TRS-80 SURPIRSE." Indeed, parts of it was a surprise.

The biggest surprise of all is that the new TRS-80 MODEL II really exists. We saw two actual working models of the computer at the NATIONAL COMPUTER CONFERENCE (New York City). In short, the computer is outstanding and a major breakthrough in small computers. The TRS-80 MODEL II is capable of handling the needs of most small business. The original TRS-80 (or should we say the TRS-80 MODEL I) was able to handle a small business, but 300,000 characters of disk capacity put a strain on businesses requiring large data bases (for large inventories, payrolls, mailing lists, etc.). The new

TRS-80 MODEL II will store up to 2,000,000 characters (bytes) of information (and keep them on line for instant access). Of course by changing diskettes, you can store an unlimited amount of information.

What follows is a list of TRS-80 MODEL II FACTS (with my personal comments):

(1) The TRS-80 MODEL II sells for $3,450 and up (approximately 1/5 the price of an equivalent IBM model). The $3,450 version includes 32K of memory, a built in video and disk drive (an 8 inch disk drive capable of storing 500,000 characters of memory compared to 85,000 on the TRS-80 mini disk drives). We strongly recommend that you buy the 64K version selling for $3899. Most businesses will quickly find that 32K of memory is not sufficient.

(2) A DISK EXPANSION SYSTEM can be plugged directly into your system. The expansion unit holds 1, 2 or 3 additional 8 inch disk drives (each with 500,000 byte capacity). 1-drive sells for $1150, 2-drives sell for $1750, and 3-drives sells for $2,350. The first drive comes with the disk expansion unit, so in effect, you are paying $550 for the expansion unit (really a disk housing unit) plus $600 for each disk drive. You can buy the expansion unit with one drive for $1150 and purchase your two additional disk drives (at $600 each) at another time. Remember, your $3450 or $3899 initial computer outlay includes a built in disk drive...so if you buy the 32K or 64K computer with the 3-drive expansion unit...you have a total of 4 disk drives. The cost of a complete 64K system with 3 additional disk drives is $6249. That will give you 64K of memory and 2 million bytes of on line disk drive storage. An equivalent IBM system sells for well over $20,000.

(3) The TRS-80 MODEL II does not have ROM. This is a nice feature not found on the original TRS-80. This means that when you power up, your computer is blank before entering your DISK OPERATING SYSTEM. This makes it much easier to use other programming languages such as FORTRAN, COBOL, CPM and PASCAL (whatever they are!).

(4) MODEL II Operates twice as fast as the original TRS-80 (faster input-output with disk drives and faster sorts).

(5) MODEL II features upper and lower case letters. It has a built-in 12 inch high-resolution video monitor that displays 24 lines of 80 normal characters or 40 expanded characters. This feature makes the MODEL II an outstanding WORD PROCESSING COMPUTER. The original TRS-80 displays 64 character lines. WORD PROCESSING on the TRS-80 was difficult because what you saw on the screen was differenct from the final copy. The MODEL II

(with its 80 character lines) makes it possible to have a WORD PROCESSOR that prints exactly what is displayed on the video monitor.

(6) MODEL II has a 76-key keyboard (with "calculator" keypad). The keypad includes advanced functions such as Control, Escape, Caps, Hold, Repeat and two software-programmable Special Function keys. The keyboard is detachable and moveable for convenient data entry.

(7) The "enhanced" LEVEL III BASIC and TRSDOS OPERATING SYSTEM takes up about 24K of RAM (out of the 32K or 64K RAM in your machine). That's just about what the original TRS-80 used. Remember, you had the 16K ROM plus about 11K of RAM so the original TRS-80 used about 27K of memory.

(8) MODEL II thoroughly tests itself on each power up. This insures that your system is working properly.

(9) Direct Memory Access allows MODEL II to continue processing during disk transfer operations.

(10) MODEL II contains built in input/output capabilities including two RS-232C channels and one Centronics parallel port. Future expansion is provided for through four plug-in slots for optional PC boards. Expansion boards are under development.

(11) THE RADIO SHACK TRS-80 MODEL II WAS DESIGNED AND BUILT BY RADIO SHACK IN FORT WORTH TEXAS.

(12) A system desk is available for MODEL II (sells for $350).

(13) LINE PRINTER II (a CENTRONICS made printer) is a nifty looking new printer available for MODEL II (as well as for the original TRS-80). The new printer is a small lightweight 7x7 dot matrix printer that will print 50 upper or lower case characters per second. It will operate in both friction-feed and pin-feed modes. WARNING...In our opinion, the LINE PRINTER II has many limitations. You must use 9 1/2 inch forms in the pin-feed mode. If you use forms with a different width, you must use the friction feed mode (which usually does not give exact alignment). THE NEW PRINTER IS POWERFUL AND ECONOMICAL. IF IT IS TO BE USED FOR MAILING LABELS, BUSINESS FORMS, CHECK WRITING, ETC...MAKE SURE THAT THE FORMS YOU ARE GOING TO USE CAN BE USED ON A 9 1/2 INCH PIN-FEED PRINTER. Another important limitation to consider is that you are limited to three part forms (original and up to two copies). LINE PRINTER II sells for $999.

(14) BETTER YET...THE LINE PRINT III is a SUPER PRINTER and well worth the

$1999 price tag. The 9x7 dot matrix printer has upper and lower case characters and prints 120 characters per second (and is bi-directional). Expanded (wide) characters may be software selected for headings or emphasis on your printed forms or reports. Line-feed increments as small as 1/8th-line and bi-directional printing make graphing and charting a strong enhancement to the system. The fully adjustable tractor mechanism feeds continuous forms of varying widths up to a maximum of 15 inches (with 100% accurate alignment). Drive motors run only during actual printing, so RADIO SHACK'S LINE PRINTER III can always be silently awaiting your print command. Print quality approaches business letter quality, but is short of the quality obtained on the IBM SELECTRAPRINT (or similar high quality printers). WE HIGHLY RECOMMEND THE LINE PRINTER III FOR MOST BUSINESS APPLICATIONS.

(15) By the way, your old TRS-80 LINE PRINTER plugs right into the new computer...so don't throw it away!

IN SHORT...THE NEW TRS-80 SURPRISE (the title of the MODEL II ad) WILL SHAKE-UP THE COMPUTER MARKET. THE NEW COMPUTER WILL BE IN DIRECT COMPETITION WITH HEWLETT-PACKARD, IBM, DIGITAL AND OTHER $10,000-$25,000 COMPUTERS (and is priced at about 1/4 the price).

AN INTERVIEW WITH RADIO SHACK'S PRESIDENT REGARDING THE COMPANY'S GROWING MICROCOMPUTER BUSINESS

The questions and answers below come from AN INTERVIEW WITH RADIO SHACK'S PRESIDENT REGARDING THE COMPANY'S GROWING MICROCOMPUTER BUSINESS. The material was provided by RS COMPUTER SERVICES.

Q. Why have you called the TRS-80 MODEL II "the most important product" ever made by your company?

A. Because again it's state-of-the-art technology, demonstrating Shack's surprising ability to do-it-ourself. And because it opens all sorts of horizons for related sophisticated products and spin-offs from microprocessor know-how. For another thing, TRS-80 products are leading us into new marketing fields and selling techniques.

Q. What are RADIO SHACK'S intentions regarding TRS-80 MODEL-I?

A. Model I is the original TRS-80 as you know; we have every intention to keep it on the market and to keep adding peripherals and software. It's the "building block" of the personal microcomputer industry, letting users into computerism at system prices below $600--even lower, as we get down the learning curve and increase productivity. MODEL II systems start pretty close to the point where the most expensive MODEL I systems end. It would make no sense whatsoever to turn our backs on this business (Model I) which is, after all, only in its infancy.

Q. What about home computers?

A. We have repeatedly stated that TRS-80 MODEL I is not a home computer. Of course, it can be used at home or anywhere else where there's AC current, that's what makes it such a breakthrough! The "home computer" is a fantasy the press is so eager to have become a happening, it has simply made up its own "facts" concerning TRS-80 MODEL I and similar equipments. When we choose to design a home computer we'll announce it loud and clear. The timing is 1980-ish. Obviously, TRS-80 MODEL II, being less transportable than MODEL I, is even less susceptible to being called a home computer.

Q. Who are the intended TRS-80 II users?

A. Probably we'll draw on a somewhat narrower base than MODEL I, zeroing in essentially on small business, small parts of large business, and professionals in every field including accounting, law, medicine, engineering, manufacturing and so on. Both models can be conveniently built up to accomodate more memory as the needs develops, but MODEL II, in its "starter system" configuration, begins close to MODEL I's top power and goes on up.

Q. What other make computer would compare with TRS-80 MODEL II?

A. It may sound a trifle like hard sell, but our people assure me that an IBM 5110, configured with a single two-sided disk and a screen about 50% smaller than MODEL II's, sells for $13,800. A TRS-80 II, using two disks (one built in and a second included in our expansion unit) but of identical power, sells for exactly 1/3rd the price of the IBM. To put it more succinctly, you can buy three of ours to one of theirs. Does that mean RADIO SHACK and TANDY have thrown down the gauntlet to the big "mini" boys? My answer is: No. We've been working on MODEL II for two years and to us it was a natural development of our program, once we saw we had a winner in MODEL I. Our distribution patterns and techniques differ widely from those of IBM, H-P, etc., and our business is to sell as many as we can to any sort of consumer. Nevertheless, MODEL II is aimed squarely at the business sector, and confrontation with major computer brands is inevitable.

Q. Why did you retain the TRS-80 name for MODEL II?

A. Well, TRS-80 is certainly "the biggest name in little computers," as one of our trademarks states. We have over 100,000 TRS-80 MODEL I users, most of them tickled pink with their purchase; in fact our TRS-80 I sales in 20 months have equalled RADIO SHACK'S entire year's sales for fiscal 1970, the first year RADIO SHACK broke the $100-million sales mark. TRS-80

is the best-known model designation in the expandable system microcomputer business; now that we have a MODEL I and a MODEL II, it should become even better known.

Q. What is the delivery situation?

A. For most MODEL I systems, delivery is immediate; this still does not apply, however, to certain peripherals, particularly disk drives. MODEL II deliveries are expected to begin in July, 1979, but we do not expect to be able to send any to our stores until October, 1979--and then on the basis of one demo to each of our 140 USA districts. Orders will be filled on the basis of first-in first-out.

Q. How is it that RADIO SHACK can undersell most competitors?

A. I feel it's more a situation of out-producing than underselling; when you out-produce you should usually be able to produce more economically. Also we have distinct advantages in distributional cost. All so-called "office equipment" manufacturers (or their distributors) have extremely high selling costs. TRS-80 systems, on the other hand, have low selling cost because they are sold in stores or Computer Centers. When the customer comes to you, rather than the reverse, the cost to sell is always less. We also have certain other overhead advantages, particularly in the areas of direct distribution, credit collection, and amortization of R & D and tooling expenses. I suspect the TRS-80 family, particularly MODEL II, will cause a few high-priced computer companies to reassess their pricing policies, although their first attack could be to try to convince the rest of the world that we are lower in quality, an approach that would lack credibility even in the short run.

Q. What impact will TRS-80 MODEL II have on MODEL I?

A. I feel MODEL I will outsell MODEL II in terms of units owing to their wide discrepancy in price. Anyone desiring to use a computer will discover that MODEL I has many very practical applications for which MODEL II may simply be "too much computer." Then added speed and computing power of MODEL II makes it a perfect fit for business use when memory storage exceeding 500-million bytes is needed. But there are many, many places where this is not needed, and that's where MODEL I comes in. MODEL I is also considerably lower in cost and lighter in weight. There are many good analogies--printing presses, typewriters, desktop calculators, fixed-lens cameras and vehicles--for determining the proper choice between MODEL I and MODEL II. And there are many examples where too much capacity in an equipment or a building simply mean waste of energy, money and space. The RADIO SHACK computer line, in our best judgment, offers an unequalled choice to the user, and each choice is expandable upward; this

was our design consideration from the very beginning.

Q. What about computers using home TV sets as monitors?

A. For starters, any system that does not include a video monitor is not a complete system and involves unpleasant compromises. TRS-80 MODEL I uses a 12" TV monitor which we modify for computer use; contrary to general opinion, it's not "just a stripped TV set." One reason for doing this is to get better character resolution. A weakness in using home TVs (particularly color sets) as monitors is poorer resolution, clarity, definition and character count. MODEL II, of course, has a professional 12" monitor that had no TV heritage. Use of a home TV additionally causes clutter and on occasion will annoy TV viewers; additionally, its location is apt to be in the wrong room environment.

Q. What about color in general?

A. Radio Shack's TRS-80 systems were purposely designed without color adaptability even though color is more spectacular in demonstrations. They are primarily business machines. In that sense, color is perceived as a gimmick rather than as a need or benefit, and more suitable to TV games and the like. The same is true of TRS-80 styling, where the more severe grays, blacks, and silvers of the TRS-80 family seem to us (and the majority of critics) more appropriate than racing stripes, fancy designs, rainbow keys and modish nicknames. In summary, RADIO SHACK sees computers more as word-processors and data processors than as youth-oriented novelties. You will note that the construction of all TRS-80 computers is extremely rugged and practical; RADIO SHACK has not cut corners on cabinet construction material or tooling as it might have had to do if our production runs were short.

Q. A lot has been written about competition...any comments?

A. We live in a competitive world and surely the word has gotten around that TRS-80 has created a whole new business in the sense of bringing computer costs and reliability down to the level of small business, schools, hobbyists and beginning programmers. We do have a substantial lead in experience and know-how, however there are plenty of well-heeled potential competitors (and the usual coterie of loft operators) who have set TRS-80 up as their target for the 1980s. Radio Shack will have to continue to make friends and influence people with quality, distribution and service. We have the resources, talent and desire to do so, and no intention to play #2 to anybody! And we have something priceless that no conceivable competitor has: upwards of 5000 salespeople with close to two years of computer sales experience and personal computers. That's more than just a head start...it's proven leadership over a "generation" of

equipment which, in consumer electronics, just may establish the difference between their promises and our fulfillment.

AN ANGRY TRS-80 OWNER RESPONDS

What follows was written by a very angry TRS-80 owner. It was one of many letters we received expressing similar thoughts. NOTE-PUBLICATION OF THE OPINION BELOW SHOULD NOT BE CONSTRUED AS AN ENDORSEMENT BY H & E COMPUTRONICS INC. OF THE IDEAS EXPRESSED.

THE RADIO SHACK SURPRISE (written by Pete Carr, Carrhorn Music, Inc., 111 Kentucky Avenue, Sheffield AL 35660).

We've been given the shaft. That's right! The people that supported the RADIO SHACK TRS-80 and that have the four disk 48-k business system have been royally "you know what." My basic TRS-80 business system includes (not counting the line printer, etc.):

Computer with 16K memory, screen and cassette recorder	$998
Expansion interface with 32K and RS-232 board	$1000
Four disk drives with 320K capacity	$2000
TOTAL.....	$3998

RADIO SHACK promised full support and that all new changes would be modular or modifications (e.g.:key bounce fix) and even in their new DOS manual they included a reader's survey sheet to fill out and send in to see what we wanted or needed in as far as support, programs, complaints about the computer, and features we would like changed or added, etc. They said that they were stepping up their support and expect to have the new 2.2 DOS ready any time. We are continuing full support for you, "our valued customers."

Well, I, like many others, filled mine out and sent it in with points and changes that I was looking forward to them adding or changing...such as: A new and better DOS, upper AND lowercase, better screen resolution and so on. I really thought that RADIO SHACK was gearing up with support for us, "their supporters", when I saw their new disk programs such as General Ledger, Mail List, and a promiste of more on the way. I was even looking forward to a mod for upper and lower case. Boy, was I fooled!

Now the promised 2.2 DOS isn't out. I see no rash of disk programs. There seemed to be no response to what I and the other people in the same situation (a four disk full business system), asked for, (some even added some features themselves) until yesterday.

RADIO SHACK sent out a new brochure about their new TRS-80 MODEL II. Look what it has AND IT OPERATES TWICE THE SPEED of my TRS-80.

1. Upper and lowercase.
2. High resolution video display.
3. 76 key-keyboard wih built in calculator keypad.
4. 24 lines of 80 characters, or 40 expanded.
5. Functions such as Control, Escape, Caps, Hold, Repeat, two programmable Special Function keys!!

And this is just the keyboard and screen. Built in on one side of the screen is a half million byte disk unit. It includes a better basic and direct memory access which allows the Model II to continue processing during disk transfer operations. This system with 64K of memory sells for $3899. That's about $100 less than my much inferior system.

What happened to all of your support RADIO SHACK?

I called my local store and asked about trade-in values. He said that the main offices in Fort Worth said they wouldn't do it because they expected a rash of people (like me) to want to trade in their system. What is this!?! We know exactly what it is and how it feels, don't we? I hope all you other TRS-80 users in my position will write letters to RADIO SHACK and do whatever is necessary to make our feelings known. Their promised support to us has just plain been forgotten.

Thank you, RADIO SHACK!!!

IN DEFENSE OF RADIO SHACK

RADIO SHACK needs no defense. They have just done what companies have been doing for years (for better or for worse). IBM and similar companies have been doing it for years. The usual trend for computers and similar merchandise (calculators, copying machines, radios, televisions, watches, tape recorders vacuum cleaners...) is to put a product on the market for two years...and come out with a better, less expensive version of that product two years later.

The process of obsolescence is not necessarily done on purpose. The first calculators to be sold to a mass market were sold for $300. Within one year, more advanced calculators were selling for $100. Now, you can buy a scientific calculator (with functions not imagined a few years ago) for $20. IBM has been coming out with NEW improved computers just about every 2 years. Each new generation of computer is far more advanced than their previous generation...and far less expensive.

Now RADIO SHACK first announced their TRS-80 on August 3, 1977. We have been predicting (since Issue #1 of the TRS-80 MONTHLY NEWSLETTER) that a new computer would evolve. RADIO SHACK has followed the normal predicted two year life cycle with their TRS-80 (that is...two years to the next

generation Computer). You can also be sure that two years from now, another new generation computer will be announced by RS.

No. We are not defending RADIO SHACK. We are just trying to say that RS has followed a normal pattern. RS is not in a position to buy back old TRS-80 machines (just as clothing stores do not buy back out of style clothes). It would have been pretty much impossible for RS to keep adding on patches to the TRS-80 MODEL I in order to bring the machine up to the TRS-80 MODEL II level.

Has the MODEL I owner been abandoned? Far from it. RS seems to have made a grand attemp at continuing its support of MODEL I owners. The 2.2 DOS has just been released. A flood of new programs have been added to the RS software rolls. The new QUICK PRINTER II is a welcome addition. RS now has a new VOXBOX (for voice recognition). Still to come, RS will soon be releasing a lower case modification, FORTRAN, a $200 payroll system (for disk), a fully integrated business system (disk), word processor (disk or cassete), and more (all for the TRS-80 MODEL I).

Yes, Mr. Carr and thousands of RS owners with disk drives ($2000 or more worth of equipment) have a right to be less than overjoyed with the release of MODEL II due to the unpleasant realization that our $3300 worth of equipment has been surpassed by $3450 of equipment with twice the capacity. On the other hand, the above thousands of RS owners would have never though about a computer if it wasn't for RS.

The new MODEL II is fantastic. Its too bad that RS can't offer a rebate for buyers turning in their old machine. It would be nice (but probably impossible). RS is a profit making organization. What will they do with all of those old machines?

WARNING...THE TRS-80 MODEL III IS ON THE WAY. RADIO SHACK is not going to stop now. RADIO SHACK has committed itself to an expanding role in the computer market. It is presently working on a TRS-80 MODEL III!! You can be sure that it will be released in about two years...and oh yes, it will make the MODEL II look like a toy (expect a bubble memory instead of disk drives with at least 10 million K of on line memory and 256K of internal RAM memory).

SO WHAT SHOULD I DO WITH MY TRS-80 MODEL I

Use it. RS has shown that they will continue to support the TRS-80 MODEL I. The chances are, you don't need the MODEL II. If you are ready for the MODEL II, then sell your MODEL I. We're not sure what the resale market will be like, but you can expect to get 50% to 75% of list price for your computer if you decide to sell it. There are still thousands of people who will decide to buy the TRS-80 MODEL I. They would gladly buy your

LEVEL II, 16K computer system for 50% to 75% off. It is not going to be too hard to sell your entire system or each separate component (one at a time). Try selling your 16K computer (with tape recorder and video). You certainly won't have any trouble selling it for $250, $300, $400 or $500 (since the list price is $988). On the other hand, you would probably have a lot of trouble trying to sell it for $975 or $950. I wouldn't be surprised if some enterprising entrepreneur started a used RS computer business (buy and sell).

WHAT SHOULD I DO WITH MY OLD SOFTWARE?

Don't throw away your 5000 mailing list or inventory. Both the programs and data can be transferred to the new MODEL II. The TELEPHONE INTERFACE II (for the original MODEL I) will allow the transfer to take place (some software patch may be necessary).

WHO SHOULD BUY THE TRS-80 II?

(1) If your initial computer outlay is going to be $2000 or more, we suggest that you purchase the MODEL II instead of the MODEL I.

(2) If you presently own a MODEL I with 48K and one or more drives, you don't necessarily need the MODEL II. Each diskette holds about 85K. 6 diskettes (or about $24 worth of diskettes) holds about 500K of data (about equal to the new TRS-80 MODEL II storage capacity). If your mailing list has 2000 names, then MODEL I is fine. If your mailing list has 5000 names, then MODEL II would be better. If your inventory has 5000 items, then MODEL I is fine. If your inventory has 10000 items, then MODEL II would be better.

MODEL II FUNCTIONS ARE ABOUT EQUIVALENT TO MODEL I. MODEL I CAN DO ALMOST EVERYTHING THAT MODEL II CAN DO. THE MAIN ADVANTAGE OF MODEL II IS LARGER ON-LINE STORAGE SPACE FOR DATA. If you are presently running out of space, then look at MODEL II.

(3) What about me? I have a 16K computer. Should I buy an expansion interface, 16K additional memory and a disk drive? Well that's $997. The new computer sells for $3450. It's probably better to buy the 16K memory and disk drive (unless you need large storage capacity).

TEXAS INSTRUMENTS IS HERE

TI has finally announced their first inexpensive computer. The new TI-99 is no match for the RS computer (and probably not a match for any computer). The TI-99/4 will be marketed as a HOME COMPUTER (RS markets the TRS-80 as a business computer). The TI-99 sells for about $1100. Here are the TI features (with TRS-80 comparisons):

(1) TI-BASIC has built-in 13-digit, floating point BASIC with special

features and extensions for color, sound and graphics. The floating point BASIC is probably equal to RS BASIC. TI probably has superior graphics (and in color) which will help emphasize the game aspect of the computer.

(2) Up to 72K total memory capacity-16K RAM, 26K ROM plus up to 30K of Solid State Software Modules. This is the real clinker. The new TI is limited to 16K...that's it. The 26K ROM holds their BASIC and color graphic features. Their 30K plug in ROMS holds there games and other programs such as Personal Record Keeping, Home Financial Decisions, Household Budget Management, Investment Analysis, Statistics and Tax/Investment Record Keeping. The bad part is...you are limited to 16K of original programming and data storage. The other 56K are ROM (read only memory) which means that you are stuck with whatever TI comes out with.

The new TI is sad indeed. After all this time, they come up with a bomb. If you want color graphics...buy the APPLE II. At least its expandable (up to 48K). The new TI doesn't even come with a cassette recorder (although one can be added). It does come with a color monitor. TI will have alot of trouble selling this bomb!

ENTER ATARI

The two new ATARI COMPUTERS do have something to offer and will compete in the low end RS market. The ATARI will be marketed as a PERSONAL COMPUTER SYSTEM. The ATARI 400 will sell for around $400. It has 8K RAM and 8K ROM and is designed to be the next logical step after ATARI video games. It comes with a cassette recorder and also uses plug-in cartridges (similar to their video game cartridges). ATARI has developed a series of educational cartridges (interactive courses in subjects such as Algebra, Economics, Spanish, Vocabulary, Zoology...). The ATARI 400 is a nice package and is designed for newcomers into the COMPUTER WORLD.

The ATARI 800 sells for about $800. It is very similar to the RS in many ways. It comes with 8K RAM but is expandable to 48K. It has one neat new feature. It also allows for two plug in cartridges for rapid program insertion (sort of plug in ROMS). Unlike RS, the ATARI is designed to be completely user serviced (RS TAKE A HINT). When you want to change your computer from 8K to 16K, 32K or 48K...just plug in your RAM into the socket (no soldering, no loss of guarantee). The NEW ATARI 800 is expandable and can be used with up to 4 disk drives. It is an attractive computer and is in direct competition with the TRS-80.

Both models of ATARI do not come with a video. You can plug them directly into your B & W or color TV.

AN APOLOGY TO THE NEW ROCHELLE COMPUTER CENTER

Unfortunately, our review of the NEW ROCHELLE COMPUTER CENTER left our local readers with the wrong impression (page 221, Issue #10). The purpose of the review was to offer suggestions for the improvement of RS COMPUTER CENTERS around the country (not to criticize an individual store). The quantity of stock and items carried by all RS COMPUTER CENTERS are limited by the policies set by RADIO SHACK. The expressed disappointment in the NEW ROCHELE COMPUTER CENTER would have been expressed about any other RS COMPUTER CENTER. The concept behind RS COMPUTER CENTERS is fantastic. Establishing the RS COMPUTER CENTERS indicate that RS is serious about supporting computers and intends to expand its venture into the computer market. The RS COMPUTER CENTERS should be something special. It should have a wealth of supportive merchandise not found in local RADIO SHACKS (such as computer magazines, carrying cases, business forms, data processing supplies, the TRS-80 MONTHLY NEWSLETTER as well as Newsleters written by our competitors, computer books and other important accessories. We would like to see the RS COMPUTER CENTERS become an essential part of the computer support market. Why should we have to find a non-RS computer store in order to buy an item such as SOME COMMON BASIC PROGRAMS (a book full of important computer programs). We want to see RADIO SHACK COMPUTER CENTERS grow. Our suggestions are offered to improve the COMPUTER CENTERS...not criticize them.

Anyhow, since our last visit to the New Rochelle Computer Center, things have improved. I was particularly impressed with the SERVICE department. The New Rochelle Computer Center (and all RS COMPUTER CENTERS) can fix most TRS-80 problems on the spot (while you wait). This kind of support is unparalleled in the computer world. RS (in Texas) has read our suggestions and has already acted on some of them.

IBM SELECTRAPRINT QUALITY

Another apology. MICRO COMPUTER DEVICES (one of our long term advertisers) took exception to one of our statements in Issue #11 of the TRS-80 MONTHLY NEWSLETTER. We stated that "The DIABLO gives high quality print (as good as or better than the IBM SELECTRTRA-PRINT)." We have no reason to believe that the DIABLO gives quality better than the IBM SELECTRA-PRINT. We should have stated that the DIABLO gives print quality about equal to that of the IBM SELECTRA-PRINT. In fact, in a close up visual comparison of print quality on the two machines, we found that the SELECTRA-PRINT left a more even print impression than the DIABLO. (We suggest that you make your own visual comparison to confirm the above.)

H & E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

SOFTWARE CATALOG NOTES

1. INTRODUCTION TO T-BUG was listed as $16.95 in CATALOG #2. The correct price is $6.95.

2. INTRODUCTION TO T-BUG, REAL TIME BASIC FOR THE TRS-80, and 32 BASIC PROGRAM FOR THE TRS-80 COMPUTER (LEVEL II), all from DILITHIUM PRESS have been scheduled for release in July. We have a large quantity on order and will shipment them immediately upon publication.

3. The following programs, although listed in our catalog, have not been released by GRT CORPORATION (producer of G2/LEVEL III BASIC: OIL TYCOON, OUTWIT, OUTWIT II and ADVENTURE. They are due to be released within the next 30 days.

4. GRT CORPORATION has release a new game program called BULLSEYE! BULLSEYE is available for immediate delivery ($14.95). BULLSEYE contains two games "designed to test your reflexes and your imagination. (1) SHOOTING GALLERY is the classic target game. You 'll have hours of fun shooting at flying ducks, running mice and, of course, balloons! (2) SPACE ACE is a pilot simulation that makes you feel like you are actually flying your own space fighter. As the stars roll by, you can feel your space craft turning to zoom in on the eney ships." We tried SPACE ACE and give it a very good rating (SHOOTING GALLERY is just OK).

5. For those of you who never played any games, we suggest that you buy the best game of all "AIRAID." AIRAID is the most successful TRS-80 games around ($14.95 listed in CATALOG #2). AIRAID from SMALL SYSTEMS SOFTWARE has caused this newsletter once again to be delayed (we have trouble getting people away from the computer when AIRAID is on). Our highest recorded score is 15,200.

6. Anyone who purchased our original MAIL PROGRAM ($99.95is eligible to receive the new MAIL PAC. In order to receive the new MAIL PAC, just send us a note along with $5. You will receive the new MAIL PAC program along with our new instruction manual and new MAIL PAC diskette. We will check our files to confirm your prior purchase before sending out the new version to previous owners.

7. Anyone who purchased our original PAYROLL PAC, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, GENERAL LEDGER or INVENTORY CONTROL PAC may purchase any of our NEW programs for $25 (selling for $99.95). These new programs were not written by H & E COMPUTRONICS INC. They are the TRS-80 translations of OSBORNE & ASSOCIATES program.

8. Our SMALL BUSINESS PAC and HOME BUDGET PROGRAMS are now selling for $49.95 (not $99.95 as in Catalog #2).

9. We have purchased about 40% of the original distribution of SYSTEMS EXTENSIONS. Although they were delivered to our customers about 45 days later than originally promised...they were shipped about 30-days earlier than shipment to non H & E COMPUTRONICS, INC. customers.

10. Our IN STOCK inventory of software, books and disk drives now totals close to $100,000. All orders are processed immediately. In the even that an item is OUT OF STOCK, customers are notified of the delay with an estimated shipping date. You should receive either your merchandise or written confirmation of your order within 10-days. All orders are processed within 24-hours (but not on Sunday). UPS delivery takes anywhere between 1 day (to New York) to 6 days (in California).

WHERE IS MY NEWSLETTER?

It looks like it will always be late. This issue was mailed on June 30. We have now published 12 issues in 12 months so we have a proven track record of publishing monthly. PLEASE DO NOT WASTE PHONE CALLS ABOUT NOT RECEIVING YOUR ISSUES. If you do not have your JULY issues by August 21, send us a post card with your name, address and subscription number. A duplicate issues will be sent to you by FIRST CLASS MAIL.

CHANGE OF ADDRESS, RENEWALS, SUBSCRIPTION STATUS INQUIRIES

...if possible should contain your subscription number. Remember, your subscription number is above your name on every newsletter you receive from us. If you don't tell us your subscription number, we could have trouble locating your name. All names are listed alphabetically...but we have more than 125 SMITH's who subscribe to the Newsletter (plus some Symdth's to make things even harder).

D.O.S. SHORT CUTS

MARC HARAS, Glen Electric Heater Corp., 2111 E 30th St., Erie, PA 16510 offers the following shortcuts not listed in the RS DISK MANUAL:

"Here is something that I found that could save 'some' people 'some' operating time. The three library commands: BACKUP, COPY and RENAME can be used without the mandatory word "TO" as shown in the RS DOS MANUAL.

BACKUP :2 TO :3 can be entered as BACKUP :2 :3
COPY SALESTAX TO SALESTAX:3 can be entered as COPY SALESTAX SALESTAX:3
RENAME CURRENT/SLS TO PREVIOUS/SLS can be entered as RENAME CURRENT/SLS PREVIOIUS/SLS

MORE ON CTR-80 PROBLEMS

Many people have already discovered that the CTR-80 cassette recorder can ruin recorded software on cassette tapes. If you STOP your recorder in

the middle of loading a program, you may have permanently damaged your program. It is very important that you DO NOT PRESS STOP IN THE MIDDLE OF A PROGRAM. The problem usually occurs when you buy software from and must find the correct volume level for loading. Most people just press STOP when they see that the tape is not loading properly. GRT CORPORATION (who distribute G/2 LEVEL III BASIC), recommend that you remove the smallest grey plug of the TRS-80 when entering important programs. This will eliminate the possibility of permanent damage of the program. RS has not confirmed the problem (but we have heard that they have corrected the problem).

One of our readers sent us the following permanent fix...open up the back of your record and expose the motor. Follow the brown wire from the motor to the circuit board. The wire splits in the center into a white center conductor and a silver shield. Take a small diode (276-1101...available at RS for 39 cents) and solder the banded end to the white wire and the other end to the shield (on the circut board). The problem is now solved (and in 30 seconds by anyone who knows how to solder).

REDUCE FRACTIONS

This short program was submitted by Arthur Scialabba, 25 Regen Rd., Danbury CT 06810.

```
10 INPUT "INPUT FRACTION A/B=A,B",A,B
20 IF A>B THEN 40
30 FOR X=2 TO B:GOTO 50
40 FOR X=2 TO A
50 IF B/X<>INT(B/X)THEN 120
60 IF A/X<>INT(A/X)THEN 120
70 A=A/X
80 B=B/X:GOTO 20
90 PRINT "REDUCTION IS ";A;"/";B
100 INPUT "AGAIN 1.YES 2.NO",S:ON S GOTO 10,110
110 END
120 NEXT X:GOTO 90
```

THE TRS-80 SOFTWARE SOURCES

The TRS-80 SOFTWARE SOURCE contains a listing of over 2,400 programs available from over 200 vendors. The software is listed alphabetically by VENDOR, and TITLE AREA. TRS-80 SOFTWARE SOURCE is availabe from H & E COMPUTRONICS, INC., for $5 (or for $2 with any other order).

NEXT MONTH WE WILL RESUME OUR BEGINNERS CORNER AND ALSO PRINT DETAILS ON THE OTHER NEW RADIO SHACK COMPUTER.

H & E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

GETTING IT TOGETHER IN ASSEMBLY
(ASSEMBLY FOR BEGINNERS)
Column #4: The Stack

by
Dr. Hubert S. Howe, Jr.

COPYRIGHT 1979 by Hubert S. Howe, Jr.

The STACK is an area in memory where data values from the CPU registers can be stored and retrieved in a simple manner. The STACK POINTER (SP) is a 16-bit register in the CPU that contains the address of the current location that is at the "top" of the stack. The idea of a stack area may seem strange, since you always have the possibility of loading or storing data in memory by using the LD instructions. Many earlier computers either did not have a stack area, or if they did it might have been different from that in the 8080 and Z-80 microprocessors. Understanding the use of the stack is crucial to writing any assembly language program for the TRS-80, for if the stack ever gets destroyed, or if the stack pointer ever gets loused up, the entire computer will not run!

The idea of having a general area in memory in which to store and retrieve data is a good one, because the need to do this occurs so frequently when running a program. First, it is essential to understand that the stack does not necessarily exist in any particular area of memory. Where it is located is determined by the programmer, through the use of one of the load stack pointer instructions. Nevertheless, when you are running a Basic program, the stack area will usually be located somewhere near the top of memory, for that is the area that is used by Level II Basic. This area is used because of the fact that Basic is an expandable program that must be capable of being run in computers with diferent memory sizes.

Second, the stack is organized as a "last in - first out" or LIFO system. When values are "pushed" onto the stack, they are saved "backwards" in memory, and the stack pointer is decremented by 2. When values are "popped" out of the stack, the SP is incremented by 2. This is why the stack pointer usually points below its original value.

Third, all uses of the stack are for double registers only. The primary use of the stack is through the PUSH and POP instructions. PUSH saves the contents of a double register in the stack, and POP retrieves them. You can PUSH or POP AF, BC, DE, HL, IX, and IY. PUSH and POP instructions for the general registers require only one byte of memory (those for the index registers require two), and the execution of a PUSH or POP is always faster than a load referring to a memory location. When the values in a register pair are pushed onto the stack, the registers themselves are unchanged.

Let us suppose, for example, that the SP contains 4288H. (The "H" appended to a number means that it is hexadecimal.) Upon executing a PUSH HL instruction, the computer saves register H in location 4287H and L in 4286H and leaves the SP pointing to 4286H. Note that, as with all double register saves, the least significant byte is followed in memory by the most significant byte. If this instruction were to be followed by a POP DE, E would be loaded from 4286H and D from 4287H, and the SP is left pointing to 4288H. Thus, the stack pointer always contains the address from which data will be popped.

Now that we understand the use of the stack area for storing and retrieving registers, we can turn to its other main use, which is with the CALL and RETURN instructions. (RETURN is abbreviated RET.) You are probably familiar with the concept behind CALLs and RETURNs from the GOSUB and RETURN statements in Basic. A SUBROUTINE is a portion of a program that can be entered from different locations in the program, with the provision that you be able to return to the location immediately following the CALL when it is over. Whenever any Z-80 instruction is being executed, the program counter (PC) points to the NEXT instruction in memory. Thus, when the computer encounters a CALL instruction, the PC contains the return address. What happens during a CALL is that the contents of the PC are pushed onto the stack; the SP is decremented by 2; and the computer branches to the location specified. When a RETURN is executed, the address is popped off the stack; the SP is incremented by 2; and the computer branches to the address. Naturally, if the stack area is used by the subroutine, it is necessary that the SP be returned to its original value before the RETURN is executed. This is one way in which beginning programmers frequently make errors.

The CALL and RET instructions of the Z-80 can be executed either unconditionally or conditionally, depending on the conditions NZ, Z, NC, C, PO, PE, P, and M (discussed in column #3). For example, CALL NZ,ADR would call the location named ADR only if the condition NZ were true, and RET NZ would return only on the same condition. These features greatly enhance the flexibility of subroutine usage with the Z-80.

Very similar to the CALL instructions are the RST (restart) instructions. These one-byte instructions are, in effect, calls to locations 0 through 56 (38H) in multiples of 8. The reason for this limitation is the fact that only 3 bits of the address are included in the instruction itself. (A regular CALL requires 3 bytes, 2 of which contain the address called.) Unfortunately, these instructions are not as useful on the TRS-80 as they are on the Z-80 in general, because locations 0 through 56 are in ROM. These locations are already used extensively by the Level I and Level II Basic interpreters, and if you know what the subroutines located at these locations do you can use them. What you cannot do is to write a new subroutine to be loaded into these memory locations.

There are several miscellaneous instructions that use the stack pointer register or the value at the top of the stack. These instructions are as follows:

```
LD    SP,HL
LD    SP,IX
LD    SP,IY
LD    SP,NN
LD    SP,(NN)
LD    (NN),SP
EX    (SP),HL
EX    (SP),IX
EX    (SP),IY
INC   SP
DEC   SP
```

The LD SP (load stack pointer) instructions are all used to set the SP to some specific address. The first three take the value from one of the other 16-bit registers (HL, IX, or IY); the fourth takes it from immediate data, and the fifth from a memory location. The sixth instruction saves the SP in a memory location. SP always contains the ADDRESS of the stack area. The abbreviation (SP) refers to the CONTENTS of the two locations at the top of the stack. The EX (SP) (exchange contets of stack) instructions swap the values at the top of the stack with one of the 16-bit registers (HL, IX, or IY). THE SP ITSELF IS UNCHANGED. INC SP and DEC SP, respectively, increment and decrement the SP. The stack area is also used to save registers during interrupt processing, but we will not discuss that here.

The stack has numerous applications in practically every Z-80 program. If you need to use a register in which to carry out some operation but you also need to retain its present contents, you can PUSH it onto the stack and POP it off afterwards. For example, suppose that a subroutine needs to use HL as a scratch register, but needs to return with the present contents of HL unchanged. There are two general solutions to this problem:

```
      CALL  SUB
      ...
SUB   PUSH  HL
      ...
      POP   HL
      RET
```

or:

```
      PUSH  HL
      CALL  SUB
      POP   HL
```

In other words, the PUSH and POP can occur either in the subroutine (usually preferable, since the registers will be saved for any call) or in the calling program, but they must occur at the same program level. What you must NOT do is the following:

```
                PUSH  HL
                CALL  SUB
                ...
          SUB   POP   HL
```

or:

```
                CALL  SUB
                POP   HL
                ...
          SUB   PUSH  HL
```

In these examples, the SP gets crossed up because the PUSH and POP do not occur within the same subprogram. The first example POPs the return address off the stack rather than the previous contents of HL, and the second pushes HL onto the stack so that the program will "return" to the address specified by HL rather than the calling location. Of course, these programming techniques can be used if the programmer understands what is happening and takes that into account when writing the program so that something he intends to have happen occurs. The point is that these are not proper procedures for storing and retrieving registers.

Another use of PUSH and POP is simply to transfer data from one double register to another. The following two sequences of instructions produce the same result:

```
                PUSH  DE
                POP   HL
```

and:

```
                LD    H,D
                LD    L,E
```

Both require two bytes, and, although the latter method is slightly faster, programmers are as likely to use one method as the other. Using PUSH and POP also allows data to be transferred to and from the index registers.

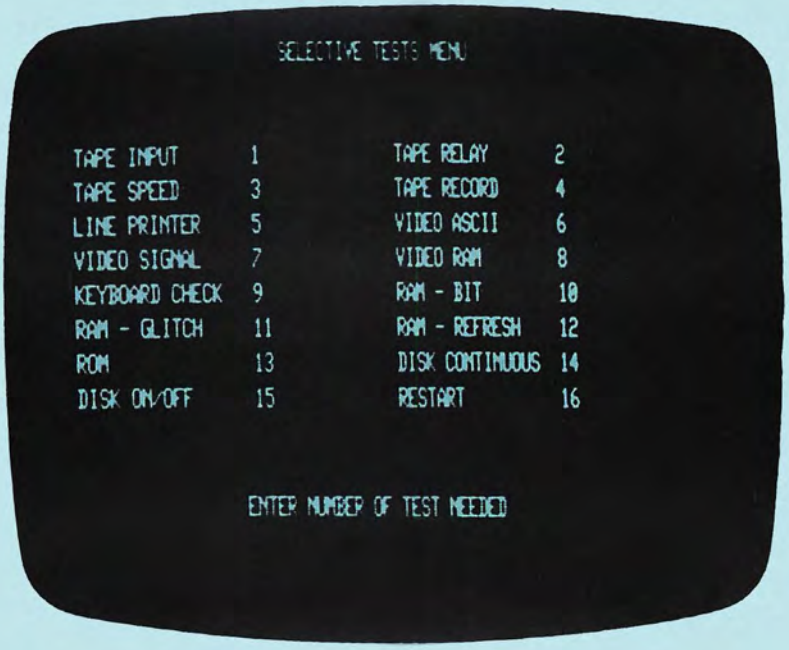
If several registers are PUSHed at the beginning of a subroutine, they must be POPped at the end in REVERSE order; otherwise the data will not go back into the same registers. The following sequence shows the correct procedure:

```
          SUB   PUSH  AF
                PUSH  BC
                PUSH  DE
                PUSH  HL
                ...
                POP   HL
                POP   DE
                POP   BC
                POP   AF
                RET
```

TRS-80™ FROM TBS INC.

The Bottom Shelf, Inc

SYSTEM DOCTOR



- ★ *CHECKS ROM TO ENSURE EVERY BIT IS FUNCTIONAL*
- ★ *CHECKS THE RANDOM ACCESS MEMORY SIX DIFFERENT WAYS TO ENSURE THAT ALL MEMORY LOCATIONS ARE FUNCTIONAL*
- ★ *CHECKS DISK DRIVES TO INSURE RELIABILITY*
- ★ *COMPLETE VIDEO DISPLAY AND VIDEO MEMORY CHECK*
- ★ *CHECKS THE PRINTER FUNCTIONS*
- ★ *CHECKS THE CASSETTE RECORDER FOR SPEED, DISTORTION AND VOLUME CONTROL*
- ★ *COMPLETE TWELVE HOUR SYSTEM CHECK ON REQUEST (WITH RESULTS PRINTED ON VIDEO, LINE PRINTER, DISK OR CASSETTE*

BASIC TOOLKIT FROM TBS INC.

The Bottom Shelf, Inc.

The Basic Toolkit is the answer to your programming problems. It is a collection of programs which are primarily oriented towards aiding the Basic Language Programmer.

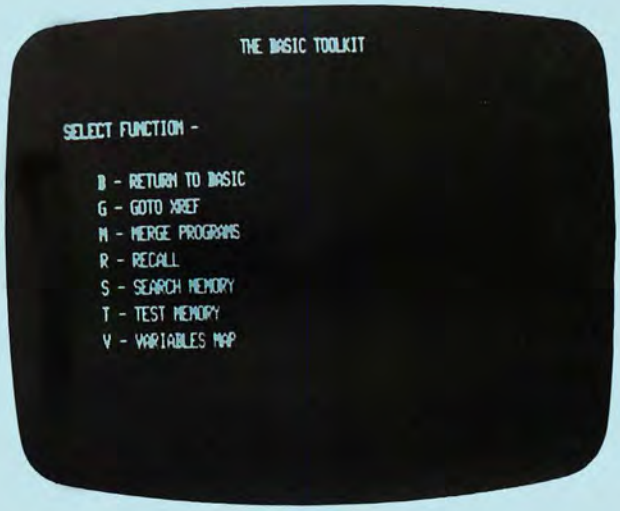
VARIABLES MAP - *Will map the location of each variable you have used in your Basic Language Program. Variable Map gives you an alphabetical listing of each variable used - a list of the lines that the variable appears on - and shows the number of times the variable appears on a line.*

GOTO X REF - *This will list in numerical sequence, the destination of each GOTO and GOSUB statement and the line number.*

RECALL - *Allows you to recall programs after you have gone to DOS and returned to BASIC or after you have erroneously typed NEW.*

MERGE PROGRAM - *Allows you to merge programs from tape.*

TEST MEMORY - *Allows you to check your memory and determine that every memory location is operable.*



SEARCH MEMORY - *Allows you to search the memory for every occurrence of byte combinations and will list the locations where these bytes occur.*

The Basic Toolkit works with both disk based and cassette based machines. The Toolkit will be resident while you are programming and will always be available by hitting shift/break.

You asked for it. Now here it is. The aid you needed - 16K - 32K - 48K versions included in each Toolkit.

GUARANTEED SATISFACTION

WE ARE THE ONLY SOFTWARE COMPANY THAT OFFERS A REFUND ON ALL SOFTWARE (TRS-80 MONTHLY NEWSLETTER SUBSCRIBERS ONLY). WE DO CHARGE A $3 PENALTY TO COVER POSTAGE AND HANDLING.

ALL ORDERS PROCESSED IMMEDIATELY

MICRO COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

Box 149 New City, New York 10956

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

PLEASE SEND ME:

SYSTEM DOCTOR $28.50 _____

BASIC TOOL KIT $19.80 _____

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____

TRS-80™

PERSONAL INFORMATION MANAGEMENT SYSTEM

A READY-TO-USE
DATA BASED MANAGEMENT PROGRAM
FROM SCELBI PUBLICATIONS

PIMS CAN PERFORM
ALL OF THE FOLLOWING FUNCTIONS

- ★ **BALANCE YOUR CHECKBOOK**
- ★ **MAINTAIN A LIST OF CURRENT DEPARTMENT STORE CHARGES**
- ★ **MAINTAIN HOUSEHOLD OR BUSINESS INVENTORY**
- ★ **KEEP A LIST OF TAX DEDUCTIBLE EXPENSES CLASSIFIED BY CATEGORY**
- ★ **MAINTAIN A MAILING LIST**
- ★ **ACCOUNTS RECEIVABLE**
- ★ **SALES ANALYSIS**

ONE PROGRAM DOES IT ALL!!

PIMS IS A COMPLETE MANUAL
INCLUDING A SOURCE LISTING FOR THE TRS-80

(PIMS IS CASSETTE BASED. SOURCE LISTING IS INCLUDED . . . PIMS IS **NOT** CURRENTLY AVAILABLE ON CASSETTE)

FROM PDI PROGRAM DESIGN INC.

BASIC STEP BY STEP FOR LEVEL II TRS-80 OWNERS

AVAILABLE FOR LEVEL I OR LEVEL II

STEP BY STEP - Ages Junior High to Adult. TRS-80 LEVEL II
32 programs and a 64 page workbook teach programming in BASIC for the beginner. Introduces all important BASIC commands and programming logic, including simple string logic and one-dimensional arrays. Lessons are interactive, presented in a question-and-answer format on the computer screen. The Workbook adds auxiliary information and is, most importantly, a permanent reference source. Through instruction, structured practice, and frequent skills testing, the user learns how to write BASIC programs.

GRAPH BUILDER - Ages 10 up. TRS-80 LEVEL I OR II
11 teaching programs and games teach students to read graphs. Covers x and y coordinates, and representation of numerical data on graphs. Starts with simplest concepts and works up to complicated grid game.

MINICROSSWORD - All ages. TRS-80 LEVEL II
4 programs that consist of 2 minicrosswords and 2 codeword games. Crossword programs invent their own crossword puzzle -- dozens of completely different puzzles are possible -- and scores how well you do each puzzle. When used in conjunction with the codeword programs, which are word-guessing games, the course provides a vocabulary and spelling development system.

SPELLING BUILDER - Junior High up. TRS-80 LEVEL II
8 programs plus an audio cassette teach important rules and skills. Helps students and adults overcome spelling difficulties. Not just spelling drill, this course teaches a method for approaching difficult words. Ideal for the student or adult who has mastered basic spelling, but has trouble deciding if it's "supersede" or "supercede," "combustable" or "combustible". Final test of 25, ten-word lists.

PRESCHOOL IQ-BUILDER - Helps 3 to 6 year olds develop vital intellectual skills needed to learn to read. Seven programs plus Guide.

MEMORY BUILDER: CONCENTRATION - Ages 6 up.
Educational games to help children improve memory and attention span. Great for parents and kids to play together. Three games plus Guide.

STORY BUILDER/WORD MASTER - Ages 9 up.
Games that teach grammar and vocabulary. Four games plus Guide.

CODE BREAKER - Ages 10 to Adult.
Scrambled messages games that build basic word handling skills needed for good writing. Three games plus Guide.

IQ-BUILDER SERIES - Prepares you for College Board and other aptitude tests.

ANALOGIES - Junior High up.
Develops a method of solving word analogy problems and gives you practice questions. Six programs plus Guide.

NUMBER SERIES - Junior High up.
Develops a method of solving number series problems and provides practicing problems. Eight programs plus Guide.

VOCABULARY BUILDER 1 & 2 - Junior High up.
Provide practice in synonyms and antonyms. 1 is beginning; 2 is advanced. Eleven programs plus Guide.

GUARANTEED SATISFACTION

WE ARE THE ONLY SOFTWARE COMPANY THAT OFFERS A REFUND ON ALL SOFTWARE (TO TRS-80 MONTHLY NEWSLETTER SUBSCRIBERS ONLY). WE DO CHARGE A $3 PENALTY TO COVER POSTAGE AND HANDLING.

ALL ORDERS PROCESSED IMMEDIATELY

THE COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™
Box 149 New City, New York 10956

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

PLEASE SEND ME:

PIMS $9.95_____
STEP BY STEP BASIC $39.95_____
GRAPH BUILDER $13.50_____
MINICROSSWORD $14.95_____
SPELLING BUILDER $14.95_____
PRESCHOOL IQ-BUILDER $13.50_____
MEMORY BUILDER $13.50_____
NUMBER SERIES $13.50_____
STORY BUILDER/WORD MASTER $13.50_____
ANALOGIES $13.50_____
VOCABULARY BUILDER 1 & 2 $13.50_____

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____

TRS-80™ DISK BUSINESS PACS

NEW OSBORNE & ASSOCIATES BUSINESS SYSTEM

- TRS-80 Translation Of The Wang Computer Business System
- TRS-80 Translation By Small Business Software Systems
- Immediate Delivery
- Completely Interactive Business System (Each Component Can Also Be Used Independently)
- On Diskette Ready To Run
- Step By Step Documentation (Each Manual Contains A Special User Section For Those Who Don't Require Technical Documentation
- All Reports

GENERAL LEDGER

- Up To 250 Accounts
- Direct Or Indirect Posting
- Maintains Account Data By Month, Quarter And Year
- Income Statement And Balance Sheet Computed Monthly, Quarterly And Yearly
- Special Account Reports (On Selected Accounts)
- Verified Data Entry
- Detailed 144 Osborne Page Manual Available

INVENTORY CONTROL

- Carries More Than 1000 Items Per Diskette
- Low Stock Status Alarm
- Provisions For Item Number, Description, Vendor Number, Quantity On Hand, Unit Price, Selling Price, Average Unit Cost, Reorder Point, Backorders, Number Sold (This Period And Previous Period)
- Index Sequential
- Random Access
- Reorder Point Report
- Activity Report
- Inventory List (By Item Or Vendor)
- 50 Page Instruction Manual
- Invoicing

ACCOUNTS RECEIVABLE

- Enter, Modify And Delete Invoices
- Enter New Invoices, Billing Existing Invoices, Pay Invoices, Pay Progress Payments, Modify Existing Invoices
- Update Accounts Receivable
- Accounts Receivable Ledger
- Customer File Maintenance
- Up To 250 Accounts
- Printed Customer Statements
- Aging Account Analysis
- 317 Page Osborne Manual Available (Includes Accounts Receivable And Accounts Payable)

ACCOUNTS PAYABLE

- **Check Writer**
- **Aging Account Status Report**
- **Up To 250 Accounts**
- **Invoice Check Off**
- **Calculate Checks To Pay Selected Invoices For Selected Vendors**
- **Vendor File Maintenance**
- **Enter, Modify And Delete Invoices**
- **317 Page Osborne Manual Available (Includes Accounts Receivable And Accounts Payable)**

PAYROLL

- **Complete Computation Of All Payroll Taxes**
- **Check Writer**
- **Quarterly, Yearly And Year-To-Date Reports**
- **W-2 Forms • 941A**
- **For Hourly Or Salaried Employees**
- **Provision For Extra Deductions, City Deductions, Disability, Overtime (As Well As F.I.C.A., Federal And State Withholding Tax)**
- **365 Page Osborne Manual Available**

* Inventory Control Interactive With . . . . But Not Osborne Version. All Specifications Subject To Change, All Prices Subject To Change.

** Osborne Manuals Are Required For Proper Program Operations. Program Prices Do Not Include The Osborne Manual. Osborne Manuals May Be Purchased With Or Without Programs.

GUARANTEED SATISFACTION

WE ARE THE ONLY SOFTWARE COMPANY THAT OFFERS A REFUND ON ALL SOFTWARE (TO TRS-80 MONTHLY NEWSLETTER SUBSCRIBERS ONLY). WE DO CHARGE A $3 PENALTY TO COVER POSTAGE AND HANDLING.

ALL ORDERS PROCESSED IMMEDIATELY

MICRO COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™
Box 149 New City, New York 10956

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

PLEASE SEND ME:

GENERAL LEDGER $125.00 ____ INVENTORY CONTROL $125.00 ____ ACCOUNTS RECEIVABLE $125.00 ____

ACCOUNTS PAYABLE $125.00 ____ PAYROLL $125.00 ____

OSBORNE GENERAL LEDGER MANUAL $15.00 ____ OSBORNE PAYROLL MANUAL $15.00 ____

OSBORNE ACCOUNTS RECEIVABLE/PAYABLE MANUAL $15.00 ____

COMPLETE FULLY INTEGRATED BUSINESS SYSTEM (INCLUDES ALL OF THE ABOVE) $499.00 ____

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____

TRS-80™ STOCK MARKET PAC

FOR MINIMUM SYSTEM OF 16K CASSETTE OR 32K DISK SYSTEMS

This collection of programs aids both financial professionals and individuals in the evaluation, selection, and management of investment portfolios. It features: coverage of stocks, bonds, convertible securities, options, warrants, and annuities; realistic treatment of taxes and commis – sions; and portfolio selection methods.

PORTFOLIO BOOKKEEPING - Keep Track of all your Stocks and Bonds. Evaluates the historical profitability of a given portfolio. Also computes realized gains for income tax purposes.

EARNINGS PER SHARE ESTIMATION. Uses historical balance sheet and income data to estimate future earnings per share.

COMPOUND INTEREST. Given any three of the four terms, solves for the fourth term in the compound interest equation relating future value of a deposit to interest rate, time period, and present value.

ANNUITIES. Solves for any one of five terms in the annuity equation relating future value, present value, interest rate, periodic payment, and balloon payment for ordinary annuities, sinking funds, and annuities due.

UNEVEN CASH FLOWS. Uses sophisticated numerical techniques to calculate the rate of return on a capital investment based on the resulting cash flows generated. Also finds future value and present value of a series of uneven flows.

STOCK VALUATION. Finds current and future values of a stock and before and after tax rates of return. Also considers commissions in all calculations.

OPTION VALUATION (Black-Scholes Model). Calculates the Black-Scholes value and optimum hedge ratio of any option.

OPTION WRITING. When selling partially covered calls, or when selling puts and shorting stock, this program is used to find the maximum profit, investment, maximum return, and upper and lower break-even points.

WARRANT VALUATION. Determines the value of both short and long term warrants.

BOND VALUATION. Given present value, coupon interest, yield to maturity, maturity value, or number of periods (3 out of 4), the remaining term is found by this program. Also considers taxes and commissions and computes the current yield.

STOCK INDICATORS. Given historical market index data and stock prices, this program finds the expected return of the index and standard deviation of that return, as well as the alpha, beta, expected return, and standard deviation of return for each stock.

PORTFOLIO SELECTION (Sharpe's Model). Determines the proportion of funds that should be allocated to each security in a portfolio to maximize returns. Calculations are based on historical stock indicators and an acceptable level of risk.

CAPITAL ACCUMULATION PLANNING. Determines the future net worth of an individual or a business based on current worth, rate of investment, and rate of investment return.

DAYS BETWEEN DATES. Finds the number of days between two given dates on the Gregorian calendar.

GUARANTEED SATISFACTION

WE ARE THE ONLY SOFTWARE COMPANY THAT OFFERS A REFUND ON ALL SOFTWARE (TO TRS-80 MONTHLY NEWSLETTER SUBSCRIBERS ONLY). WE DO CHARGE A $3 PENALTY TO COVER POSTAGE AND HANDLING.

ALL ORDERS PROCESSED IMMEDIATELY

THE COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™
Box 149 New City, New York 10956

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

PLEASE SEND ME:

STOCK MARKET PAC $49.95 (Disk or Cassette Version) _____

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____

THE HORSE SELECTOR II (FLATS)

NEW SIMPLIFIED VERSION OF THE ORIGINAL HORSE SELECTOR

GUARANTEED PROFIT

91% WINS PLACES SHOWS

32% AVERAGE PROFIT AT ALL TRACKS-1978

HIGHER PROFITS (OVER 100%) POSSIBLE THROUGH SELECTIVE BETTING ON

- Rates Each Horse In 10 Seconds
- Easy To Follow Rules
- Can Be Used With Any Simple 8-Digit Electronic Calculator
- 100% Money Back Guarantee (Returned For Any Reason)
- Uses **4** Factors (Speed Rating • Track Variant • Distance Of The Present Race • Distance Of The Last Race)
- Using The Above Factors, The Horse Selector Calculates The Estimated Odds. **BET** On Horse Whose Actual Payoff (From The Tote Board or Morning Line is Higher Than Payoff Based on Estimated Odds).
- Using The Above Factors, The Horse Selector Calculates The Estimated Odds. **BET** On Any Selected Horse With An Estimated Payoff (Based On Tote Board or Morning Lines) Higher Than Calculated Payoff (Based on Horse Selector II).
- Source Listing For The TRS-80, TI-59, HP-67 And Basic Computers.
- No Computer Or Calculator Necessary (Although A Calculator Would Be Helpful For The Simple Division Used To Calculate Estimated Odds)

FREE DUTCHING TABLES ALLOWS BETTING ON 2 OR MORE HORSES WITH A GUARANTEED PROFIT.

GUARANTEED SATISFACTION

WE ARE THE ONLY SOFTWARE COMPANY THAT OFFERS A REFUND ON ALL SOFTWARE (TO TRS-80 MONTHLY NEWSLETTER SUBSCRIBERS ONLY). WE DO CHARGE A $3 PENALTY TO COVER POSTAGE AND HANDLING.

ALL ORDERS PROCESSED IMMEDIATELY

COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™
Box 149 New City, New York 10956

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

PLEASE SEND ME:

HORSE SELECTOR II $50 _____

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS

None of the stack operations affects the condition codes except for POP AF, which loads the flag register with an entire different set of conditions. Therefore, the values of registers can be restored before a conditional operation, as in the following sequence:

```
        PUSH  DE       ;save D (and E)
        LD    D,(TST)  ;load D from TST
        CP    D        ;compare A to D
        POP   DE       ;restore DE to previous values
        CALL  Z,SUB    ;call if compare equal
```

(In assembly code, anything following a semi-colon is taken to be a comment.) This small portion of a program saves D and E in the stack and then loads D from a location called TST. This is compared to the accumulator, and then registers D and E are popped back off the stack. The CALL is executed only if the compare was equal, but by the time the CALL occurs D and E have been restored to their previous values.

Since all subroutines use the same stack area, any time a RET is executed it will branch to the address at the top of the stack, regardless of which program executed the last CALL. Assuming that SUB2 is a subroutine that ends in a RET (as all subroutines do), the following program sequences are identical:

```
SUB1  ...
      CALL  SUB2
      RET
```

and:

```
SUB1  ...
      JP    SUB2
```

The first SUB1 sequence CALLs SUB2; SUB2 does its thing and returns to SUB1; and SUB1 returns to the calling program. The second SUB1 sequence ends by jumping to SUB2; when SUB2 returns, it goes back to the program that called SUB1.

What happens if a program tries to call itself? Imagine this:

```
5000  CALL  5000
```

Location 5000 contains the first byte of an instruction that calls location 5000! When executed, 5003 (the return address) is pushed onto the stack, the SP is decremented, and the computer branches to 5000. Then 5003 is again pushed onto the stack, and the process continues. This program will have the effect of repeatedly pushing 5003 onto the stack, thus destroying all of memory and causing the computer to hang indefnitely. Actually, the process will continue until location 5000 is bombed, and then the computer will repeatedly execute the instructions represented by 50 (LD D,B) and 03 (INC BC).

Because the use of the stack is so flexible, you never need to worry about where to store data temporarily; just push it onto the stack. Always make

H & E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

sure that you know where the stack is located so that you don't mess it up. The best way to accomplish this is to always put a LD SP instruction at the beginning of any program you write. And don't forget that the computer also uses the stack during subroutine calls and interrupts, so that you have to keep PUSHes and POPs on the same levels.

In our next column, we will examine some of the subroutines in the Level II ROM and write some small programs using them.

micro squared

Specializing in hardware and software for the TRS-80 user

Suite 5B, 7131 Owensmouth Avenue, Canoga Park, CA 91303 (213) 883-1993

SUPPORT EQUIPMENT FOR THE TRS-80

DISC DRIVES

BUY COMPLETE, READY TO PLUG IN AND RUN
OR
SEPARATELY

DUAL power supply for 5¼" mini-floppy disk drives (Can also be used with single drives—add on later at no cost!!!) $85
Dual chassis—holds 2 drives, power supply, cable $45
Single chassis—holds 1 drive, power supply, cable $29
Interface cable for dual drive $25
5¼" disk drive—capable of 40 tracks—decreased track access time! 5 milliseconds! $299

SOFTWARE PROGRAMS ON DISKETTE
Comparable to $250 programs!

accounts payable
accounts receivable
invoice/billing
payroll
inventory control & pricing
$99.50 ea.
Also available: Custom business software. Inquiries invited.

SPECIAL

COMPLETE SYSTEMS—SHIPPED TO YOU READY TO PLUG IN AND RUN
Dual power supply, chassis, interface cable and 2 disk drives COMPLETE . . . $749
Single power supply, chassis, interface cable and 1 disk drive COMPLETE . . . $429

DISCOUNTS !!!!

All prices per items ordered in quantity 1 - 4
4% discount on quantities 5 - 10
7% discount on quantities 11+

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

DOUBLE PRECISION ROUTINES

by

PETER SHENKIN, PH.D.

NOTE #1...DOUBLE PRECISION ROUTINES IS IN NO WAY A COPY OF RADIO SHACK'S DOUBLE PRECISION ROUTINE PACKAGE. IT WAS WRITTEN PRIOR TO THE RELEASE OF THE RS PACKAGE.

NOTE #2...MOST PRINTERS DO NOT PRINT AN UP ARROW (USED FOR EXPONENTS). IN THIS NEWSLETTER (AND MANY BOOKS), YOU WILL SEE A BRACKET [USED IN PLACE OF THE UP ARROW.

NOTE #3...YOU WILL NOTE THAT ALL PROGRAM LISTINGS IN THIS NEWSLETTER ARE LISTED IN LARGER PRINT THAN OUR TEXT. THIS IS BECAUSE A SPECIAL TYPING BALL IS USED WHICH CONTAINS CERTAIN FUNCTIONS NOT FOUND ON A NORMAL TYPING BALL (SUCH AS GREATER THAN, LESS THAN AND A BRACKET).

All functions on the LEVEL-II TRS-80 will accept arguments which are either single or double precision. However, the output of these functions may not be double precision. In fact, all of the trigonometric functions, the exponential function, the logarithm function,the exponentiation function, and the square root function all yield results only accurate to 6 places of accuracy. This is true whether or not the answer is printed out with sixteen digits. For example, we may try the following in command mode.

a) `PRINT 3 [ 4` Computer prints 81.0001

b)
```
X# = 3#: Y# = 4#
PRINT X# [ Y#
```
Computer prints 81.0001

```
Z# = X# [ Y#
PRINT Z#
```
Computer prints 81.00004577636719

The correct answer to all of the above is 81.The result printed may not seem like much of an error but is at the least, misleading. The last result especially gives a false impression of accuracy. Single precision functions are said to give six digit accuracy, but in the above, we see that there may sometimes be some question about that sixth digit.

Why do we desire more than six digit accuracy? After all, isn't this enough? Certainly, this is not the case with large volumes of money related to financial transactions. In cases like this, accuracy to the penny is generally desired. Sometimes even more accuracy is desired...but suppose we have only six digits of accuracy and the amount $136351.44 comes across our desk. Is this the correct amount? In fact, we do not know if the $.44 is accurate at all. If much computation was involved getting to this number, then even the dollar or ten dollar digit may be in error. This is because accuracy is generally lost when many computations are involved. Thus if one starts with 6 digit accuracy, he may wind up with 5 or even 4 digit accuracy. Thus, it is best to perform computations with as many digits of accuracy as possible. Remember, an amount as little as $10000.01 has seven significant digits.

The accompanying program contains double precision routines for integral powers, square roots, the exponential function, natural, logarithm, the exponentiation operator, sine, cosine, and tangent. For those of you who have had calculus, the programs make use of Taylor Series. The only built-in TRS-80 functions used in developing the Taylor series were addition, multiplication and division. These operations do have double precision accuracy. The Taylor series is carried out until the remaining terms are so small that they are insignificant compared to the 13 or 14 digit accuracy we desire. For example, to compute Exp(.01), we take the sum of the following terms:

```
1 + .01 + .0001/6 + .000001/24 + .00000001/120 + ...
```

Notice how the fifth term is quite small. Thus it seems that we do not have to sum very many terms of the Taylor series to get the desired accuracy. If the argument was 10 instead of .01, the series would not "converge" so rapidly. We would need many terms of the series for the desired accuracy. This would take a long time to compute. Thus much of the subroutines involve procedures for making the arguments small. The routines still take some time to run. The integral powers subroutine does not involve Taylor series, but only repeated multiplication. The square root is computed using Newton's method with the use of the single precision SQR() function to get a first estimate of the square root.

The actual program is presented via a MENU. To run the program load it into the machine and press RUN and ENTER. The comments at the beginning appear. We again press enter and see:

MENU

1. INTEGRAL POWERS
2. SQUAE ROOT
3. EXPONENTIAL FUNCTION
4. NATURAL LOGAITHM
5. A[B WITH A>0 AND B ARBITRARY
6. SIN()
7. COS()
8. TAN()
9. END OF PROGRAM

ENTER DESIRED CODE

Suppose that we wish to calculate 5 to the 10th power. We just press 1 and see:

INTEGRAL POWER

EXPONENT CAN BE ANY INTEGER

ENTER BASE, EXPONENT (0,0 TO END)?

We enter 5,10 followed by ENTER and we see:

5[10=9765625

ENTER BASE, EXPONENT (0,0 TO END)?

This time, we enter 0,0 and return to the MENU.

By the way, if we go through the following sequence in command mode:

```
X#=5# : Y#=10# :Z#=X : PRINT Z#
```

we get the result 9765647. This is off by 18 compared to the correct answer...and once again gives the impression of being exact.

Though the present program does give nice results, they are in isolation from one another. The real value of the separate routines in this program is that they may be used in any program in which it is necessary to compute the given functional values to the accuracy given in the subroutines.

In order to use these as subroutines in another program we must be certain that the variables used in the subroutines are not important variables used in another part of the program. Also, some of the subroutines depend upon others. For example the exp() subroutine makes use of the integral power subroutine so the latter must be entered whenever the former is used. Below we list the various subroutines along with subroutines they depend upon and also any variables which occur. The variables mentioned are in addition to any variables in the other subroutines mentioned.

SBR	DEPENDS ON	INPUT	OUTPUT	OTHER VARIABLES
POWER		B#,E	P#	E1,E%,J%
SQR()		X1#	P1#	X2#,X3#
EXP()	POWER	Z#	P2#	Z1#,J1%,X4#,J2%,I%,E,B#
LOG()	SQR()	Z2#	P3#	Z3#,J1%,X4#,J2%,I%
ARBPOWER	EXP(),LOG()	B1#,E#	P4#	Z2#,Z#,P2#
SIN()		Z6#	P5#	PI#,PH#,Z7#,I2%,X4#
COS()	SIN()	Z8#	P5#	PI#,PH#,Z6#
TAN()	SIN(),COS()	Z8#	P5#	Z1#,Z6#

For example if we wanted to use the ARBPOWER subroutine which begines at 60400 we would want both the EXP() and the LOG() subroutines included. The calling program would supply the base,called B1# and the exponent, called E#. The result, B1# to the E# power would come back to the calling program as the variable P4#.

The following is an example of a short program which computes the salvage value of an item for each of five years using both our power function and the built-in exponentiation function.The item depreciates at a fixed percentage rate per year.

```
5 CLS
10 REM SALVAGE VALUE
20 INPUT"ORIGINAL PRICE";PR#
30 INPUT"DEPRECIATION RATE(IN %)";R#
40 R#=R#/100#
50 B#=1#-R#
55 CLS
60 PRINT"                SALVAGE VALUE":PRINT
70 PRINT"  YEAR       POWER SBR          BUILT-IN POWERS"
80 FOR E=1 TO 5:GOSUB 60000:PRINT E;PR#*P#,PR#*B#[E:NEXT
90 END
```

```
1300 CLS:PRINT"          EXP()  FUNCTION":PRINT
1310 PRINT"ANY ARGUMENT WILL DO.":PRINT
1320 INPUT"ENTER ARGUMENT(0 TO END)";Z#
1325 IF Z#=0 GOTO 300
1330 GOSUB 60200
1350 PRINT"EXP(";Z#;") = ";P2#
1360 GOTO 1320
1400 CLS:PRINT"          LOG() FUNCTION":PRINT
1410 PRINT"ARGUMENT MUST BE POSITIVE":PRINT
1420 INPUT"ENTER ARGUMENT(0 TO END)";Z2#
1425 IF Z2#=0 GOTO 300
1430 GOSUB 60300
1450 PRINT"LOG(";Z2#;") = ";P3#
1460 GOTO 1420
1500 CLS:PRINT"          A ↑ B FUNCTION":PRINT
1510 PRINT"BASE CANNOT BE NEGATIVE":PRINT
1520 INPUT"ENTER BASE,EXPONENT(0,0 TO END)";B1#,E#
1525 IF B1#=0 AND E#=0 GOTO 300
1530 GOSUB 60400
1550 PRINT B1#;" ↑ ";E#;" = ";P4#
1560 GOTO 1520
1600 CLS:PRINT"           SIN() FUNCTION":PRINT
1610 PRINT"USE DEGREES. 9999 ENDS."
1615 GOSUB 60500:PRINT:REM INITIALIZE PI
1620 INPUT"ENTER ARGUMENT(9999 TO END)";Z8#
1625 IF Z8#=9999 GOTO 300
1630 Z6#=Z8#*PI#/180#
1640 GOSUB 60500
1650 PRINT"SIN(";Z8#;") = ";P5#
1660 GOTO 1620
1700 CLS:PRINT"            COS() FUNCTION":PRINT
1710 PRINT"USE DEGREES. 9999 ENDS."
1715 GOSUB 60500:PRINT:REM INITIALIZE PI
1720 INPUT"ENTER ARGUMENT(9999 TO END)";Z8#
1725 IF Z8#=9999 GOTO 300
1730 Z#=Z8#:Z8#=Z8#*PI#/180#
1740 GOSUB 60600
1750 PRINT"COS(";Z#;") = ";P5#
1760 GOTO 1720
1800 CLS:PRINT"             TAN() FUNCTION":PRINT
1810 PRINT"USE DEGREES.COSINE OF ARGUMENT CANNOT=0  :9999 ENDS."
1815 GOSUB 60500:PRINT:REM INITIALIZE PI
1820 INPUT"ENTER ARGUMENT(9999 TO END)";Z8#
1825 IF Z8#=9999 GOTO 300
1830 Z#=Z8#:Z8#=Z8#*PI#/180#
1840 GOSUB 60700
1850 PRINT"TAN(";Z#;") = ";P5#
1860 GOTO 1820
1900 END
```

```
60000 REM POWER SUBROUTINE
60010 REM E IS EXPONENT,B# IS BASE,P#=B#[E
60015 P#=1
60020 IF E=0 RETURN
60025 IF E<>INT(E) PRINT"INPUT ERROR":STOP
60030 E1=E:IF E<0 THEN E1=-E
60040 E%=E1+1E-14:FOR J%=1TOE%:P#=P#*B#:NEXT
60045 IF E<0 P#=1/P#
60050 RETURN
60100 REM SQUARE ROOT SBR
60110 REM WILL FIND SQUARE ROOT OF X1#.RESULT IS P1#
60120 IF X1#<0 PRINT"ILLEGAL ARGUMENT":STOP
60130 IF X1#=0 P1#=0:RETURN
60140 X2#=SQR(X1#)
60150 X3#=X2#-(X2#*X2#-X1#)/(2*X2#)
60160 IF X3#-X2#<1E-15 AND X2#-X3#<1E-15 GOTO 60180
60170 X2#=X3#:GOTO 60150
60180 P1#=X3#:RETURN
60200 REM EXPONENTIAL FUNCTION SUBROUTINE
60210 REM COMPUTES P2#=EXP(Z#)
60220 Z1#=Z#:IF Z#<0 Z1#=-Z#
60230 J1%=0
60240 IF Z1#>.002 Z1#=Z1#/4:J1%=J1%+1:GOTO 60240
60250 P2#=0:X4#=1:J2%=0
60260 P2#=P2#+X4#:IF X4#<1E-15 GOTO 60280
60270 J2%=J2%+1:X4#=X4#*Z1#/J2%:GOTO 60260
60280 IF J1%=0 GOTO 60290
60285 FORI%=1 TO J1%:E=4:B#=P2#:GOSUB 60000:P2#=P#:NEXT I%
60290 IF Z#<0 P2#=1%/P2#
60299 RETURN
60300 REM NATURAL LOGARITHM SUBROUTINE
60310 REM COMPUTES P3#=LOG(Z2#)
60320 IF Z2#<=0 PRINT"ILLEGAL ARGUMENT":STOP
60330 Z3#=Z2#:IF Z2#<1 Z3#=1/Z2#
60335 J1%=0
60340 IF Z3#>1.02 X1#=Z3#:GOSUB 60100:J1%=J1%+1:Z3#=P1#:GOTO 60340
60350 P3#=0:X4#=Z3#-1:X5#=X4#:J2%=1
60360 P3#=P3#+X4#:IF X4#<1E-15 AND X4#>-1E-15 GOTO 60380
60370 J2%=J2%+1:X4#=-X4#*X5#*(J2%-1)/J2%:GOTO 60360
60380 IF J1%=0 GOTO 60390
60385 FOR I%=1TOJ1%
60386 P3#=P3#*2
60387 NEXT I%
60390 IF Z2#<1 P3#=-P3#
60399 RETURN
```

H & E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

```
60400 REM ARBITRARY BASES AND POWERS
60410 REM WILL CALCULATE P4#=B1#[E# FOR B1#>0
60420 IF B1#<=0 PRINT "ARGUMENT ERROR":STOP
60430 Z2#=B1#:GOSUB 60300:Z#=E#*P3#:GOSUB 60200
60440 P4#=P2#
60490 RETURN
60500 REM SBR COMPUTES P5#=SIN(Z6#)
60505 PI#=3.1415926535897932:PH#=PI#/2
60510 Z7#=Z6#:IF Z6#<0 Z7#=-Z6#
60520 IF ABS(Z7#)>PI# Z7#=Z7#-2*PI#:GOTO 60520
60530 IF Z7#>PH# Z7#=PH#-Z7#
60535 IF Z7#<(-1)*PH# Z7#=Z7#+PI#:Z7#=-Z7#
60540 P5#=0:X4#=Z7#:I2%=1
60550 P5#=P5#+X4#:IF ABS(X4#)<1E-15 GOTO 60575
60560 I2%=I2%+2:X4#=-X4#*Z7#*Z7#/(I2%*(I2%-1)):GOTO 60550
60575 IF Z6#<0 P5#=-P5#
60580 RETURN
60600 REM SBR COMPUTES P5#=COS(Z8#)
60610 PI#=3.1415926535897932:PH#=PI#/2
60615 Z6#=ABS(Z8#)
60620 Z6#=PH#-Z6#:GOSUB 60500
60630 RETURN
60700 REM COMPUTES P5#=TAN(Z8#)
60710 GOSUB 60600
60715 IF ABS(P5#)<1E-15 PRINT"ILLEGAL ARGUMENT":STOP
60720 Z1#=P5#:Z6#=Z8#:GOSUB 60500:P5#=P5#/Z1#
60730 RETURN
```

TAPE WINDER FOR TRS-80

RUN OR REWIND TRS-80 CASSETTES WITHOUT UNPLUGGING LEADS OR AFFECTING OPERATION OF TRS-80 COMPUTER!! REQUIRES NO POWER---10 SECONDS TO CONNECT!!
WILL NOT ADD GLITCHES TO YOUR PROGRAMS
ONLY $10.00 POSTPAID - TWO FOR $17.50

C.S.E.
P.O. BOX 5526,
COLUMBUS, OHIO 43221

TRS-80™ Owners

Before You Buy Any More Software Subscribe To

80 Software Critique

Have you been disappointed with some of your purchased software. Does that super-sounding Star Trek game become boring after playing it only 3 or 4 times? Does a bug cause the program to go bonkers? Which Backgammon game is best?

You can now have all the information you need about a program **before** you buy. Subscribe to 80 SOFTWARE CRITIQUE. This unique publication rates TRS - 80 software, giving detailed information on what the program does, any bugs in the program (and we have found many bugs), and our rating on a scale of 0 - 100.

We will review games, simulations, educational programs, music programs, and software which may be useful around the home. We will review no business software.

Issue #1 of 80 SOFTWARE CRITIQUE includes review of 6 Star Trek games, MICRO-CHESS 1.5, SARGON, Bridge Challenger, Clipper - Round the Horn, Cribbage, 3 versions of Backgammon (including FASTGAMMON), Enigmas - I, G/2's The Market, 2 bowling games, Golf, Poker, Santa Paravia & Fiumaccio, The Library 100, Keyboard 80, 3D Tic-Tac-Toe, Time Bomb, End Zone, Robot, Tarot, Pork Barrel, Kentucky Derby, Safari, Oil Tycoon, Keno, Car Race, Hexpawn, and many, many more programs.

A one year subscription (4 issues) to 80 SOFTWARE CRITIQUE is $24. Single copies are available for $7. If you can avoid buying just one disappointing program each issue, the subscription will more than pay for itself.

Subscribe to 80 SOFTWARE CRITIQUE **today**. You won't be disappointed!!

Software Vendors - We are now scheduling software for issues #2 and #3. If you want your programs reviewed, send them to us. We only review software sold on tape. Send us the software just as you would sell it to a customer including the normal documentation included with the program. Include prices and shipping charges.

TRS - 80 is a Trade Mark of Tandy Corporation

Send check or money order to

80 SOFTWARE CRITIQUE
P.O. Box 134
Waukegan, IL 60085

Name _____

Address _____

City _____

State, Zip _____

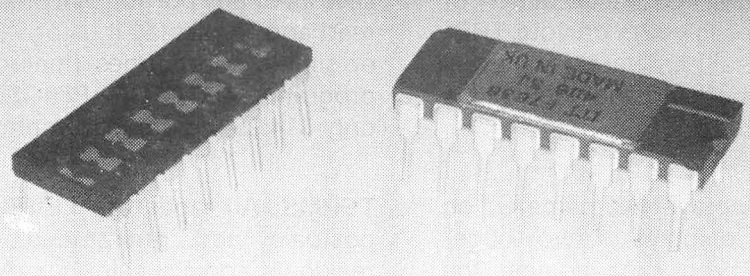
_____ Single Copy ($7)

_____ One Year - 4 issues ($24)

_____ Two Years ($44)

TRUE or FALSE . . .

All TRS-80 Memory Expansion Kits are the Same.



Dealer Inquiries Invited

FALSE! All memory expansion kits are not the same. So, read on if you are about to expand your microcomputer system. We're UHF Associates and we offer a *complete* 16K memory kit for $95.* We know others offer similar storage for about the same price. Unlike others, UHF gives you *speed and storage.* After all, what's storage if your system has to wait in line to get to it. We'll tell you what it is — *an inefficient bottleneck.* Pure and simple. UHF gives you both memory expansion and a *fast* 200 nano-second minimum access time.

Your UHF 16K kit will come to you as eight new 4116 RAMS (fully guaranteed for one year), pre-programmed dip shunts and all necessary data for installation. All you need is a screwdriver and about 10 minutes. Or, if you'd prefer, UHF will install it for no added cost. Either way, call, write or use the order blank today. UHF offers immediate delivery and all orders are sent post paid.

When it comes to memory expansion kits, go with UHF and don't be stuck with an upgrade that falls short.

* you can buy up to 48K for the expansion interface and save even more.

UHF ASSOCIATES

90 Transport Avenue #4
Rohnert Park, CA 94928 (707) 584-7844

Your BANKAMERICARD welcome here

We honor master charge

Order Form

☐	**16K Kit with shunts** (for computer)	$ 95
☐	**16K Kit** (for expansion interface)	$ 95
☐	**32K Kit** (for expansion interface)	$180
☐	**48K Kit** (for computer and expansion interface)	$265

Name (print) _____

Address _____

City _____ State _____ Zip _____

Charge my ☐ Visa ☐ Master Charge, code# _____

Card Number _____

Expiration Date _____

Signature _____

Make check or money order payable to: **UHF Associates**

Mail to: 90 Transport Ave. #4, Rohnert Park, CA 94928

California residents please add appropriate sales tax D

SOMETHING DIFFERENT?

Ready for something really different in TRS-80* software? **PHASE 80** brings you *unique* thoroughly tested LEVEL II programs like —

ADULT GAMES - STRIP DICE is an exciting party game for 2 to 6 adults of both sexes with a unique graphic display of rolling dice. A good memory really pays off in STRIP CONCENTRATION for 2 players. Both 4K games are supplied on a single cassette for only $8.95.

TENNIS-80 - At last, the fast paced action of those "TV" tennis games is yours on your TRS-80 without any additional hardware. Five levels of play and a practice mode are included in this 4K game for only $8.95.

SUPERBUG - A single player 4K game which uses fantastic graphic displays of two "bugs" and a rolling die as you race against the computer to finish your "bug" first. Only $5.95.

AUTO-GRAPHICS - Lets you quickly create complex graphic displays with simple interactive commands and instant visual feedback. There is no need to know the "POKE" graphic codes. You can draw lines and boxes, fill areas with graphic or ASCII characters, reverse graphic characters, and perform other functions using easy row-column addressing. The *entire* screen is available for the display and you can save all or any portion of it on tape. You can then read and re-display it using AUTO-GRAPHICS or simple subroutines (included) in your own programs. AUTO-GRAPHICS runs in 4K and is only $14.95 including complete instructions.

TERMS: All tapes are LEVEL II and are sent postpaid and **guaranteed loadable**. Texas residents add 5% sales tax. Allow 3 weeks for delivery. Send check with order to:

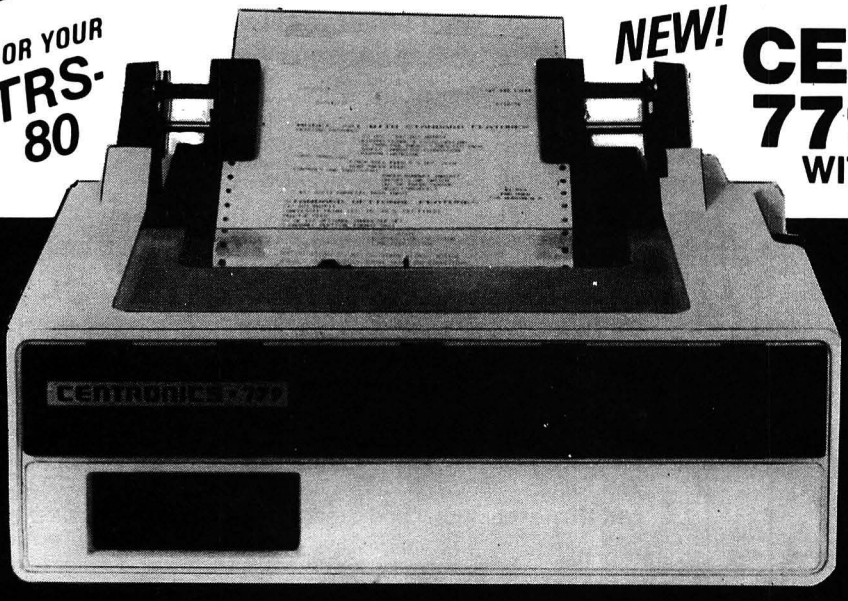
PHASE-80, P.O. Box 2177, Richardson, TX 75080

*TRS-80 is a registered trademark of Radio Shack.

FOR YOUR TRS-80

NEW!

CENTRONICS 779 PRINTER
WITH TRACTOR FEED



Only $1050 plus freight

- Cable: $35
- Zip-pak Ribbons: each $4.50
- Box of Paper: 9½"x11" (3200 sheets) $20
- Mini Floppy Verbatim Diskettes Box of 10. $30
- Plastic Library Diskette Case (Holds 10) $3

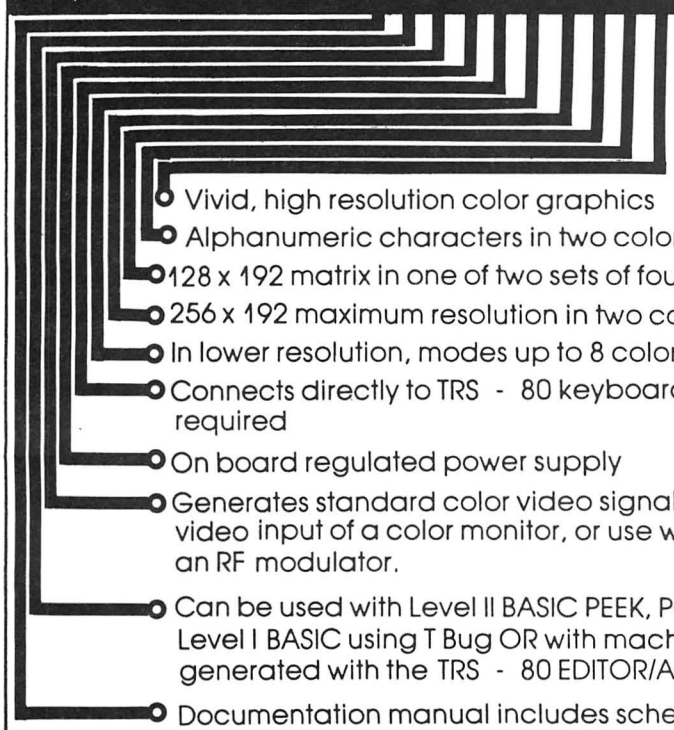
60 Characters Per Second
80-132 Characters Per Line
Serviced Nationwide by Centronics
90 Day Warranty

Call Dolores collect: (516) 433-0613 ■ Charge to your Visa or Master Charge.

MANCHESTER EQUIPMENT COMPANY, INC.

30 MIDLAND AVENUE ■ HICKSVILLE, NEW YORK 11801
(516) 433-0613 ■ (212) 564-6065 ■ FLORIDA: (305) 491-7660

NEW IDEA for your TRS 80!
Color Graphics Interface PC Board



- Vivid, high resolution color graphics
- Alphanumeric characters in two colors and reverse video
- 128 x 192 matrix in one of two sets of four colors (software selectable)
- 256 x 192 maximum resolution in two colors
- In lower resolution, modes up to 8 colors available
- Connects directly to TRS - 80 keyboard, no expansion interface required
- On board regulated power supply
- Generates standard color video signal. Connects directly into video input of a color monitor, or use with a standard TV set with an RF modulator.
- Can be used with Level II BASIC PEEK, POKE, & OUT commands or Level I BASIC using T Bug OR with machine language routines generated with the TRS - 80 EDITOR/ASSEMBLER
- Documentation manual includes schematics, circuit theory, parts list and sample software.

Send the handy mail order coupon:

JFF ELECTRONICS LTD.
001 CN Towers
Saskatoon, Canada S7K 1J5

Enclosed is my cheque or card number for $49.95 plus $2.00 shipping and handling.

VISA master charge

Name

Address

City State Zip

Card type & no.

Expiry

!!!!! NOW AVAILABLE FOR YOUR TRS-80 !!!!!

I NDEX
S EQUENTIAL
A CCESS
M ETHOD

- ★ GET AND PUT RECORDS TO DISK FILE BY "KEY"
- ★ READ FILE IN KEY SEQUENCE WITHOUT SORTING
- ★ DELETE RECORDS WITHOUT RECOPYING FILE
- ★ ADD RECORDS TO DISK FILES IN ANY SEQUENCE
- ★ VARIABLE KEY LENGTH FROM 1 TO 50 CHARACTERS

BUSINESS APPLICATION ADVANTAGES

- Improved Disk Utilization
- Easier Program Development
- Improved Operating Characteristics
- Reduce or Eliminate Sorting
- Improved Performance

ISAM SUBROUTINES **On Diskette $50.00**
ISAM UTILITIES
COMPLETE DOCUMENTATION
—PLUS— Free Mailing List Sample Application

KENO **L-II 16K** **On Tape $ 7.50**
PLAY THIS HIGH PAYOFF GAME FROM RENO

- ★ Full Game Instructions
- ★ Extensive Graphics
- ★ Multi Player - Multi Ticket Play
- ★ Cumulative Banking

TEXT **L-II 2K Disk** **On Disk $25.00**
THIS BASIC PROGRAM USES MOST CAPABILITIES PROVIDED BY MORE EXPENSIVE TEXT EDITORS.

- ★ Full Screen Text Window
- ★ Non Destructive Cursor
- ★ Control Codes For Printer Control
- ★ Automatic Screen Line Control at Word Boundries
- ★ Upper/Lower Case Keyboard (screen remains all caps)
- ★ Recall, Merge, and Save Text on Disk

JOHNSON ASSOCIATES
P.O. Box 352
Palo Cedro, CA 96073

CALIFORNIA RESIDENTS ADD 6% SALES TAX

WE ACCEPT BANKAMERICARD AND MASTERCHARGE

★ ★ ★ ADVENTURE – FOR THE TRS–80 ★ ★ ★

(New faster machine language version)

ADVENTURE is like no other program you have ever seen! It was inspired by the large ADVENTURE game found on big college computers in the last few years. Yet it will run on your TRS-80 level 2 16k machine! This is one game you will NOT master in an hour and then lose interest in! ADVENTURE is a machine language program using all 16k of your TRS-80. All commands now operate instantly! Adventure also supports lower case.

As you wander through the Adventure land you issue commands through two word ENGLISH sentences such as: 'WALK NORTH' or 'LOOK AROUND' or 'KILL DRAGON' etc. Each Adventure has over a 100 word vocabulary! ADVENTURE is so written that by changing the data base an entirely different adventure may be created, so look for many more ADVENTUREs in the future.

ADVENTURELAND is so innovative that the author has been asked to speak on it at the Personal Computer Festival of NCC '79!

ADVENTURES CURRENTLY OFFERED:

1) ADVENTURELAND – You wander through an enchanted world trying to recover the 13 lost treasures. You'll encounter WILD ANIMALS, MAGICAL BEINGS, and many other perils and puzzles. Can you rescue the BLUE OX from the quicksand? Or find your way out of the maze of pits? Happy Adventuring. . . . .

2) PIRATES ADVENTURE – 'Yo Ho Ho and a bottle of rum. . .' You'll meet up with the pirate and his daffy bird along with many strange sights as you attempt to go from your London apartment to Treasure Island. Can you recover LONG JOHN SILVER'S lost treasures? Happy sailing matey. . . . .

3) MISSION IMPOSSIBLE ADVENTURE – Good Morning, Your mission is to. . . and so it starts. Will you be able to complete your mission in time? Or is the world's first automated nuclear reactor doomed? This one's well named, its hard, there is no magic but plenty of suspense. Good luck. . . . .

All ADVENTUREs come on high quality (5 screw) calandered tapes for long life. All ADVENTUREs are shipped FIRST CLASS, usually within 7 working days.

*EACH ADVENTURE IS $14.95 (Specify ADVENTURE number when ordering)

(Dealer inquiries invited. Also available on 24k PET & CP/M)

Make check or money order payable to:

SCOTT ADAMS – Box 3435 – Longwood, Florida 32750 – Ph (305) 862-6917

(COD prices 10% higher, Sorry no Bank Cards)
(* TRS-80 is registered trademark of the Tandy Corporation).

ENGINEERS! TEACHERS! . . . STUDENTS!

LOOK! MATH DONE BY MACHINE LANGUAGE

Our TRS-80 Math Library can speed up your homework. Enjoy the speed of machine language while solving problems. Get the accuracy of double precision and the range of complex arithmetic. Only $4.50 for each machine language program.

Level II 16K programs come on **tape**, but if you use **DOS** the programs come on diskette. (Add $3.50 per diskette) the programs come one per cassette or up to four per diskette.

For a starter, we suggest you try **Roots** (a program to find the real or complex roots of polynomials up to tenth order. . . and the coefficients may be real or complex also) It's powerful, and yes, it uses double precision. You can always use a program like this.

If you use **Roots** with **Chrpol** and **Simplex** you can find the eigenvalues and eigenvectors of a matrix. So there are more programs. Really! We send a list with each order.

Pay by check or money order. Allow up to two weeks for personal checks to clear.

Autotype Executive Services P.O. Box 4617, Austin, TX 78765.

TRS-80
SOFTWARE
SOURCE

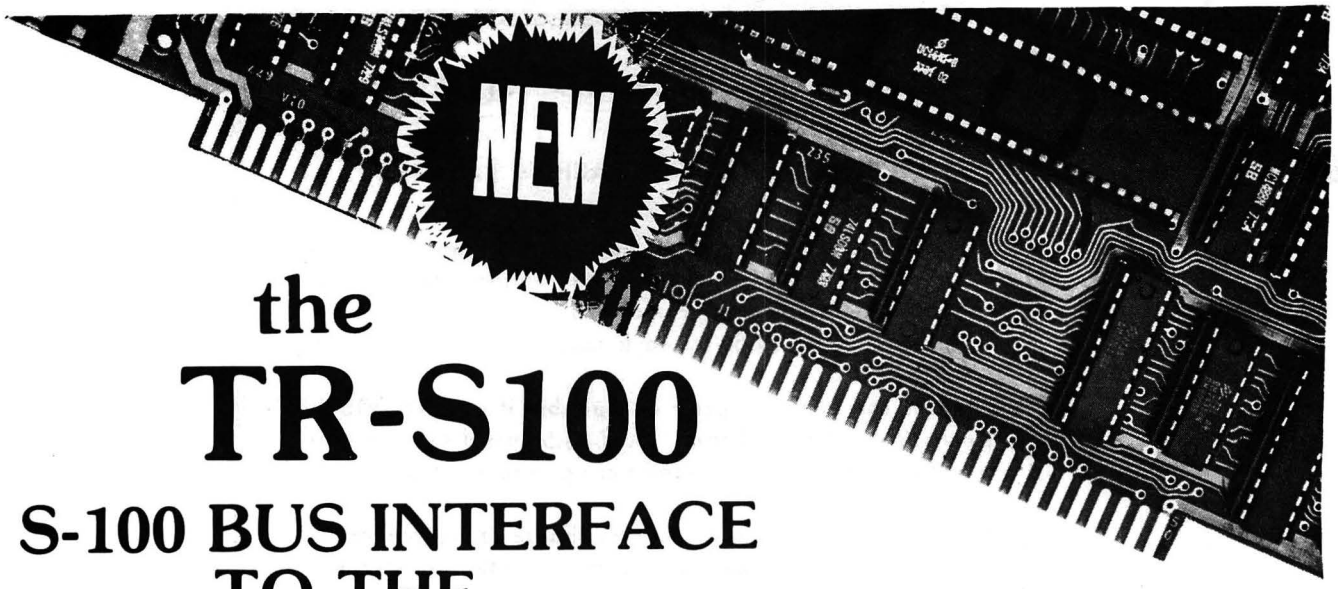
2,400 PROGRAM LISTINGS	**125 SOFTWARE SUPPLIERS**
ALPHABETIZED	**CROSS-REFERENCED**
PROGRAM DESCRIPTION	**CLASSIFICATION LISTINGS**
BASIC LEVEL & MEMORY	**ALPHABETICALLY LISTED**
SUPPLIERS NAME & ADDRESS	**PHONE NUMBERS**
CASSETTE LISTINGS	**SINGLE ISSUE $3.95**
DISK LISTINGS	**SUBSCRIPTION $10.00**
PROGRAM PRICE	**PUBLISHED SPRING-SUMMER-FALL**

DEALER INQUIRIES WELCOME

FOREIGN ORDERS ADD $2.00 SINGLE-$5.00 SUBSCRIPTION

COMPUTERMAT

BOX 1664C LAKE HAVASU ARIZONA 86403

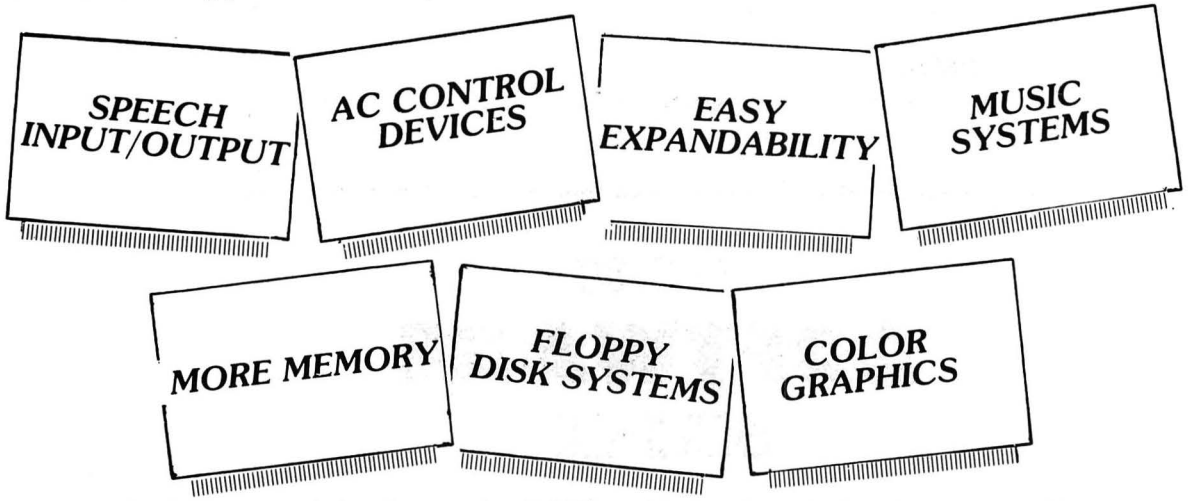


the TR-S100

S-100 BUS INTERFACE TO THE Radio Shack TRS-80

TRS-80 is a product of Radio Shack, A Tandy Corporation

. . . the "breakthrough" for TRS-80 Owners! Now you can make your TRS-80 compatible with the S-100 Bus systems . . opening a whole new world of peripheral devices and applications to you!



We have opened the door to the S-100 world of unique devices for the TRS-80 owner/user. With the TR-S100 you get more than the S-100 interface! We have included sockets for memory expansion up to 32K Bytes. A parallel printer port is provided and provisions have been made for a floppy disk interface (either the 5" mini-floppy of the full size 8"). All this, and software compatibility with the TRS-80 System.

If you already have a TRS-80 expansion chassis, you won't need all the options on our card. But if you have our card, you won't need a TRS-80 expansion chassis. No matter how you put your system together, you can use our card.

For the adventurer, The TR-S100 module allows the TRS-80 to be reconfigured to run software written for the S-100 Bus.

micro computer devices inc.

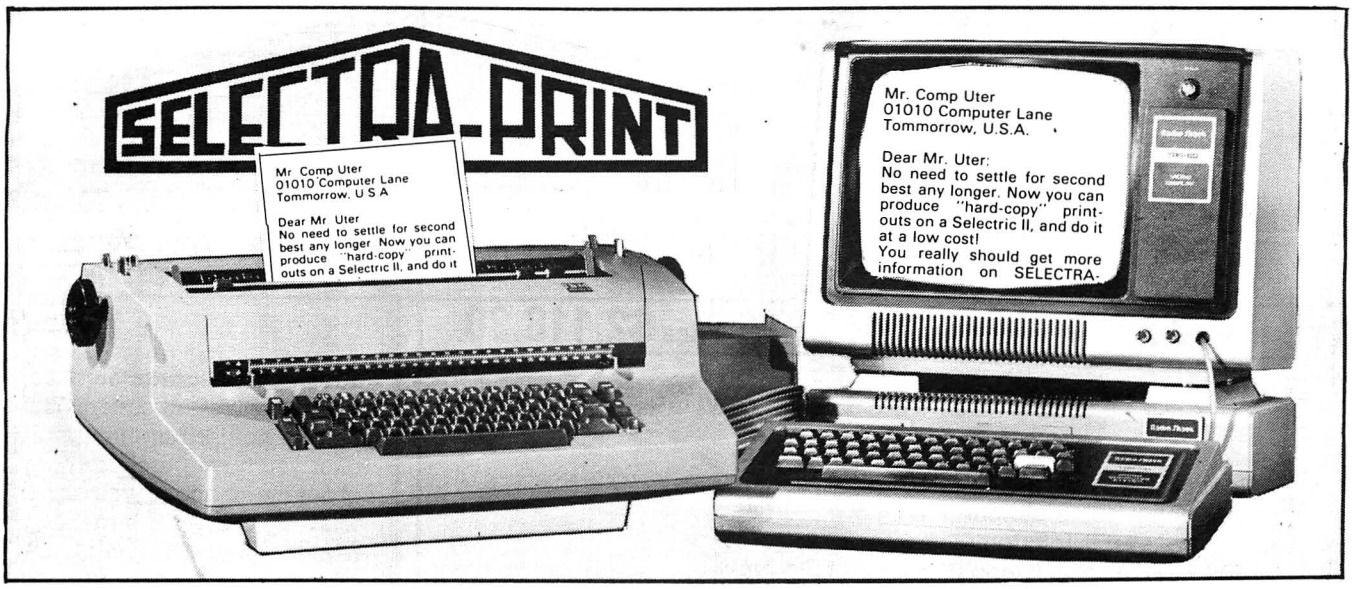
960 E. Orangethorpe, Bldg. F
Anaheim, California 92801
Telephone (714) 992-2270

mcd

Direct International Sales
International Sales Division
17648 Orna Drive
Granada Hills, CA 91344, USA

Discounts Available to
EDUCATIONAL ACCOUNTS
Contact: [redacted] P.O. Box 8394
Ann Arbor, MI 48105 (313) 665-8514

"Innovators to the Microcomputer Industry"



IF YOU OWN A TRS 80 *.....

TRS-80 is a product of Radio Shack, A Tandy Corporation

SELECTRA-PRINT PUTS YOU JUST A CABLE LENGTH AWAY FROM A "HARD—COPY" (Typewriter Quality: clean, clear, high-fidelity) Word Processing System!

. . .just a simple hook-up with the supplied cables and your *SELECTRA-PRINT* is ready to run.

For Word Processing on a TRS-80, for example, just command "LPRINT" and *SELECTRA-PRINT* automatically outputs clear, clean, high-fidelity, hard copy. . . . and of course you can use it to print-out any other information you might need.

SPECIAL NOTE:

SELECTRA-PRINT is a Selectric II typewriter and although it has been modified for computer print-out, it may still be used as a standard office typewriter.

PRICE: $1,850.00* *TRS-80 Version $1925.00

OPTIONS:

Dual Pitch	$125.00
Correction Feature	$125.00
Noise Reduction Feature	$50.00
RS-232 Interface	$195.00

* *SELECTRA-PRINT is VERSATILE!*

SELECTRA-PRINT is compatible with most micro- and mini-computers including *PET ● Apple ● Heath H8 ● IMSAI ● Cromemco ● Alpha Microsystems ● Space Byte ● North Star Horizon ● SWTP ● Vector Graphic ● Sol ● Polymorphic ● Digital Group ● Ohio Scientific ● Altair ● Sorcerer Xitan ● Rex ● KIM ● EXORcisor . . . .*

"From now on, **PRINT-OUT takes on a new meaning"**

M30

micro computer devices inc.

960 E. Orangethorpe, Bldg. F
Anaheim, California 92801
Telephone (714) 992-2270

"Innovators to the Microcomputer Industry"

Direct International Sales:
International Sales Division
17648 Orna Drive
Granada Hills, CA 91344, USA

Discounts Available to
EDUCATIONAL ACCOUNTS
Contact **Delores Sun** P.O. Box 8394
Ann Arbor, MI 48105 (313) 665-8514

TRS-80 SYSTEMS

"PROFESSIONAL SYSTEM"

Identical to Radio Shack 16K system
with compatable peripherials below.

- Level II-16K RAM Complete System (26-1056)
- Expansion Interface (26-1140)
- Mini Disk Drive
- P 1 Printer w/cable
- Work Station

SAVE OVER $400 **VR DATA Price $2,118.30**

"DELUXE BUSINESS SYSTEM"

Identical to Radio Shack 32K Deluxe system
with compatable peripherials below.

- Level II-16K Complete System (26-1056)
- Expansion Interface, 16K RAM (26-1141)
- 2 Mini Disk Drives
- Centronics 779 line printer, cable
- Work Station
- Line Printer Stand (26-1302)

SAVE OVER $750.00 **VR DATA Price $3,584.40**

1 MEG + OF DISK MEMORY

on Line for TRS-80
Includes—Operating System (CP/M)

VR DATA Price $2,195.00

HUH Electronic S-100 Interface to TRS-80

Kit . . . $280.00 **Assembled . . . $350.00**

VR Data corp
MORE DATA PER DOLLAR

777 Henderson Blvd. N-6
Folcroft, Pa. 19032
(215) 461-5300

Satisfaction Guarantee
VR Data gives all customers a 15 day no-risk run through. If, after you have purchased any of our merchandise, you do not wish to keep it—for any reason—we will accept any and all returns (providing the equipment is like new and in original cartons) and grant you a full 100% refund.

All equipment sold by VR Data is covered by 90 day manufacturer's warranty in addition to our satisfaction guarantee.

Classroom Instruction offered in Level II Basic—$49.95; and DOS/Disk Basic—$69.96.

Outlet Hrs: Mon.—Fri. 9AM-7PM. SAT. 12-5PM.

Quan.	Description	Each	Total
____	TRS-80 Complete System Level II-4K RAM	$ 628.20	____
____	TRS-80 Complete System Level II-16 K RAM	$ 889.20	____
____	Expansion Interface	$ 269.10	____
____	Mini Disk Drive	$ 415.00	____
____	Additional Disk Drives	$ 385.00	____
____	BASF 6106	$ 495.00	____
____	Centronics 779 Printer	$1,299.00	____
____	Centronics 101 Printer	$1,400.00	____
____	Centronics P1 Printer	$ 445.00	____
____	560 (selectric) Printer	$ 975.00	____
____	Memory Unit (installed)	$ 138.00	____
____	(kit)	$ 98.00	____
____	Diskettes ea.	$ 4.95	____
____	3 for	$ 12.00	____
____	10 for	$ 37.50	____
____	C-10 cassettes 5 for	$ 4.50	____
____	25 for	$ 18.75	____
____	Paper, per carton	$ 29.95	____
____	Paper, Quick Printer 3 rolls	$ 14.95	____
____	5000 3-1/2" x 15/16" labels	$ 17.95	____
____	"Professional System"	$2,118.30	____
____	"Deluxe Business System"	$3,584.40	____
____	1 Meg +.Of Disk System	$2,195.00	____
____	HUH Electronic S-100 Interface to TRS-80 (kit)	$ 280.00	____
	(assembled)	$ 350.00	____

Prices subject to change without notice.

Sub Total of Order $_____
(Penn. residents add 6% sales tax) $_____
TOTAL AMOUNT OF ORDER
$_____

Please send me the equipment I have indicated on the order form to the left.

Enclosed is my check or money order for $ _____.
Please charge to my credit card:
Master Charge #_____
VISA (BankAmericard) # _____
Expiration Date_____
Name_____
Address_____
City _____ State_____ Zip_____
Signature _____

MORE DATA PER DOLLAR

RADIO SHACK COMPUTER OWNERS
TRS-80 MODEL I AND MODEL II

TRS-80™ MONTHLY NEWSLETTER

- PRACTICAL APPLICATIONS
- BUSINESS
- GAMBLING • GAMES
- EDUCATION
- PERSONAL FINANCE
- BEGINNER'S CORNER
- NEW PRODUCTS
- SOFTWARE EXCHANGE
- MARKET PLACE
- QUESTIONS AND ANSWERS
- PROGRAM PRINTOUTS

. . . . AND MORE

FREE **WORD PROCESSING PROGRAM (Cassette or Disk)**
For writing letters, text, mailing lists, etc., with each new subscriptions or renewal.

LEVEL II RAM TEST -
Checks random access memory to ensure that all memory locations are working properly.

SEND FOR OUR 36 PAGE SOFTWARE CATALOG (INCLUDING LISTINGS OF HUNDREDS OF TRS-80 PROGRAMS AVAILABLE ON CASSETTE AND DISKETTE). $2.00 OR **FREE** WITH EACH SUBSCRIPTION OR SAMPLE ISSUE.

.....

THE COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™
Box 149 New City, New York 10956

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

ONE YEAR SUBSCRIPTION $24 .....

TWO YEAR SUBSCRIPTION $48 .....

SAMPLE OF LATEST ISSUE $ 4 .....

START MY SUBSCRIPTION WITH ISSUE _____
(#1 - July 1978 • #7 - January 1979 • #12 - June 1979)

NEW SUBSCRIPTION _____ RENEWAL _____

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____

*** ADD $6/YEAR (CANADA, MEXICO) - ADD $12/YEAR AIR MAIL - OUTSIDE OF U.S.A., CANADA & MEXICO ***

NIE COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™
Box 149 New City, New York 10956

U.S. POSTAGE
STANDARD
BULK RATE
Permit #58
New City, N.Y. 10956

FORWARDING POSTAGE
GUARANTEED
ADDRESS CORRECTION
REQUESTED