THE CREATIVE
TRS-80

Edited by Ken Mazur

N.Y. STOC
24 ½ 26
39 ..... 02.

The Creative TRS-80

Edited by
Ken Mazur

Creative Computing Press
Morris Plains, New Jersey

To Maureen, who passed too quickly.

The Creative
TRS-80

Preface

If you've ever read an issue of *Creative Computing* magazine, you know that our commitment to the growth and development of the TRS-80 has been a serious one. Every month, *Creative Computing* presents the TRS-80 owner with valuable information on the latest developments involving their machine as well as interesting tutorials on how to use the TRS-80 to its fullest potential.

But perhaps you've never picked up an issue of *Creative Computing* or maybe you've tried to get a hold of a back issue which contained an article of particular interest and found that the issue you wanted was one of the many issues of *Creative* that are now out of print. The *Creative TRS-80* was compiled for the *Creative Computing* newcomer as well as for the *Creative Computing* reader who needs a single reference source of valuable TRS-80 information.

While containing many hardware and software reviews, *The Creative TRS-80* also covers applications in business, the home, and the school. There are articles on programming tips to help you in many varied application areas as well as an entire chapter of game listings which you can type directly into your computer.

We think you'll find *The Creative TRS-80* to be a necessary addition to your TRS-80 library but remember — for the absolute latest in TRS-80 information, pick up an issue of *Creative Computing* every month!

John Anderson
Associate Editor
Creative Computing

Contents

Chapter V. Programming Tips

Chapter VI. Games

Chapter VII. Graphics and Music

Chapter VIII. Word Processing

Chapter IX. Education

Chapter X. TRS-80 Strings

Chapter I
Hardware

Many Capabilities, Few Weaknesses

Why I Like the TRS-80

Stephen B. Gray

It's become fashionable in many personal-computer circles to call Radio Shack's machine the "Trash-80," to speak of Model I's hardware as poorly designed, and to cite various inadequacies of Level II Basic.

Yet, despite all these hardware and software problems, Radio Shack has somehow managed to sell over 200,000 (perhaps 250,000 by the time you read this) of these "poorly designed and inadequate" computers.

How did Radio Shack manage to fool so many people? How were a quarter of a million people hoodwinked into buying such an inferior piece of merchandise?

What They Wanted

One answer is that Radio Shack provided what many people out there wanted, at a price they felt was right, and at thousands of outlets all over the country where a person could go try it out before buying.

Once the TRS-80 caught on, the name

became as magic in its own field as IBM's in the mainframe business. IBM may not make the best computers, or the fastest ones, but it knows, better than all the rest, the importance of service and support.

Radio Shack made a lot of mistakes with the TRS-80, as would any company marketing the first popular ready-to-run personal computers. But they've learned a lot, they've made tens of thousands of free fixes, and they've brought out three more TRS-80 computers that alone may well outsell both Apple and PET.

My TRS-80

Nobody who's used a personal computer for more than a few weeks is completely satisfied with it. There are always some features on other machines he'd like to have on his.

I've had a 16K Level II Model I since December 1977. I've been writing the TRS-80 column in this magazine since the Nov-Dec 1978 issue.

It took me months before I realized

that some of my dissatisfaction with my TRS-80 was due to my not completely understanding how it works, and exactly how to program some difficult tasks.

Once I began to realize what my TRS-80 could do, and could not do, I began to appreciate it much more.

There's a great deal I still don't know about the TRS-80. I'm not all that much into machine language, preferring to use Basic, (which I'm still learning about,) in areas such as strings, matrices, and TRS-80 graphics.

But the more I use the Level II computer, the more I like it. I know just about what it can do, and can't, and I recommend it to most of the people who ask me what personal computer to buy.

Most, but not all. The TRS-80 can't please everybody, which is why the Apple II, PET, Atari and Sorcerer computers sell as well as they do.

What I Like About the TRS-80

Service and support are two of the main reasons for my liking the Level II TRS-80.

As for service, when I had problems with my RAM memory, and also wanted the lower-case modification installed, along with the free cassette-loading fix, all I had to do was take my keyboard unit down to a Computer Center in lower Manhattan, where a skilled technician took all of 55 minutes to fix the memory problem (a faulty RAM IC) and install the two mods.

Who else has over 225 Computer Centers around the country? How many other personal-computer manufacturers require that you *mail* the computer to them for service?

As for support, I'm talking about the vast amount of absolutely fascinating Level II software available.

I don't mean Radio Shack's programs, most of which have shown a great deal of conservativism and lack of imagination. (Although they're beginning
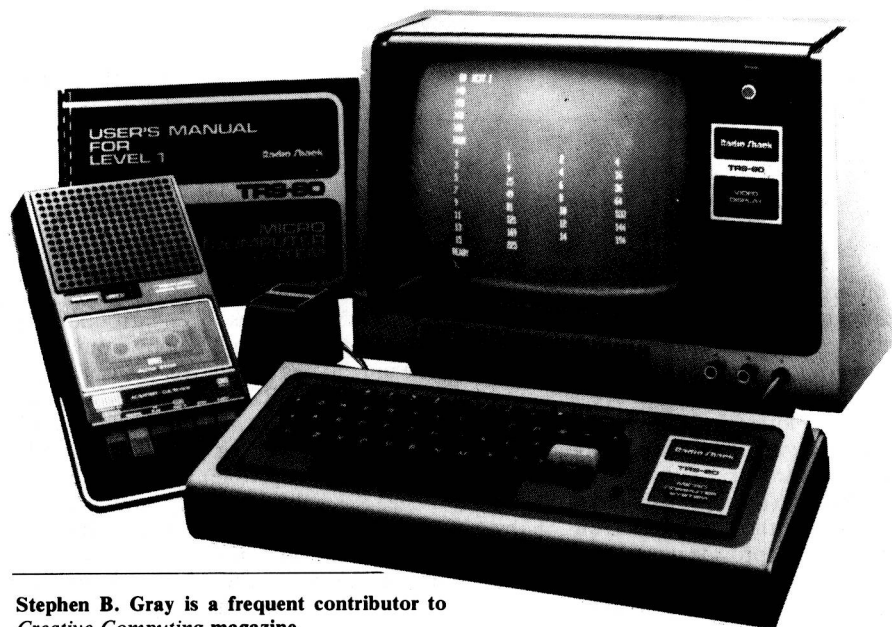
Stephen B. Gray is a frequent contributor to *Creative Computing* **magazine.**

to break away from the mold, and have brought out some good programs lately, mostly written by outsiders, and including Scripsit, Astrology and Dancing Demon.)

Although a great many poor programs are being sold by people whose main interest seems to be in making a fast dollar, some very clever software is being written by programming geniuses. Leo Christopherson, who wrote Dancing Demon, has written several outstanding games. Lance Micklus is another master gamesman.

The pages of *Creative Computing* and other computer magazines are full of ads for some highly imaginative TRS-80 games and some very well thought out utility and business programs for the TRS-80. There are programs for fighting your way through a dungeon full of demons, playing music, drilling children in math, balancing a checkbook, communicating on a network, performing advanced math, writing paychecks, word processing, playing baseball, simulating lab experiments, playing the horses, turning on household appliances, creating and using a database, printing a mailing list, controlling inventory, working in double-precision math, managing a budget, tracking stock trends, generating a horoscope, drawing animated movies, playing chess and backgammon, and hundreds more.

Yes, the other popular personal computers have a lot of programs, but nowhere near the variety and number written for the Level II TRS-80.

More publications specialize in the TRS-80 than in all the others put together: *80-US, The Eighty, 80 Microcomputing, PROG/80, S-80 Bulletin, Insiders,* and probably a couple more I don't know about. That's in addition to the magazines that regularly run TRS-80 articles.

What I Don't Like About the TRS-80

There are some things I don't like about the TRS-80, although several of these have been taken care of with free modifications.

I got terribly annoyed when extra letters started showing up on my screen, as in NEXXT, FFOR and RNND. That can be fixed by prying up the keys and cleaning the spring contacts; the newer keyboards don't use spring contacts.

The lack of lower-case letters was a nuisance until I had the lower-case mod installed. There were problems loading some tapes, until I had the free cassette-loading mod installed, which enabled me to load all but the very worst tapes.

The Level II TRS-80 Model I doesn't have color. But now there's the TRS-80 Color Computer. Several things were left out of Level II Basic. But they are in Microsoft's Level III Basic.

The Level II manual is really a reference manual, and as such is missing a great deal of helpful information. But Radio Shack promises to publish its own Level II user's manual some day. And several fine Level II manuals have been

written outside Radio Shack.

Using cassettes for storing programs used to require a lot of cable-plugging and unplugging. But then I discovered a switchbox (Dick Fuller's RF-II) that eliminates all the cable-handling, also provides a speaker for listening to the bit-stream, and permits easy copying of tapes from one cassette recorder to another.

The TRS-80 Model I has no software-definable keys like the Exidy Sorcerer. But the TSHORT program from Web Associates provides that capability, in addition to several others.

A good letter-quality printer costs about $2,000. Well, that's really a problem, and my only solution is to save up for one.

Conclusions

After three years of using a TRS-80, I've learned its many capabilities and few weaknesses, and have learned to live with them. Occasionally there are some problems, such as when the Scripsit word-processing program doesn't work the way I want it to, but that's mostly because I don't use it enough to be fluent in all its idiosyncracies.

I wouldn't trade my Level II TRS-80 for any other personal computer made, except for Radio Shack's Model III, with integral disk drives and keyboard.

If there's a peripheral or program I want that doesn't exist, and it's not too far out, somebody will be selling it before long. □

Expanding the TRS-80 Model I

Exatron MM+

<div align="right">

Harley Dyk

</div>

If you are considering memory expansion, floppy interface, serial I/O, etc. for your TRS-80 read on.

If you own a 16K Level II TRS-80 Model I, you own a very cost effective computer. This does not necessarily mean, however, that you are content with your computer.

Harley Dyk, 1644 Grant, Grand Haven, MI 49417.

If you are a programmer you are aware that programs often grow to fill (or exceed) available memory. If you are a serious user of your system you probably long to add a disk drive or alternative, such as the Stringy Floppy or the Beta-80. In either case you may need more memory and/or a floppy controller.

The MM+ (memory plus interface) by Exatron and the System Expansion by LNW Research provide quality alternatives to the Radio Shack Expansion Interface and either could save you some money depending on your needs.

MM+

The MM+ has just been introduced by Exatron (the Stringy Floppy company). The unit comes assembled and is made to fit under the TRS-80 monitor. Standard features are: 32K of memory, built-in power supply, parallel printer port (Radio Shack/ Centronics compatible), serial printer port (RS-232C), light pen port, real-time clock, and general parallel port (IBM Model 50 compatible). The unit was designed with Stringy Floppy owners in mind, and this accounts for the fact that a floppy controller was not included as a standard feature.

The MM+ has room for an additional board and its power supplies run at or under 50% capacity. An additional 32K (bank 2) and floppy controller will be the first options available on the second board. Exatron is polling its Stringy Floppy owners to find what other options they would like to have available on the second board. The company plans to work on the options in order of preference indicated by their customers. Some of the other things under consideration are: color graphics, hard disk controller, RS-232C serial I/O, IBM Model 50 bidirectional interface (use typewriter keyboard), multi-port parallel I/O, A/D and D/A interface, TRIAC/SSR/OPTO-Isolater control interface, port FF audio output circuit (for sound effects), IEEE-488 Interface, and a communications modem.

A unique feature of the MM+ is the light pen port. This port is designed for use with the "Photopoint" light pen made by MicroMatrix. The light pen can be used with a cassette recorder serving as an amplifier, but the light pen port makes the amplifier more convenient and leaves the recorder free. The port should work with any light pen that normally connects to the Radio Shack cassette recorder.
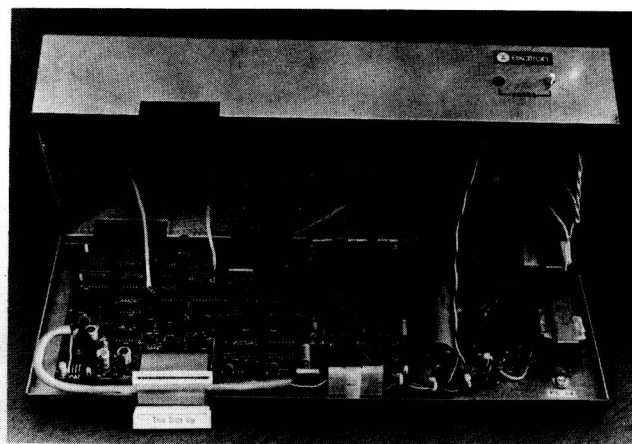
The MM+ is guaranteed to run at double CPU speed (3.55 MHz). This makes the MM+ compatible with the TRS-80 speed-up kit offered by Exatron.

Comparisons

The key to selecting one of the two expansions lies in the answers to the following important questions. Do you want to build your expansion unit? Do you need a floppy interface immediately? Do you need serial I/O now? (The MM+ has output only at this time.) Do the additional features being considered for the MM+ interest you? These questions address the basic differences between the two units. Table 1 can also help you compare the major features at a glance.

Both units have performed well for many users. Both work well with disk alternatives such as the String Floppy and Beta-80. Both units are of top quality and are produced by reputable companies. At a minimum, either unit should fix your OM errors and provide many additional features. □

The Memory + Interface (MM+)´ by Exatron.

	MM+	LNW
Size	17" x 7" x 3"	10" x 12" x 3" (in LMB 10123 chassis)
State	Assembled only	Bare board only
Cost	$199.95	$270-$300 including power supply and 32K
Memory	32K only	16K or 32K
Floppy Interface	No (but an option soon)	Add $50 plus cable
Real-Time Clock	Yes (can use with Level III Basic)	Add $4
Serial I/O	Printer output only (300 and 600 baud	Add $22
Parallel printer port	Yes	Add $3
Dual cassette port	No	Add $10
Light pen port	Yes	No
Bus extender	Yes	Yes
On-board power supply	Yes	Yes (minus transformer)
Dealers	No, mail-order order through program chairman (active Stringy Floppy owner)	None established, however some dealers may stock this board, otherwise mail-order
Warranty	Year/30-day money-back	90 days (board only)
Toll free number	Yes	No
Contact	Exatron 181 Commercial St. Sunnyvale, CA 94086 800-538-8559	LNW Research 8 Hollowglen St. Irvine, CA 92714
Misc.	Guaranteed to run at 3.55 MHz, has memory bank select circuit so can add another 32K, has on-board memory-mapped address decoding.	Prices of options above are accurate only if built in the order listed. Any other order could change prices since parts are shared in many sections.

Table 1.

Another Expansion Alternative

The LNW System Expansion

Richard Zatarga

This article addresses those computerists who are ambitious, industrious, and capable of reading a schematic diagram; possess a better than average ability to use a soldering iron; and have a desire to upgrade a TRS-80 Model I computer and save over $100 in the process.

The above mouthful may sound like science fiction, however, if I have just described you and you are willing to spend a few—well actually, quite a few—evenings with iron and solder in hand, you can have an Expansion Interface for two-thirds of Radio Shack's price, and with a serial RS-232C/20mA interface thrown in as a bonus.

"Sounds too easy!" "What's the catch?" you ask. Well read on and I'll tell you how I did it. First, I parted with $69.95 plus $3.00 for shipping and handling for the LNW Research System Expansion printed circuit board. Please note that this is a bare P.C. board. What you are paying over $70 for is a meticulously traced and silk screened epoxy circuit board and LNW's electronic expertise.

Ten days after I placed my order for the P.C. board, UPS delivered the board and the assembly/user manual. After opening the box, I inspected the board for damage. The board was fine, but what I noticed during the inspection was the very tight and dense component layout. I've built a few electronic kits in my day from a simple speaker system to a complex color television, but I had never run across a you-build-it circuit as tightly packed as the System Expansion. This project is definitely not—I repeat, *not*—for the novice solder jockey or the sweat solder expert who works with copper tubing and a propane torch. Construction of this unit requires time, patience and precision.

With the board inspected, I sat down in my favorite easy chair and began to read the manual. Quickly thumbing through its 67 typewritten pages, I was initially impressed. However, after reading it thoroughly from cover to cover, I found

Richard Zatarga, 800 Towner Swamp Rd., Guilford, CT 06437.

the manual to be a bit of a disappointment due to the lack of detail, especially in sections on assembly, testing and trouble-shooting.

The next thing I did was to collect all of my electronic component catalogs and a few back issues of some computer magazines. Armed with the component checklists provided in the LNW assembly manual, I perused the catalogs and magazine advertisements looking for the best buys on the various components I needed to construct the System Expansion.

I found that resistors were a bargain from one supplier, while integrated circuits were better purchased from another. Another vendor had great IC prices, but his capacitor prices were outrageous. The results were separate orders to six vendors in four states. With my orders for parts in the mail, I sat back and impatiently waited for the components to arrive.

A stroke of luck—the first order to arrive consisted of some integrated circuits and all of the IC sockets I needed for the interface. Actual construction began with mounting and soldering all of the sockets on the PC board. Next, the resistors and capacitors were added. Finally, all the diodes were inserted and soldered in place. I worked on the interface a few evenings

a week over a period of two months.

It was just three days shy of the second month when my final parts order arrived. If all the components had been readily available, eight or nine evenings would have been all the time needed to complete the board and thoroughly check my handiwork.

Testing

The main power to the System Expansion is provided by a TRS-80 computer transformer. The LNW onboard power supply takes the raw transformer voltages and provides the regulated +5V, -5V, +12V, and -12V needed to activate the rest of the board. These voltages are isolated from the main part of the System Expansion by five jumpers, and the LNW assembly manual has a procedure for testing them out before the jumpers are added and power is supplied to the rest of the board.

When I first powered up the System Expansion, I expected something to happen, such as blowing both onboard fuses or at least a little puff of smoke. Nothing! I proceeded with LNW's test procedure taking voltage readings at designated test points with a DMM. Everything in the power supply section checked out fine.
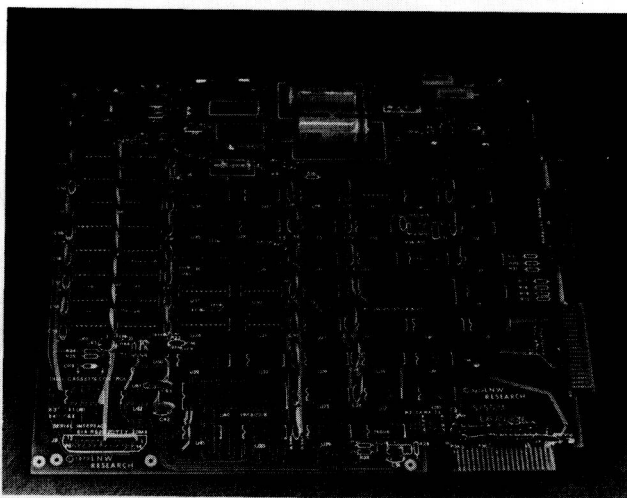
The LNW Research System Expansion with power supply and 32K. Transformer not shown.

Next, I added the jumpers providing power to the rest of the board. Please note, all of the IC sockets were empty at this time. I saw no reason to test a fully loaded board and take the chance of incinerating some expensive integrated circuits.

I proceeded with LNW's next test procedure. All voltage supplies checked out except for one of the +5 volt sections. I traced the +5 volt supply through the schematic and onto the board, and found a couple of terminating resistors bridged together with solder and loading down the +5 volts to less than 3.2 volts. A light touch with the tip of a soldering iron rectified the problem and all voltages checked out.

Verifying the power supply voltages is the extent of the testing procedures provided in LNW's manual. Still being cautious, I decided to test the rest of the System Expansion one section at a time. The first section I tested was the Dual Cassette Control.

Using the parts list by section, I inserted the required IC chips into their proper sockets, and attached two cassette recorders to the DIN connectors. I powered up the System Expansion and the keyboard, and loaded blank tape into each recorder. I wrote a short Basic program and entered CSAVE#-1'TEST'. The first recorder responded. I then entered CSAVE#-2'TEST' and the second recorder fired up. To complete the test of the Dual Cassette Control, I CLOADed the test program from each recorder and ran the program. Both recorders saved and loaded data perfectly. So far, so good.

The next section I tested was the 32K memory. I tested this section in 16K increments. Why annihilate 16 RAM chips at once when I could do it in two easy steps. The first eight chips were inserted and power was applied to the system. I entered ?MEM from the keyboard and lo and behold a number greater than 15,572 magically appeared on the screen. I ran a RAM test routine and all the memory checked out. I was feeling pretty good at this point and inserted the other eight RAM chips.

PRINT MEM yielded 48,340 this time. The RAM test confirmed that all, including the new 32K memory addition, was functioning properly. Now my ego was really soaring. It must have been up to eleven points on a ten point scale. Confidence in my construction ability was at an all time high, so I decided to forge ahead, even though it was 1:30 in the morning.

Next on the list for testing was the parallel printer port. The relevant chips were inserted and a printer cable connected between the System Expansion and a

borrowed printer. I powered up the entire system and CLOADed the test program mentioned earlier. I entered LLIST and *Eureka* the program listing was output to the printer. I modified the program by changing all the PRINT statements to LPRINT. RUN ENTER produced a nicely formatted report on the printer. Three sections tested and I was batting a thousand. I decided to check one more and call it a night.

I inserted the integrated circuits required for the Floppy Disk Controller section. The 40-pin FD-1771 disk controller chip took some effort to get into its socket. There always seemed to be one or two pins that slipped out of alignment. Finally, the FD-1771 was properly inserted, and I connected a borrowed disk drive to the interface and applied power to the system—again.

I inserted a diskette into the drive and pushed the reset button. Nothing happened! What was wrong? I checked the power switches. Everything was on. I checked the floppy cable and that looked fine.

I read the DOS manual (When all else fails, read the instructions. Right!!) and discovered that DRIVE 0 must be the terminal drive, i.e., the last drive on the cable, and it must be the drive farthest away from the interface. Also, the connector nearest the interface must always be attached to a drive. My borrowed disk drive and cable came from a friend with a two drive system and he only lent me one drive. I moved the drive to the first connector on the cable, and this time when I pushed the reset button the drive activated, the CRT screen went blank for a second, and *voila!* DOS READY appeared on the screen. I ran the TEST2 utility provided on the TRSDOS diskette to stress test the floppy controller. The test was successful and I decided to pack it in for the night. I'd test the RS-232C/20mA interface in the morning.

The last of the ICs was put on the board. The 40-pin UART went into its socket without a hitch. It's amazing what a little experience or a couple hours of sleep and four cups of coffee will do for one's manual dexterity. I entered a serial interface routine LNW provided in the appendix of their manual. The RS-232C/20mA interface worked like a charm. Testing of the System Expansion was complete. All sections worked and I had an expansion interface equal to Radio Shack's with the added plus of an RS-232C/20mA serial interface.

The Bottom Line

Did I really save money by going the construction route to upgrade my Model I? My answer has to be a definite yes.

Was the completed unit worth the time, effort and, on occasion, aggravation required to construct it? Again, I must answer in the affirmative. Permit me to elaborate.

My total cost for the printed circuit board, sockets, resistors, capacitors, power pack, miscellaneous hardware, integrated circuits, including sixteen 4116 memory chips, was $310. I built a case for the completed board and two power packs— one for the System Expansion and one for the CPU—from some scrap lumber I had in my workshop. If you don't have access to any scrap lumber, another $10 or so can be added to the overall cost.

A substantial investment indeed, but still quite a bit under Radio Shack's price.

Check the discount mail order advertisements in this magazine for the cost of a Radio Shack Expansion Interface. The cheapest one I found was $249. Check out the prices on 4116 memory chips. The best value I found was $40 for eight chips. That totals to $349—only $29 more then I invested and no construction required. But hold on for just one second, the System Expansion includes an RS-232C/20mA I/O section and my total cost includes the components required for this serial interface.

Check the advertisements again, and you'll find that $89 is about the best buy you can find for Radio Shack's RS-232C option. Now your cost is up to $418. A $100 savings should be worth the time and effort required for anyone to build the unit. It was for me.

An added advantage of constructing the LNW System Expansion is the ability to repair any problems that may develop with the unit. Armed with the schematic diagram, the sectionalized parts list and the circuit descriptions provided by LNW, a minimum of time and effort should be all that is needed to locate and fix most troubles. Please note that this last statement assumes some electronic and trouble-shooting ability.

Conclusion

I've been using my System Expansion for the past four months. I have my own printer and disk drive attached to the unit. You can borrow hardware from friends for only so long before they start forcing lease with option to buy contracts on you. Well, the System Expansion has been performing very well. I haven't experienced any crashes or erratic operation. Disk I/O has been impeccable. Everything has been functioning perfectly.

So, if you possess the skills I mentioned earlier, want to save some of your hard-earned money and want the satisfaction of building a sophisticated piece of computer equipment, then I recommend the LNW System Expansion. You won't be disappointed. □

Aimed at the Business Market

The TRS-80 Model II

Stephen B. Gray

Radio Shack, manufacturer of the best-selling TRS-80 personal computer, introduced its big brother, the new TRS-80 Model II, at a New York City press conference in late May.

The new computer is said to perform as a general-purpose dataprocessing machine, an intelligent terminal, or a word processor. Software is available for general ledger, accounts receivable, inventory control, mailing list management and payroll.

The TRS-80 Model II microcomputer system, designed and manufactured by Radio Shack in Forth Worth, is not intended to replace or obsolete what is now called Model I, but, according to John V. Roach, Radio Shack executive vice-president, is "specifically designed to take up where the original TRS-80 leaves off—a machine with increased capacity and speed in every respect, targeted directly at the small-business application market. A market which has been estimated from $1 billion to $2 billion by 1983. This machine bridges the gap between personal computers and the low end of the commercial market such as the IBM 5100 series, Dapapoint, ADDS, etc. Yet we do not plan to emulate these companies' sales techniques but rather plan to market this equipment in much the same way as the TRS-80 to those customers who are willing to come to us for sales, training, and maintenance."

Software-compatible (only Basic Programs) with the Model I, and resembling the smaller computer in several respects, TRS-80 Model II has the same 12-inch video monitor, but with 24 lines of 80 characters, with both upper and lowercase, as compared to 16 lines of 64 characters, uppercase only, in the Model I.

The TRS-80 Model II has a built-in 8-inch diskette drive at the right of the screen, providing half a million bytes of storage in addition to the 32k or 64k bytes of internal RAM. The drive is manufactured by Shugart, and

Stephen B. Gray is a frequent contributor to *Creative Computing* magazine.

second-sourced by two disk manufacturers whose names Radio Shack executives would not divulge.

Additional diskette drives are available in an expansion chassis that holds up to three drives, and which mounts in or on a system desk.

The new keyboard includes Control, Escape, Caps, Hold, Repeat and two software-programmable Special Function keys not found on the Model I keyboard.
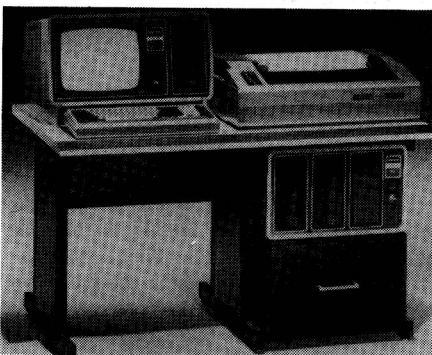
Prices for the TRS-80 Model II start at $3499 for a 64K byte computer with it's built-in diskette drive. The disk expansion with one drive is $1150, with two drives $1750, with three drives $2350. The Model II system desk is $350.

The Model II uses the same Z80 processor as the original TRS-80, but operates it at twice the speed. A direct memory access feature, according to Dr. John D. Patterson, director of Tandy Systems Design, "further enhances throughput by controlling the data transfer between memory and disk, allowing the CPU to perform other tasks simultaneously."

An enhanced Level-III version of the TRS-80's Level II Microsoft BASIC and TRSDOS operating system are automatically loaded in memory when the machine is turned on. In addition, each time the computer is turned on, it tests itself.

Built-in I/O capabilities include two RS-232C channels and one Centronics parallel port. Future expansion is provided for via four plug-in slots for optional PC boards.

As for software, Jon A. Shirley, vice-president of the Radio Shack

Computer division, noted that "About the same time we start shipments we will have the first of five business packages. All of these will run on the basic one disk version of the Model II. There will be a General Ledger capable of handling 500 accounts and a Payroll system that will handle up to 500 employees in up to three different states. An Accounts Receivable package will offer a variable number of accounts versus number of transactions ranging from 300 accounts with up to 8,000 transactions per month, to 2,000 accounts with up to 1500 transactions per month.

Another new package is a very capable Retail Inventory system that handles 3000 items. Finally, we will offer a mailing list system that can handle up to 4000 names. Mailing list management has proved a popular item for churches, school, groups, as well as for business. Prices for these programs will range from about $150 to $400, keeping them in a low price range for software of this capacity.

Also announced were several programs for the TRS-80 Model I, including a Payroll program for up to 100 employees, a Retail Inventory Control system for up to 1000 items, Accounts Receivable, Advanced Statistical Analysis, and Real Estate packages 1, 2 and 3. The real estate packages, which will be eventually expanded to an eight volume set, sell for $30 each and, according to Shirley, "represent an excellent example of how an under-$1,000 computer can provide a small business with very sophisticated software dedicated to a specific industry. These packages range from simple calculations of mortgage payments to the present value of income streams and other very complete calculations for the real estate investor." Also coming is a $99 FORTRAN, and a stock analysis package developed in conjunction with Standard & Poors.

The Radio Shack TRS-80 Model II will be sold at Radio Shack Stores and Computer Centers, and participating Radio Shack dealers, nationwide.
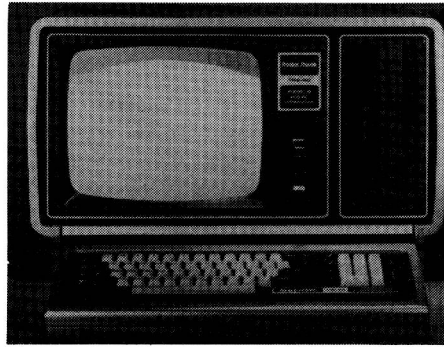
Radio Shack "will fall slightly below our goal of 50 centers by June

30th," according to Charles A. Phillips, senior vice-president, operations. "As of today we have 38 open with the prospect of five more in June. The majority were opened in March and April 1979, and despite high, non-recurring opening costs, many have turned profitable and we are optimistic about their sales and profit contribution to the company for fiscal 1980."

The Radio Shack Model II, with a basic price of $3450, falls in between the Model I, with a basic price of $599, and the Tandy 10, a relabeled ADDS System 70, with a minimum price of $8995.
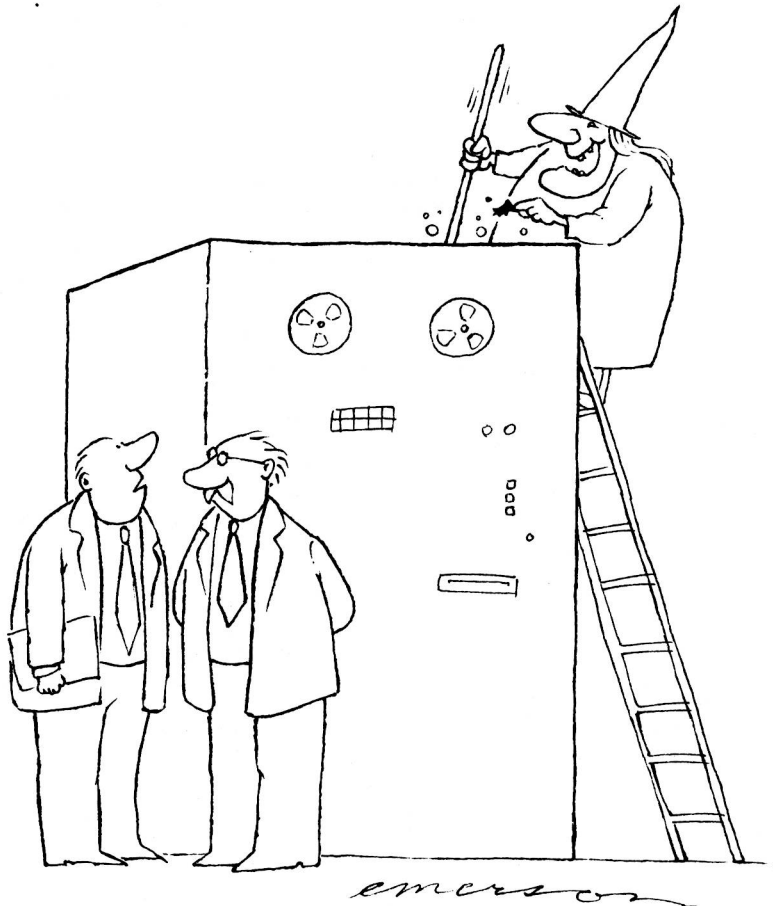
In comparing the Model II with other computers, Roach asked, "How does the Model II compare to other small business computers? An IBM 5110 in comparable configuration would cost the end user between $15,000 and $20,000. Hewlett-Packard 9800 System 45 desk-top computer with printer sells for around $20,000. The Wang WCS-15 is over $10,000 without printer. The new Datapoint 1400 is around $6,000 without printer and is almost identical to the $3450 Model II configuration.

The TRS-80 Model II is a multiple-function machine. It can, on a small scale, be a general purpose data processing machine doing the traditional general ledger, payroll and accounts receivable type of applications. It can also serve as a low-cost word processing machine with a variety of print qualities available depending on the printer you place in the system. Additionally it's a terminal device with a standard communications interface that permits you to hook up to a telephone through a low-cost modem. Therefore, in one package you have an affordable intelligent terminal word processing computer system. The acronym guys can have fun with that." □

Radio Shack's TRS-80 Model II has a built-in 8-inch diskette drive, 12-inch monitor displaying 24 lines of 80 normal or 40 expanded characters, and a keyboard with 76 keys including functions such as Control, Escape, Caps, Hold, Repeat, and two software-programmable Special Function keys, plus a "calculator" keypad. From one to three additional diskette drives fit into an expansion chassis, mounted on or in a Model II System Desk. Price for the system shown, with 64k bytes of internal RAM memory: $6,599.

"New programmer?"