

# THE EIGHTY

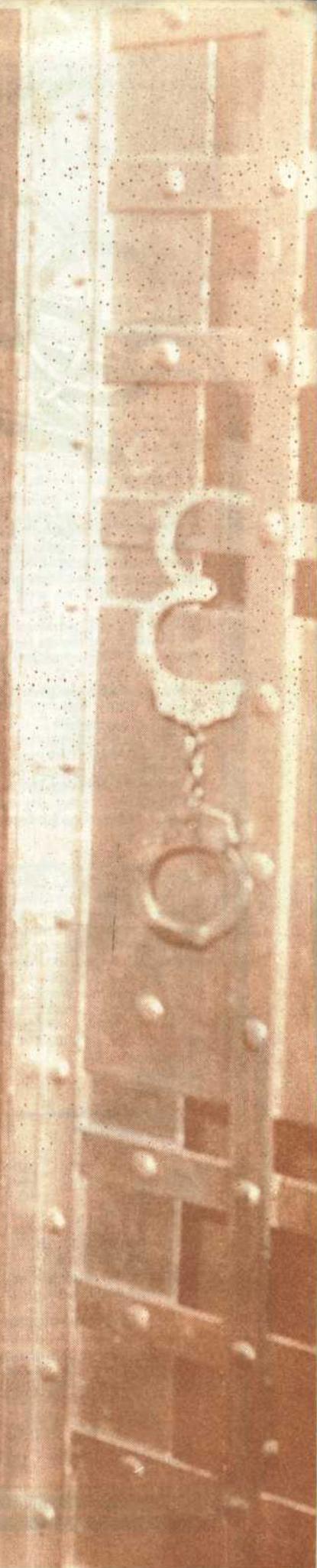
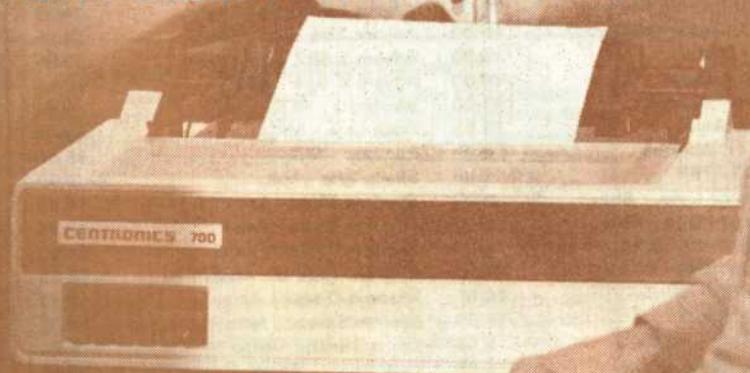
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# Editorial!

We have been astonished at the quality of recent software for the TRS-80\*. Highly sophisticated, thoroughly debugged programs that are carefully tailored to particular applications are starting to appear in quantity. Here is a list of some of the best.

**THE ELECTRIC PENCIL** by Michael Shrayor Software. We use this highly sophisticated text editor in-house to prepare copy for our magazines. It has powerful search and edit functions, and with a little extra knowledge, can even be used to edit BASIC programs.

**NEWDOS** from Apparat and VTOS 3.1 from Virtual Technology. It is a sad comment on the ineptitude of TANDY CORPORATION that we must be so appreciative of disk operating systems that work! But after TRS-DOS miserable attempts 2.0, 2.1, 2.2, and 2.3, we have come to really appreciate the other systems.

**ST80D** from Lance Micklus, Inc. This communications package turns your microcomputer into a smart terminal for a maxicomputer. It provides the necessary control codes, allows you to redefine keys, edit, send information to and from diskette, dump directly to printer, and edit received files, with many other features.

**APL80** from TSE. This powerful language comes with tutorial material and is a logical choice for many engineering and scientific applications. The lack of the APL character set on the TRS-80\* is a stumbling block, but it does not take long to learn the new representations.

**CCA Data Management System** from Personal Software. This is a sophisticated data base manager with a comprehensive manual, excellent editing routines, selective reporting, flexible report formats, computational abilities, and many special features.

With all this magnificent software available, it is time for some other computer manufacturers to produce compatible systems. TANDY seems to be determined to alienate customers with production shortcuts such as the deliberate elimination of lower case and the absence of a data separator on the Model 1 and the unreliability of the Model II. Just the other day I tried to install an RS-232 board in my expansion interface only to find a note from Radio Shack. This is my loose translation of the notes:

Ha Ha! We gotcha! We ran out of parts and shipped this out without connectors, hoping you would never notice. If you take your computer to your local repair center, we will order a connector for your RS-232. Why don't you buy another computer to use in the meantime?

\*TRS-80 is a trademark of Radio Shack, Division of Tandy Corporation.

## THE EIGHTY

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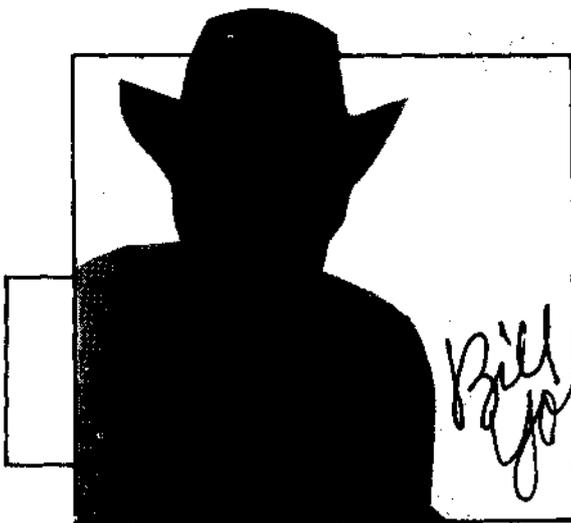
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### Submissions

Articles, Reviews, and Press Releases are welcome and will be published as space permits. No compensation is offered for commercial submissions. Individual authors are compensated at \$20 a page.

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# PURE & SIMPLE

I come to you not as a prophet.....

A very hearty welcome to the pages of 'The Eighty' Magazine. Now that the holidays have passed, it gives us a moment to reflect on the events of the preceding decade, and ponder what the future has in store for us as an industry. Without question the WORLD POWER scheme dominated the picture, but it just might be possible that the end result will prove to be positive to all of us. The industry badly needed an 'issue' to pull everyone together and form a unified body to oversee the goings on, and WORLD POWER provided us with that reason. M.I.T.A. (Microcomputer Industry Trade Association) created a watchdog group to closely scrutinize new entries into the field and at the same time started plans to draft a policy on software piracy. M.I.T.A. is a group made up of the best people the industry has to offer, and they should be heartily supported.

If you haven't read Harvard Pennington's book 'TRS-80 Disk and Other Mysteries', it's high time you did. The book was written using the 'Electric Pencil' and is very easy reading. It provides essential information for anyone who seriously uses his TRS-80 system. I understand that it just entered its second printing.

Speaking of the 80's, I'm very interested in what you feel the 80's have in store for us as an industry - write or call and let me know. I intend to use the space in this column to provide you with timely information...and some good insight that will be of benefit to all of us. I'm not planning any junkets to Asia or France, but with any luck I will attend most of the major shows, and will relay what's 'hot', and the best prospects for the future.

I feel very strongly that the 80's will reveal to the 'Supercomputers' the real strength of the Microcomputer concept. The 70's showed the strength of the Z-80, 8080, and 8085 chip in engineering applications, and Radio Shack's jump to the 6809 speaks for itself.

I just finished reading an article by Sidney Fernbach in the January issue of **COMPUTER WORLD**, entitled, 'Great Hardware Advances of the 70's', in which he discusses everything from the IBM 4000 to expanded peripheral equipment...and never mentions Microprocessors. If we are to believe Mr. Fernbach, we really have our work cut out for us.

I understand from some of our people who are attending a show in Las Vegas, that a new microcomputer manufactured in Hong Kong is on display. It seems high time that the American manufacturers take a hard look at the Asian and European markets before it's too late.

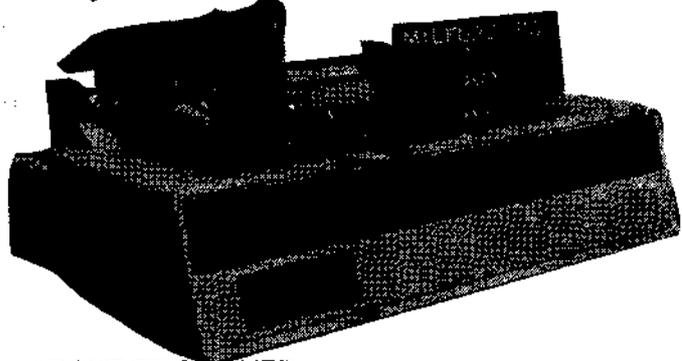
Now that you have had a chance to read our first issue, and are about to read the second, please let me know what you think. We are very receptive to criticism from our readership...it's the only way we can improve with each issue. It's your magazine, we'll do all the work.

Please feel free to send in any product releases you would like to have us run for you, and we'll get them in as soon as possible. Send your material to:

'The Eighty'  
PO Box 68  
Milford, N.H. 03055  
603-673-0585

I'll look forward to hearing from many of you in the near future.

See you in March.



## ABOUT THE COVER...

Nothing can be more disturbing than typing a page of text and having your printer decide to be uncooperative. Future issues of **THE EIGHTY** will devote editorial space to printers with the theme "Don't get locked up with printer problems". Our cover "prisoners" are a CENTRONICS 700 printer and Lester Anderson of our staff. Our special thanks to the Milford, New Hampshire Police Department for allowing us to use their facility.

# REVIEW

## The Software Technical Manual

by Valen Clough

The 'Software Technical Manual' is available from Houston Micro Computer Technologies. The price of the manual when I purchased it was \$49.95, however the price is now down to \$40.00 according to the price list that was sent with it. The manual arrived about three weeks after I ordered it and when I opened the package to see what my \$49.95 had bought, I was a bit disappointed, as it is only 40 pages long and is bound in a light plastic cover. My disappointment changed to real enthusiasm, however, when I started reading.

The first line of the introduction defines the entire manual by stating;

'The purpose of this manual is to provide the assembly language programmer with documentation of the TRS-80 Level II Basic ROM ENTRY points and provide working examples of their use.'

The manual meets the stated purpose in a way that enables a beginner to really understand the subjects that are presented.

The specific subjects addressed are; data handling, compares (string and numeric), arithmetic (add, sub, mult. and div.), basic functions (higher level math functions), data conversions and I/O (including 'EDTASM' and basic tape formats), and extending the USR function (a well documented program for multiple USR calls). In addition to these articles there are 10 examples of programs and subroutines, and 10 tables of collated information. Table 9 is the most useful. It is the Level II Basic rom map. It lists the entry points to the basic rom utilities and includes the entries for all of the Level II functions. It also documents the disk basic functions entry points.

The 'working examples' do indeed work. They are written efficiently and are well documented and discussed. The section entitled 'extending the USR function' provides the beginning programmer with an example of good assembly language programming style. The accompanying text follows the flow of the program from start to finish.

Although only 40 pages in length, the manual provides information that will help both the beginning programmer and the professional level pro-

grammer. By using the subroutines that are already existent in the ROM, programs will be shorter and the programming time will be substantially reduced. It is comparable to using a set of utility routines, but without the memory overhead.

I found that after using and reading the manual, my understanding of assembly language and the Level II ROM was greatly increased. It also helped to motivate me to tackle assembly language programming.

In conclusion, although the 'Software Technical Manual' is priced at \$40.00, to the assembly language programmer, the information is almost a necessity. It also provides an answer to the question 'now that I have an assembler, what do I do with it?' So whether you are programming for fun or profit or both, the 'Software Technical Manual' can save you time and increase your knowledge of the TRS-80\* Level II BASIC ROM.

The Software Technical Manual is available from:

Houston Micro Computer Technologies  
5313 Bissonnet  
Bellaire, Texas 77401  
Telephone: (713) 661-2005

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THE EIGHTY

**DATA BASE MANAGER IDM-IV** \$69  
You can use it to maintain a data base & produce reports without any programming. Define file parameters & report formats on-line. Features key random access, fast multi-key sort, field arith., label generator, audit log. MOD-II version with more than 50 enhancements \$199.

**ACCOUNTS RECEIVABLE ACCT-III** \$69  
One or more drives. Order entry calculates sales tax, shipping, amount for multiple items. Credit checking, aging, sales analysis, invoices, statements and reports. As opposed to most other A/R, ours can be used by doctors, store managers, etc. MOD-II version \$149.

**WORD PROCESSOR** 16K \$39, 32K \$49, MOD-II \$49.  
First word processor specifically designed for the TRS-80 that uses disk storage for text. Written in BASIC. No special hardware and text limit. Use for letters, manuals & reports. 32K version features upper/lower case without hardware change and multiple input text files.

**MAILING LIST advanced MAIL-V** \$59.  
Fast sort by any field. Multiple labels and reports. 4-digit selection code, new zip code ext., screen input, five keyboard, powerful report writer. MOD-II \$99.

**INVENTORY INV-V** \$99.  
9-digit alphanumeric key for fast key random access. Reports include order info, performance summary, etc. Calculate E.O.Q. Powerful report writer. MOD-II \$149.

All programs are on-line, interactive, random access, virtually bug free, documented and delivered on disks. MOD-I requires 32K, DOS. We challenge all software vendors to offer low cost manuals so you can compare and avoid those high-priced undocumented, 'on-memory' programs. Send \$5 for a MOD-I manual and \$10 for MOD-II.

MOD-II programs are extensively modified, guaranteed to run with 1 year newsletter & updates. 10% off for ordering more than 1 MOD-II programs.

**MICRO ARCHITECT**  
96 Dothan St., Arlington, MA 02174

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## GOING INTO BUSINESS

by Lance Micklus

I got a letter a couple of months ago from a lad who wanted a copy of my Checkers program. The letter began:

Dear Mr. Inc.

We got a big chuckle out of it. The letter now hangs on the bulletin board in my office. Obviously, my young friend did not understand what Inc. means. Do you?

Yes, it means incorporated, of course. That means there is a legal entity, registered in the State of Vermont, which has certain legal rights. It has stockholders, a board of directors, an employer I.D. number, an attorney, books to keep track of the company's business, a checking account, an accountant, a credit rating, is a member in such things as the Lake Champlain Area Regional Chamber of Commerce, and a lot of other things - all which have little to do with creating and selling computer programs.

Fortunately for me, I had some experience operating a small business. For several years I was a performing magician, and I also ran a very successful photography business. Neither was ever incorporated, and both were operated part-time. But operating anything as a full-time business is another matter.

First, there is the question of how you will organize your business. Your options are: sole proprietorship, partnership, sub-chapter S corporation, or corporation. Select one of the above. It's really not very easy. Each choice has its advantages and disadvantages. Unless you've been in business before, it's hard to understand what the implications are for choosing any one of these types of organizations. But, if you choose the wrong type, it will spell trouble down the road.

Then there is the rubber stamp. It is my classic example of the types of things you have to do to run your own business. The rubber stamp is that thing which, when used with an ink pad, causes your business's name and address to be placed on an envelope. This is a small matter to take care of, but there are hundreds of these small matters to deal with.

Another example is the telephone company. First, you have to figure out what type of telephone service you want. You then have to get the telephone company to install it. Finally, you have to get them to make what they installed work. In my case, this was no easy task because my telephones are actually in Essex Junction, Vermont but they are connected 10 miles away in the Burlington, Vermont telephone exchange. When they were installed, they did not work. The reason was that it took five telephone men, all working out of different locations, to get them to work. When they finally got them running, they went dead two days later because of

equipment failure. Then, a short time after that, the phones failed again because of a shorted cable pair.

Shall we talk about taxes? Let's.

Besides being a tax collector for the governments (federal, state, city), you must also contribute additional money to the taxes you collect. So, to the money you pay your employees, add an additional 6.13%. Also, add to that unemployment insurance and workman's compensation insurance, and you are now adding a factor of about 10% to your payroll. Then you will have to pay property taxes, income taxes on your business, plus just plain old ordinary multi-peril insurance on your business . . . man, that's a lot of money going out the door. Each and every item requires filling out a special form or application. None of it gives your employees any fringe benefits. That's extra.

According to a survey made in 1976 by Dun and Bradstreet, 98% of all businesses failed because they were poorly managed. Almost all of the businesses in the micro-computer field are small businesses. When we look . . . yes, indeed, it's just like Dun and Bradstreet said . . . they failed because of management problems.

Usually, when you think of a badly managed company, you think of a boss who pays his employees cheaply, works them too hard, and creates low morale. This is not often the case. It's all of the taxes, paper work, and business decisions that get them.

Had it not been for my experience with two other part-time businesses, I am certain that Lance Micklus, Inc. would have gone down the tubes by December 1979 - six months after it started operation. The chances are 50-50, based solely on statistics, that it will survive much more than a year.

So, the question is not if Lance Micklus is the greatest TRS-80 programmer in the world. Rather, the question is if Lance Micklus is just a fairly good businessman.

I see a lot of people coming into micro-computing, striking out for all that gold out there in computerland. If you're one of them, here's some advice from a guy whose been there.

First, don't assume that just because you're a good programmer you are going to be successful. If you're like most people, you don't know how to make a living. That's why most people work for someone else who does know how to make a living.

Second, you are going to be operating a small business. Learn everything you can about running a business. It's more important that learning

another computer language. If your business must have somebody who can write in FORTRAN, hire some smart guy who knows programming but hasn't yet figured out how to make a living for himself.

Third, surround yourself with good people. They're easier to find than you think. For example, if you want to find a good attorney, ask several successful small business operators who they would recommend.

Fourth, be prepared to work extremely long hard hours, especially in your first year of operation. You must be the kind of person who will work 70 to 80 hours per week without anybody standing over you saying, "Work. Work! Work!!" It means on a nice sunny summer day, when your kids want you to take them swimming, you say, "No." It means that on

Christmas day, after the presents are all opened, you go back to the office to balance the checkbook.

Fifth, don't go into business if you're easily depressed. Believe me, there are times I've gone to bed telling myself, "This will never work. My company is not working out. We're going to go broke. I'd better close up now while there's still a little money left or I'll go totally in the hole."

When I first started marketing my programs through TSE a year and a half ago, I used to worry about competitors. Since being in business for myself, I don't worry any more. Because I know that very few of them are good businessmen. So, they can't really hurt me. The only enemy I have is myself. Can I cut the mustard? Boy I sure hope so.

EIGHTY

# Control the world!

## MICRO MINT

# BUSY BOX

Home control unit for the personal computer!  
Interface your computer to the BSR X-10 or Sears Home Control system and control appliances, lamps, and wall switches.

Designed by Steve Clarcia, featured in January, 1980 BYTE.

Assembled and tested interface, in attractive 8.25 x 6 x 2.5 inch plastic case, with cable and connector for TRS-80\* keyboard or expansion interface, power supply, and manual, including BASIC listing for simple control routine for 4K, Level II minimum system, \$104.95.

Four year control program, requires expansion interface for real time clock, on BASIC cassette, \$19.95.

Package PK 500: BSR X-10 Command Console, cordless controller, two lamp modules and one appliance module, \$124.99.

Separate Prices: UC 301 Command Console, \$49.95; CC 401 Cordless Remote Controller, \$24.99; LM 501 Lamp Module, \$16.99; AM 601 Appliance Module, \$16.99; WS 701 Wall Switch Module, \$16.99.

Shipping costs are not included in prices. To order, call TOLL FREE 1-800-258-1790.

For more information, call (603)673-5144.

Note: Your BUSY BOX will not work with the Radio Shack Home Controller, a stripped down version of the BSR X-10.

**HARDSIDES**

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# SUCCESS WITH TRS-80\* CASSETTES

by John Victor

Computer audio cassettes have a bad reputation with computer owners—and for good reason. Many unsuspected TRS-80\* users have spent countless hours of frustration trying to load programs from commercially recorded cassettes or trying to figure out how to record their own programs on cassette. It is no wonder that many abandon their cassette systems for disk systems at the first opportunity. This is unfortunate. The TRS-80\* cassette system can be just as reliable as the disk system, and in some ways is better than disk for program and data storage.

The TRS-80\* cassette-based system is half the price of the disk system—a budget-minded hobbyist or school system may have chosen the TRS-80\* because of price. Second, the audio cassette is much more durable than a floppy disk. Cassettes can be dropped or handled carelessly without being damaged; floppies, on the other hand, are more like rare butterfly specimens. Any abuse at all can destroy programs or data files.

Another consideration is system reliability. A 16K TRS-80\* system is simple and fairly reliable. An upgraded 16K system with expansion interface and floppy disk drives appears to be jerry-built—things don't fit together very well. The more components are added to this system, the less reliable it becomes, so that the disk system loses data, or crashes at the wrong moment.

## The TRS-80\* Cassette Recording Format

The TRS-80\* stores programs on cassette tape in the form of binary numbers made up of 0's and 1's. Each binary number (or byte) consists of 8 of these digits. For example, the number 160 is written 10100000 in binary. To store the number on cassette, the computer feeds on digit at a time into the cassette player for recording. When the program or data is loaded back into the computer, each binary digit is sent back into the computer one at a time.

Each personal computer uses its own method of recording a 0 or 1 on cassette tape. The TRS-80\* uses a 'rhythm' method. Figure 1 shows how it works.

The TRS-80\* sends out clock pulses at regular intervals. These set up a timing scheme. Data or program pulses fall between the clock pulses. If the computer sees a pulse between the clock pulses, it records a 1. If it sees nothing between the clock pulses, the computer counts this as a 0.

The clock pulses can be thought of as the down beat on a drum (1,2,3,4, etc.). The data pulses can be thought of as an upbeat strike (1, and 2, and 3, and, etc.).

The big advantage of this system is that it is self-clocking. The cassette player used to store and load the programs back into the computer can run at different speeds without affecting program loading. As long as the computer can count the clock pulses, the data will load back into the computer without problems.

Audio recording equipment is not comfortable with the kinds of signals that come out of computer electronics. Computer signals are in the form of square waves with sharp corners. Audio electronics tend to round sharp square waves into sine waves because sharp signals are associated with unpleasant noise, while sine waves are associated with pure tones and music.

Because of the sharpness of computer signals, audio recording equipment will distort computer signals by rounding them off. In addition, because of the narrowness of the TRS-80\* signals, this rounding process will also fatten them out when the signal is recorded.

However, the cassette interface in the computer can take these distorted signals and turn them back into square waves for the computer to work with. It can do this just so long as the clock pulses and the data pulses can be kept separate. Unfortunately, fattening of the pulses can push the clock and data pulses so close together that the computer loses the ability to tell them apart.

## LEVEL I TO LEVEL II

When Radio Shack first came out with the TRS-80\* computer, it used Level I BASIC that stored binary digits on cassette tape at a rate of 250 digits per second, or 250 baud. This system proved to be very reliable, but the people at Radio Shack obviously thought that 250 baud was too slow (the cassette system on the Apple computer works at 1500 baud). When Radio Shack came out with Level II BASIC, the recording speed was doubled to 500 baud.

Level I programs recorded at 250 baud are relatively easy to manufacture using high speed duplication equipment, even though this equipment distorts the heck out of the pulses. Distorted signals were not that serious since at 250 baud there is sufficient room between the clock and data pulses. However, doubling the recording speed leaves only half as much room between the pulses. The distortion of ordinary tape duplication equipment pushed the clock and data pulses too close together. Commercial tape duplication of Level II programs became almost impossible using standard methods, and TRS-80\* users found that making their own cassettes became much more difficult at the new speed.

## DIGITAL DUPLICATION

The key to duplicating Level II TRS-80\* cassettes is to keep the pulses as narrow as possible so that the clock pulses do not crowd the data pulses. High speed audio duplication equipment of music uses an analog method of copying — the equipment tries to copy everything it hears. This is analogous to reproducing a page of typing on an office copier. It copies everything, including

coffee and tobacco stains on the paper. More often than not, the office copier exaggerates the light blotches on the paper and makes everything look worse than the original.

Analog duplication of TRS-80\* signals fattens out the pulses. It also exaggerates any defects in the original recording of the program. A little noise always comes in with the computer signal, and very often analog duplicators will pick up this noise and blow it up. Manufacturers that are using analog methods to duplicate TRS-80\* cassettes use filters to remove this noise, but filters tend to distort the pulses.

Another way to keep analog distortion within acceptable limits is to slow the duplication process down. The most common way to do this is to connect one TRS-80\* computer to several recorders at once. This method can produce workable cassettes, but is hardly the professional way to record.

But even if the duplicator can keep the fattening process within limits, analog recording methods will always cause the end cassette user trouble.

The cassette user must turn his or her cassette player up loud enough to get the pulses to register in the computer. Analog-duplicated signals spread out when the volume is turned up, so that the volume that will load the program into the computer will fall into a small range that is not too loud or too soft. Tapes that are duplicated with analog methods load at a small range of volume settings (that the user invariably has trouble finding).

The best solution for commercial tapes is to record the signals on the tape digitally. This is like giving a handwritten copy to a typist who then retypes the page. It doesn't matter how bad the original looks just so long as it can be read. The digital duplicator first reads the original recording, and then it issues its own pulses to the cassette tape. This insures that narrow pulses are sent to the cassette tape, and it also insures that background noise will not find its way into duplicated copies.

The hallmark of digitally duplicated cassettes is that they load within a wide range of volume settings. This is because the pulses do not spread as much when the volume is increased.

Several cassette duplicators around the country now claim to be doing digital duplication. However, in a few instances, I have found that the so-called digital tapes were actually duplicated analog when the recording was checked out with an oscilloscope. (The scope showed fat pulses.) One duplicator who has the true digital process is Cook Laboratories of Norwalk, Connecticut.

## THE CASSETTE PLAYER

Most cassette systems on personal computers were designed specifically to be used with inexpensive cassette players. However, there is a limit. It is my experience that the cassette players supplied with the TRS-80\* systems are not adequate for serious applications. We use Panasonics and Sonys with good results.

The first problem with cheap cassette players is one of good mechanics. Cheap players often do

not hold the cassette securely while it is playing. You can check this on your player by pushing down on one end of the cassette while you listen to it play. On really poor machines you can hear the differences in volume as the cassette rocks back and forth — these differences will be more than enough to cause tapes not to load properly.

Another problem is that the player heads on cheap machines are knocked out of alignment much easier than those of better machines (although any cassette player can have misaligned player heads). This causes the tape to be played at an angle, which "squashes" down the recorded pulses. The problems of head misalignment are the scourge of the computer cassette business since the user cannot diagnose the problem easily. The tapes may be perfectly good, but to the user the tape appears bad because of misalignment.

Head misalignment is a mischievous problem because the user can usually load some tapes some of the time. It is easier to blame the tapes than the cassette player.

Fortunately, there are ways to diagnose and cure head misalignment. The only thing needed is a small jeweler's screw driver, a good quality TRS-80\* tape, and an access hole drilled in the cassette player to allow the user to get at the head alignment screw. The user plays the tape and listens to the signals coming from the tape. All connections to the computer must be removed to do this! The screwdriver is then inserted into the access hole and inserted into the head alignment screw. As the screw is turned, the signal from the tape will become "bright", then gradually become muted. The point where the signal sounds the brightest is closest to the correct player head alignment.

Another solution to the head alignment problem is the 'Peak Meter' manufactured by Cook Labs. This device measures the heights of the pulses coming from the tape as they are played back from the cassette player. The user simply inserts the plug from the meter into the ear jack of the cassette player. A special high quality calibration cassette (supplied by Cook Labs) is then played and the user turns the head alignment screw. The point where the meter pointer is at the highest level (where the pulses are at their highest) is where the head alignment is the most correct. The volume should not be changed while this is being done, but should be left at around midrange.

The Peak Meter can also instantly determine the proper volume at which to play a particular tape. Tapes are very often recorded at different volume levels, and users often have to resort to a frustrating trial and error search to find the correct level for a particular tape. This process can be done away with if the user has the Peak Meter. All that has to be done is to plug the computer connection into the Peak Meter while the meter is still hooked up to the cassette player. The signal will go through the meter and into the computer to load the program. The user watches the indicator on the Peak Meter and changes the volume until the pointer is near the middle of the dial. By using this device, I have never had to spend more than a

minute finding the correct volume for even poor quality tapes.

If the cassette player is used on a regular basis, the player heads must be cleaned and demagnetized at least once a week. Player heads are cleaned with anhydrous alcohol and cotton swab, and they are demagnetized with a special head demagnetizer. Both of these can be purchased in kits sold by Radio Shack or at an audio shop. If this maintenance is not done, the user will eventually start having loading problems since even an invisible coating of residue will significantly interfere with the signals coming from the cassette player. If the player heads become magnetized, it is possible for them to damage cassette tapes by putting noise on them.

## RINGING

A poor quality cassette player may not be good enough to use with the TRS-80\*. But there is also a problem if the cassette player is too good, such as would be with a \$400 unit.

Cassette players that use expensive electronics tend to be very sensitive to changes in signals coming from the computer during the recording of a program. With the sharp pulses that come from the TRS-80\* a good tape deck will 'overshoot' when it is recording the signals. That is, the signal will go too high or too low. As the recorder attempts to compensate for this overshoot, the signal will vibrate back and forth. This oversensitivity is called 'ringing'. Ringing is a problem in that it tends to distort the pulses, and sometimes the oscillations are mistaken by the computer for extra data or clock pulses.

The user can compensate for ringing by recording at a lower volume setting. However, this can be tricky if the user is not checking out what is being recorded with an oscilloscope.

If the user plans to make tape masters on reel-to-reel equipment for reproduction purposes, or plans to use a very good tape deck for data storage with the TRS-80\*, then certain electronic modifications should be made on the equipment to eliminate ringing. These will require an audio expert, but they can be done.

## TAPE

There are two common problems that occur with cassette tape that the TRS-80\* owner should try to avoid. The first problem is one of 'soft spots' or dropouts on the tape. Poor quality tape is not manufactured uniformly, so that parts of the recording medium may get too thin in sections of the tape. A dropout is potential land mine for the TRS-80\* user since the computer cannot fill in gaps in a recorded program. If just one clock pulse gets recorded on a dropout, the computer may not see it when the program is played back. What happens then is the next data pulse may be seen as the clock pulse, and the computer misreads everything from that point on. You can actually see in many cases just where a dropout occurred because the program listing looks normal up to a point and then suddenly changes to what looks like computer 'garbage'.

The second problem with inferior tape is that the recording medium can flake off and foul the playback head of the cassette player. Poor quality tape is much more likely to do this than good tape, and when it happens, the user is also likely to get a dropout in the program.

Two materials commonly used as recording media for cassette tape are iron oxide and chrome oxide. These are magnetized in various places on the tape to produce the signals recorded on the tape. It is recognized in the recording industry that chrome oxide tape is superior to iron oxide tape due to its ability to record a wider range of sound frequencies (very important in the recording of music). However, chrome is also superior to iron tape for the recording of computer square waves. Chrome tape has a better 'transient response', which means that it can record sharper changes in signal frequency. This also means that it can record a narrower pulse than iron tape. In addition, chrome oxide tape is much less likely to have dropouts, and the tape seems to make better contact with the cassette player heads.

Our experience with chrome oxide tape has been excellent. We have been able to produce TRS-80\* tapes that load within a range of volume settings from 3 to 7, even when the cassette player has some head misalignment. The only problem with chrome tape is that it is more expensive than iron, so that the user will simply have to decide which is more important—good recording or low cost.

Another possible problem with chrome oxide tape for those TRS-80\* owners who are using the Radio Shack cassette unit is that the unit does not have enough 'juice' to record over a previously recorded tape. If the user wants to record and re-record on chrome oxide tape using this unit, he or she will have to erase the tapes with bulk eraser before re-recording on a previously used tape.

The user can tell if a tape is chrome oxide by the color—iron tape is brown, while chrome oxide tape is purple-black in color.

## SUMMARY

The TRS-80\* cassette recording format can pose problems to both the commercial software publisher and the TRS-80\* owner. However, a little understanding of how the system works can produce miracles for everyone concerned. The first step is to use an adequate quality cassette player on which the user performs regular cleaning and head alignment. The second step is to use good quality cassette tape (preferably chrome oxide tape). Commercial tapes should be duplicated using digital methods rather than the analog duplication methods used for recording music.

Cassette based systems have the advantage of being simple and cheap. With knowledge and understanding they can also be very reliable.

# A SCIENCE OR AN ART?

by Ron Potkin

Is computer programming a science or an art? I believe it is an art. Webster's Dictionary defines ART as:

"Creative work or its principles; making or doing of things that display form, beauty or unusual perception: it includes painting, sculpture, architecture, music, literature, drama, the dance, etc."

Does this not also describe a computer program? Have you not read a program written by someone else and sensed a feeling of elation as you studied the methods and principles used which showed a mastery of the language? Form, beauty and perception is a creation of the mind — and how could you better describe programming?

You may have had the opportunity to watch a wood sculptor at work. He starts with a block of wood. He has already studied the grain and its texture and he is able to visualise the shape of the object he intends to create. Watch him closely as he approaches each cut with a sureness and precision which comes only with many years of experience. He knows exactly which chisel or gouge to use and keeps them honed to perfection. And, always, he has that final creation in his mind.

A computer program, however, is different. We can load a tape and see immediately the work of an artist. The program shows a polish, a smoothness and a flow which puts it several levels above other programs.

Unlike most other art forms, we have an advantage because we can go behind the scenes, as it were, and see the master at work. We can study his methods and the tools he used and the pains he took to create that work of art. We can emulate his ideas and maybe, one day, achieve the same level of perfection.

Therefore I urge you, if you are an avid programmer, eager to understand the finer points of your computer, to take the time to study the work of those whose programs you admire. If you have spent several hours typing in a program from "SoftSide", do not despair and become frustrated because it refuses to work. Take the time to find your errors; study those complicated subroutines.

How do you know if the program was written by a professional? Believe me, you'll know as you study its inner workings and your own programs in the future will be all the better for that effort.

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