

TRSTimes

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LITTLE ORPHAN EIGHTY



It is somewhat ironic that I filled the entire 'Little Orphan Eighty' column from last issue by addressing the subject of piracy in the TRS-80 world and then, because of the ending remarks in another article, I now find myself in the middle of a controversy. The article is also from the Mar/Feb issue and is called PDRIVE WITHOUT TEARS. I close the

article by giving the history of the letterset used to draw PDM:

"Before ending this article, I have to give credit to an unknown programmer from Holland for creating the font used to draw the letters PDM. Peter Plomp submitted a disk with a program called AGCAP. This program will be featured as soon as I can plow through the code. It is a clever utility that will automatically figure out what the PDRIVE setting should be for a particular drive. Anyway, the programmer used the font to draw the letters AGCAP. I was impressed with the style, so I shamelessly stole the letter P, modified C to make D, and finally made M from two modified A's. Thank you, unknown programmer."

Boy, did I ever open up a can of worms. I received a letter from the CRAFT-80 group in Holland, informing me that the program was written by A.A.W.M. (Bert) Gielen and C.P.M. (Kees) van dem Assem, and that it is not in the public domain. The letter was very civil - actually it was very nice - but it did indicate that Peter Plomp was being held responsible, being thought of as a possible pirate. As this is not true, let me publicly clear up the matter by recounting the chain of events.

Since the inception of TRSTimes, Peter has been acting as a sort of intermediary between the magazine and the Dutch TRS-80 users. I have asked him many times to try to get the programmers there to submit articles to us, as we, here in the U.S., are very interested in what goes on in Europe. Well, a few months ago, Peter responded by sending a disk with a great hi-res program written by Johan Volgers. As it needed an article to go with it, I turned a copy of the program over to Dr. Allen Jacobs who promised to write the text to go with the program listing. That being done, I proceeded to look at the other files on the disk, and there I found AGCAP.

Since I had just written PDM, I was naturally interested in another NEWDOS/80 program. I ran it and was immediately impressed with it; not only with the program itself, but also with the font used to draw the little letters. As there was no source file, just the /CMD file, I disassembled the program to see how the letterset was done. Going through

the disassembly printout, it became apparent that there was neither a copyright notice, nor the name of an author. Nowhere in the code was there any indication that this program belonged to anyone, so I used the letter P (byte for byte) and modified other letters to form PDM in my program. My sincere apologies to Bert Gielen and Kees van dem Assem. They deserve full credit for a very artistic font.

While I take full responsibility for this situation, let me make a recommendation to Bert, Kees and all other programmers: Be SURE that your name(s) and copyright is in the code itself. It only takes up a few more bytes, and it will avoid things like this.

Now let me turn the attention to what I regret most. Peter Plomp is being blamed for what is my mistake. At no time did he ever claim to have written any of the programs. He even cautioned me that one of the programs on the disk was not for publication in TRSTimes, but was only for me to see what Dutch programmers were capable of. Unfortunately, he did not call the program by name and, as I did not find ownership in the AGCAP code, I assumed that this was not the program he was talking about. I won't repeat the old saying about the word 'assume', but it sure applies here. The error was, once again, all mine, and I apologize to Peter Plomp for putting him in a situation that was not of his own making.

To close the matter, I wish to clear up something that both the CRAFT-80 group and Peter may have misunderstood from the PDM article. It was never the intentions of TRSTimes to take the program and sell it in disk format. What I meant by 'presenting' was the same as we will do with the hi-res program by Johan Volgers: present the source code as a type-in listing along with an article. Obviously, we will not do that without permission. Also, 'plowing through the code' was my term for reading the raw disassembly, and then commenting each line of the source code for the readers.

Now, let me point your attention to the TRSTimes AUCTION, which you can find beginning on page 26. Over the last few years we have bought, inherited, or swapped all kinds of items from the TRS-80 people going on to other computers. Well, the storage bins are overflowing (and my wife is nagging me to make some room), so it is time to offer all kinds of goodies to the readers. All software contain original disks and/or cassettes, and all manuals are originals. Most of the books are totally unavailable from any other source at this time, so be sure to send in your bid. This auction might raise the question if I am quitting the TRS-80. The answer is NO. I either already own the items, or know that I'll never get around to using them, so better get them to someone that will. I will be around for a while.

Lance W.

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Article submissions from readers are welcomed and encouraged. Anything pertaining to the TRS-80 will be evaluated for possible publication. Please send hardcopy and, if at all possible, a disk with the material saved in ASCII format. Any disk format is acceptable, but please note on label which is used.

LITTLE ORPHAN EIGHTY 2
Editorial

THE MAIL ROOM 4
Reader mail

SPEEDING UP YOUR HARD DRIVE 7
Roy T. Beck

REC: EXACT RATIONAL ARITHMETIC 10
Michael W. Ecker, Ph.D.

DOUBLE PRECISION FUNCTION ROUTINES 12
Jim E. King

HINTS & TIPS 15
Volgers, Wolstrup, Goss, King, Welcomb,
Kowalyshyn, Brennan

ALL ABOUT ALLWRITE pt. 4 19
Dr. Allen Jacobs

A FAST SYSTEM DRIVE 22
Lance Wolstrup

MORE FROM 'OLD' ENGLAND 23
Graeme Draper

ZORLOF WORD PROCESSING SYSTEM 24
Fred Blechman

THE TRSTIMES AUCTION 26



THE MAIL ROOM



SOFTWARE UPGRADES FROM RADIO SHACK

First I want to thank you for publishing my letter concerning SuperScript in the Mail Room column in the Nov/Dec issue. I learned a number of things about SuperScript that I plan to share with you in the future.

The main reason for this letter is the enclosed list from the new Radio Shack Consumer Mail Center Catalog. In case you haven't heard, Radio Shack has issued upgrades, not just reissues, for several of their older software packages. I don't know what changes were made to any of the programs, but I've ordered the SuperScript upgrade. As I learn more about these upgrades, I'll let you know. The upgrades can be ordered from any Radio Shack store. Thanks for TRSTimes.

Walt Danylak
Syracuse, NY

We look forward to the tips on SuperScripts. See the box insert on the next page for the list of available Radio Shack program upgrades.

Ed.

NETWORK 3 & 4

I am looking for information about both software and hardware relating to Network 3 and Network 4. They never really took off in the United Kingdom, but hold a particular interest for me.

Graeme Draper
Centre for Computers in Education and Training
University of Salford
Salford M5 4WT,
Great Britain.

DOS COLLECTOR NEEDS HELP

I am looking for a copy of SUPERDOS for Model I. Also the Logical Systems/Radio Shack Hard Disk drivers that were released with LDOS 5.1.4 Hard Disk package that will drive the 10 & 15 meg hard disks for Model I.

I am also looking for Hard Disk drivers will run on DOSPLUS 3.4/3.5 on the Model I.

Art McAninch
122 Pecan
Borger, TX 79007

A HARD DRIVE TALE

I bought a 15 meg drive out of the Carolina Trader magazine (this is our trading and swapping magazine here in Columbia, SC that deals in just about everything that you want to buy and sell). I had no idea that I could ever get it to do anything, or even that it would work on my computer, but as most computer junkies are, I had to have it just to see if I could do anything with it. (Blame it on Roy Beck and all his articles about Hard Drives in TRSTimes magazine).

I went and looked at this thing (it looked pretty good, but I had no idea what I was looking at) and I bought it, not knowing if it would ever work.

Calling Radio Shack in Texas I was told that the drive would work on a Model III or 4 computer if I bought a cable and a Hard Disk Operating System to go with it.

I figured out that I could make my own cable and save a few dollars in case this thing was junk. Boy, did I jump into something that I didn't know anything about. I changed the cable every way I could think of to get it to work - and couldn't get anything out of it at all. By this time I was sure that the drive or controller was bad, and that, most likely, I wouldn't be able to do anything with it.

I wrote a letter to Roy Beck, asking all of the questions that I could think of to ask, and he wrote back with all the information that he could. It was a big help, but I still couldn't get it to work.

I had just started to box up the cable to send it to Roy Beck when a fellow hacker here in Columbia called me. He told me that he would gladly help me out if he could, and that he just happened to have the service manual for my hard drive.

He came over and, sure enough, after all of the cable switching that I had done, the cable was still wrong. It only took him a few minutes and, presto, my 15 meg hard drive was up and running.

Now, I don't know what I am going to put on all of those tracks of storage space, but it sure is nice to know that it will run. I still have a few problems with it, but I am sure that we will get them worked out. The green active light won't come on at all to let you know when it is working, and sometimes I think it gets too hot and just shuts down.

William R. Salisbury
Columbia, SC

This little story just goes to show why the TRS-80 is still alive and well after all these years. Whenever someone has a problem, there is always someone else who has the answer AND is willing to help.

Ed.

SOFTWARE UPGRADES

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RAMDISK

I have a couple of questions that I hope the TRSTimes readers can answer for me, also some items that I would like to trade. Let's start with the questions.

1. How do I copy the system files to a ramdisk, after I have created it, so that every time I do a directory of a disk (I am trying to sort out what I have) the computer won't first start drive :0 to get the directory program, and then go to the drive in question to get the directory? I have the same problem with FORMAT, but have just about completed a mod to it so that it asks you if you would like to format another before it finishes. If you say 'Yes', it reloads

itself from upper memory and starts over. I am doing it this way because FORMAT overwrites part of itself with the track and sector information that it is going to put on the disk. Any suggestions would be appreciated and, of course, if FORMAT can be put on ramdisk, that would be ok too.

2. I have seen references to using an IBM compatible memory board as a ram disk. I have a fully populated Captain Board for a Model 1200 that I believe is in working order. I would be interested in using it this way, unless someone out there is interested in trading for it.

Now for the good stuff. I would like to trade some software for the Model 4.

The first is a complete original copy of the disk and manual for TRSDOS 6.2 (note: the manual is 6.2., not Disk System, as the 6.0 manual is called).

Also, I have an original copy of PFS:file, manual and disk for the Model 4 and/or the III.

Finally, I have 2 memory boards and a cpu board for the Model 16. One memory board is complete, while the other has no ram.

These items are for trade, not sale. Selling things across the border will result in duty, taxes, etc. I am interested in something I don't have, and will not accept money. I am really not sure how much the stuff is worth (bad business sense). I have a couple more items and would answer any inquiries.

A couple of things I am interested in for the Model 4 is a reasonable good drawing program to use with my graphics board from Micro-Labs, and a program from Hyper-Soft that allows a PC compatible to run some Model 4 software. However, these items may be too costly, I am not sure.

As you may have gathered, I have acquired (dare I even think it) an IBM compatible. However, I have no intentions of getting rid of my Model 4; the manual I am trading is a second copy.

One more thing while I think of it. I am almost finished with an assembly language program which converts Apparat's DISASSEM/CMD to run on the Model 4 in 4 mode. So far I have only one minor bug left. If you are interested, please let me know.

John Greenland
Box 171
Kelligrews, New Foundland
Canada A0A 2T0

TRSTimes would certainly be interested in your DISASSEM/CMD conversion. It would be nice to have it run on LS-DOS.

The ramdisk questions are good ones and, in your honor, this issue features the article 'A FAST SYSTEM DRIVE'. It gives the step by step instructions to just what you want to do. As an addition to the article, let me say that if you are not going to use DEBUG, you can REMOVE SYS5/SYS and SYS9/SYS from the memdisk, and copy FORMAT/CMD up there instead. This should solve your problem.

Ed.

DISK DRIVE FOR MODEL 100

I am looking for a Model 100 disk drive PDD-1 at a reasonable price. Ours have stopped working, and we're frightened to take it to Radio Shack, feeling that they will charge more to repair it than it is worth.

Please contact:
James Lewis Lowe
P.O. Box 8
Norwood, PA 19074

WHAT HAPPENED TO STANTEST?

I have been given a query concerning TTOD #5 which I have not been able to solve. It involves the program STANTEST/BAS which is shown on the index, but does not appear on the disk. I have two disks and it is on neither. Have you an explanation, please?

On another subject, I have been reading Roy Beck's articles with great interest, especially his latest offering detailing the Dishwasher episode! That article caused me to have a couple of phone calls from friends who had read it and were equally amused.

Tom Ridge
England

I checked the TTOD #5 master disk and, sure enough, STANTEST/BAS is not there. I then spent the next 3 hours checking every disk I could get my hands on - with the same negative result - bummer!!! I will try to talk the author into sending me another copy of the program so we can put it on a future TTOD.

Ed.

MORE NEWDOS

I found the 'PDRIVE WITHOUT TEARS' article from the Mar/Apr 1991 issue of TRSTimes very interesting. Please keep my Model III and me happy by publishing more articles about NEWDOS/80. There is so much to learn!

David A. Bernstein
Provo, UT

We will keep the NEWDOS/80 articles coming.

Ed.

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SPEEDING UP YOUR HARD DRIVE

Roy T. Beck

With the blazing speed of hard drives, (relative to floppies), why even try to speed them up? But then, why climb mountains? Essentially the same answer applies to both.

Whenever a person first installs a hard drive on a Model 1, 3 or 4, the usual reaction is WOW, what speed! But even hard drives have their limitations, and after a while the urge returns to see if we can hot rod this dragster a little more.

I admit to this mania, and so I began thinking a little about the factors which control the overall data transfer rate (speed) of a hard drive. The following list includes every factor I can think of over which we have some degree of control.

1. CPU clock speed.

The Model 4 family has a means of switching clock speeds; "SLOW" vs "FAST". This is supposed to yield a 2/1 speed ratio, with the CPU running at 4 MHz when set for FAST, and 2 MHz when set for SLOW. Actually another factor enters into the situation. The earlier (Non-Gate Array) machines ran at slower clock speeds, and the 2 and 4 MHz is only true for the Gate Array versions. Further, some after-market speedup kits are available, such as those by Anitek, which may push the speed even higher.

Now, changing the CPU clock rate won't of itself change the rate of data handling within the hard drive subsystem, but since some massaging of data by the CPU does occur (loading and unloading memory buffers, for instance), then a faster CPU clock will inevitably help a little in the push for speed. Not a lot, perhaps, but every little bit helps.

Issue the command `DEVICE` to see which speed you are using. You will probably see the word "Fast" after the word "Options", and if so, nothing more is to be done. The `SYSTEM (FAST)` command will set your CPU to the high rate if it is not there. Follow this by `SYSGEN` to be sure you get the fast ticker every time you bootup. As far as I know, there is never any reason not to use FAST unless you are running some game which you need to slow down.

2. Hard drive head stepping rate.

The heads of a hard drive must step in and out like those of a floppy drive so as to access the various tracks (cylinders, in HD parlance). Hard drives have two different types of stepping hardware. These are stepper motors and voice coil drives. The older drives used by Tandy in

the Models 3 and 4 use a stepper motor mechanism to move the heads. This is similar to the two motors in most dot matrix printers which move the head and the paper roller. Because of their greater inertia (compared to voice coil mechanisms), the stepper motors are inherently slower to respond. In fact, stepper motors typically require 3 milliseconds to move one track. This is because the stepper motor must start moving, and then come to rest again, the whole cycle taking about 3 ms (0.003 seconds). In the days when the Tandon 5 Meg drive was state of the art, and there were only 153 cylinders to step, 153 steps of 3 ms for a total of 0.459 seconds was pretty good, certainly better than the floppies of the time. Would you believe 40 ms per track for those old floppies?

But man must have his speed. At least two techniques (that I am aware of) came into existence. One was Ramped Seek, which caused the heads to accelerate to a high rate of speed, "cruise" for awhile, and then apply the retro-rockets to decelerate for a landing on the desired cylinder. Some controller and drive combinations were designed to work this way, but the hardware and software complications were too messy for success in the market place. Average access time was better than the 3 MS per track rate.

The alternative method is Buffered Seek. In this technique, the bubble itself took note of the speed at which stepping pulses arrived. If they arrived at a very high rate of speed, the drive simply counted them in a buffer until a 3 ms or longer pause occurred. When this happened, the bubble logic would then calculate, internally, the parameters for a ramped seek, and the heads would zoom to the desired cylinder. This technique required only that the software send pulses at a high rate of speed, in which case the buffered seek occurred, or that the software send pulses at 3 ms or longer intervals, in which case the heads stepped in synchronism with the 3 ms pulses, slowly but surely. The Buffered Seek method is no faster than the Ramped Seek, but is almost universally available in modern bubbles. Use it if it is available. I believe the widely used ST-225 bubble has an average access time of about 85 MS.

The voice coil system is so named because the hardware is analogous to the mechanism which moves the cone of a loudspeaker. The voice coil is the electrical element which causes the cone to move in and out in response to voice or music signals. Voice coil drives have been used on hard drives for at least 5 years, and are the

really fast way to go. Average access speeds of 17 MS are not unusual, but the price tag is significantly higher.

Most hard disk driver installation programs ask a question about the stepping speed to be used. My suggestion here is to try the fastest speed (shortest pulse interval) which the software offers, and see if the drive will format and verify. If the drive is not capable, the verify will fail. If this occurs, do it again with slower stepping rates until you discover what works. Most drives have buffered seek, and will accept the fastest stepping rate you can give them. The only ones I know of which won't step at the fastest rate are the old 5 Meg Tandy units. These utilize the TANDON TM-602S bubble, and the ones I have worked with will only step at the 3 ms rate. Every other drive I have worked with has buffered seek, and will accept the fastest rate the driver will allow.

By the way, MISOSYS' RSHARD5/6 series asks for a speed in the range of 0 to 9. The numerals 1 to 9 correspond to 0.5 to 4.5 ms. The "0" Value corresponds to buffered seek. Try 0 first. If you have to settle for 3 ms stepping, the value to be entered is "6".

3. Partitioning by cylinder offset vs. head offset

Three basic choices are available when choosing drive partitioning; head offset, cylinder offset, and a combination of both. Head offset is probably simplest to understand, in that it assigns one head to a partition. As files are needed in that partition, the head assembly is simply stepped along that one platter's surface. The second head can be the next partition, etc. The term "offset" refers to the fact that the successive partitions are located on successive heads, and each partition is offset from the previous one by one (or more) heads. Remember all the heads move in unison. The software has to keep track of the present location of the heads. This is important, because the head must be moved within one partition, and if access to another partition is required, it must know where the DOS left the heads parked the last time it moved them. This sounds complicated, but for Soltoff and people like him, it is child's play.

Cylinder offset consists of using all heads in each partition, with the first partition assignment beginning at the outermost track and consisting of some number of cylinders. If the drive has 4 heads and 153 cylinders, it could be partitioned by cylinder offset as follows:

drive	heads	cylinders
:0	1-4	001-038
:1	1-4	039-076
:2	1-4	077-114
:3	1-4	115-153

In this case, the total head movement within one partition is only 38 cylinders, whereas in the head offset case mentioned above, the heads must move over the entire 153 cylinders to access all the files in one partition. Since cylinder offset entails less head movement, file access is faster.

Finally, a combination of head and cylinder offset is possible, with say, one partition occupying 2 heads and 76 cylinders of the drive, the next partition occupying the other two heads of the 76 cylinders, and the third (and last) partition using all 4 heads and the remaining 77 cylinders on the drive. If the software is clever enough, tricks like this can be done. RSHARD5/6 by MISOSYS (Soltoff) allows this type of partitioning. Radio Shack's hard driver allows only head offset, and is not very flexible.

From a pure speed point of view, head offset is the fastest way to go. In the extreme case, a large drive can have 8 heads and a large number of cylinders. By utilizing all 8 heads in each partition, the head movement within any one partition is minimized. This is the way to go for SPEED!

4. Cluster system files around directory of system drive

Any time you ask for a system or library file on the system partition, the DOS has to send the head to the directory cylinder and search for the entry corresponding to the file. Then the head has to step to the cylinder where the file is located. All of this takes perceptible time. Wouldn't it be smart to locate the desired file near the directory? I don't know any clever way to do this on the non-DOS partitions, but the system partition can be improved.

Roy Soltoff of MISOSYS remarks on this (in somewhat obscure fashion) in his documentation update for LS-DOS 6.3.1. The command MEMORY (A="A",B=n), issued prior to FORMATting a disk, (hard or floppy), can be used to group the SYSTEM files just above and just below the directory, and then a repeat of the command with a different value of n will cause the library files to be grouped just around the SYSTEM files. The key to properly locating the files is to know where the directory is. Since TRSDOS locates the directory at half the total number of cylinders, this is a known quantity.

The HD procedure is simple. FORMAT the drive. Then issue the MEMORY command with n set about 2 cylinders lower than the directory track. Now backup the system files (only) to the HD partition. Next, reissue the MEMORY command with n set about 5 cylinders below the directory. Now backup the remaining files to the partition. Finally, issue the MEMORY command again with n = 1 to restore normal operation. n = 1 is the normal (default) value.

This MEMORY command has been in the DOS since 6.2, but was not in 5.1. The values for n given above are for hard disk operation. The principle also applies to a floppy, but since a cylinder of a floppy holds less than a cylinder of a hard drive, the values for n must be set lower than for a floppy. Do some arithmetic to determine best values for a floppy.

Art McAninch tells me there is an article in TMQ about this, but I haven't dug it out to study, yet. LDOS works same as LS-DOS. Soltoff has written powerful code, but does not always make us aware of its strengths. I only learned of this through his question and answer series attached to the LS-DOS 6.3 update documentation.

5. Sector interleaving

When it comes to sector interleaving on a hard drive, I must plead ignorance. I will discuss it lightly in a theoretical fashion, and then abandon the topic when I run out of knowledge.

First, the concept. As the sectors of any disk rotate past the head, the data of a cylinder is either read or written. But the following sector is coming along at a great rate of speed. If the CPU has insufficient time to handle the previous sector data and get ready for the next one before the next one arrives, then the disk must make a full rotation to allow the CPU to be ready for the next sector. This is the slowest method, and allows only one sector to be handled per revolution of the disk. Since hard drives usually turn at 3600 RPM, the time from sector to sector is 0.5 MS for each sector and the time BETWEEN successive physical sectors is quite brief. In the days of floppies, when this problem was first considered, the speed of rotation was 300 RPM or 5 revolutions per sector. At 10 sectors per track (cylinder), each sector required 20 MS to pass by the head. The first designer of TRS DOS systems decided that it was appropriate to handle one sector, skip the next, handle the next, skip the next, and so on. To easily accomplish this, he layed out the sector sequence around the cylinder as:

0-5-1-6-2-7-3-8-4-9

The read-skip-read etc sequence can now read (or write) 10 sectors in correct sequence in two revolutions of the disk, allowing 20 MS between sectors for the CPU to massage data. There is actually an extra sector between #4 and #5 when these are read sequentially, but this doesn't hurt anything.

When hard disks came along, the same problem had to be faced. Since everything happens much quicker on a hard disk, most CPU's required more time between sectors for overhead. A typical interleave pattern for 18 sectors appears below:

0-6-12-1-7-13-2-8-14-3-9-15-4-10-16-5-11-17

At this point I am fast running out of knowledge. I do know that TRSDOS uses only 16 sectors (of 256 bytes each) per cylinder, and I also know that many of the drives we use could actually hold 18 such sectors but only 16 are used. What happens to the remaining space on the cylinder? I dunno. They may be formatted as dummy sectors. Also, don't assume TRS uses the sequence I just showed. This interleave requires the CPU to process every third sector, and requires 3 revolutions to handle one entire cylinder. The floppy pattern shown before only required 2 revolutions. I don't know what our drives are doing! This pattern is most likely set in the FORMAT/CMD program, and I haven't dug into it to find out.

The ideal interleave would be 0-1-2-3-4 etc, with only one revolution to read the entire cylinder. This would give the fastest access (if the CPU can keep up), but I strongly suspect our TRS-DOS and others are using a slower interleave. I'm sure Roy Soltoff knows but I haven't asked him. He has enough to do trying to make a living without answering all my silly questions.

In conclusion, I don't know what interleave we are actually using, and it is set by parameters embedded in the FORMATTER. Since the HD subsystem has its own clock driving its own CPU and handling its own on-board memory, it is entirely possible that the interleave for our units is set by Western Digital who designed the HDC board, and we may not even have any options here! I have only discussed Interleave in this cursory fashion to let you know it is there, and is a subject for future study and writeup by someone. I won't promise anything, and if some one else gets there before I do, more power to him!

6. MEMDISK

The use of a SYSTEM MEMDISK is still another way to speed up access and execution of system and library files. I will give it short shrift here, as it does not involve the HD at all, and speeds operation by setting up the system files in a block of memory, which is faster than any HD we will ever see! Another reason for not discussing it here is that Lance Wolstrup (Ye Editor-in-Chief) is developing a great article along this line, and I don't want to steal his thunder! (Stealing thunder from great chief is a risky proposition, you know!)

Having exhausted my knowledge, my allotted space, and probably your patience, I will hereby terminate this essay and get on to finishing my taxes. (Time, Tide and Taxes wait for no man, someone once said).

-Roy-

Recreational & Educational Computing Exact Rational Arithmetic and Programming Recreation Challenge

By Michael W. Ecker, Ph.D.

Welcome once again to Recreational & Educational Computing. This issue's column is devoted to a program sent in by reader Robert Caldwell. The topic: adding fractions exactly.

If there are any users of MSDOS reading, please note that I have edited the program in question so that it runs, as printed, on either a TRS-80 Model 3 or any PC running GWBASIC under any version of MSDOS. I suspect it will run on many other machines' BASICs, including other TRS-80s, Macintosh, etc.

First we need to understand the significance of our little arithmetic adventure. Note that programming languages such as BASIC and Pascal, as a general rule, do not perform exact rational arithmetic. But suppose you want to calculate, say, $1/2 + 1/3$, which should be $5/6$. BASIC has a bigger problem than an inability to calculate the sum exactly by conventional means. Rather, it will challenge you just to input the values $1/2$ and $1/3$! If you've never tried it before, fire up your TRS-80 (or other PC) and BASIC and try to input a fraction without a prior variable assignment.

Mind you, I'm not saying it cannot be done. In fact, there are probably several clever approaches possible. You might enjoy writing to send your own to me at the address to follow.

Bob Caldwell's program allows input of two or more fractions. Given this, it then outputs the sum. As I implied before, he wrote it explicitly for the Model 3. However, merely by adding a few spaces, I've edited it to run on several other machines with virtually no adjustment.

If you wish to type in the listing faster, you can omit all the remark lines (those with the apostrophe). If you prefer not to type in the listing, I'll send it free to you as a service. I do ask for \$2 to cover my costs of disk, postage, copying, and handling. Please specify your computer model(s) owned and preferred format.

FRADDER/BAS

```
10 CLS 'NAME IS FRADDER (FRACTION ADDER)
11 'THE SUM OF FRACTIONS IS GIVEN IN FRACTION
    FORM WITH THE
```

```
12 'NUMERATOR AND DENOMINATOR RELATIVELY
    PRIME.
13 'GIVEN NUMERATORS AND DENOMINATORS
    MUST BE INTEGERS.
14 'NUMERATORS MAY BE POSITIVE, NEGATIVE OR
    ZERO.
15 'DENOMINATORS MUST BE MORE THAN ZERO.
16 'EXAMPLE: A/B + C/D + E/F =
    (ADF + CFB + EBD)/BDF = NU/DE
17 'BY ROBERT B. CALDWELL, JAN. 19, 1991
18 'INSPIRED by Dr. Ecker's REC Newsletters, issues
    #7 and #15/16.
20 CLEAR:
    DEFDBL A,D,N:
    INPUT"HOW MANY FRACTIONS TO BE ADDED";F
30 IF F < 2 OR F < > INT(F) THEN 20
40 DIM N(F),D(F),P(F,F),Q(F*F),DP(F)
50 DE = 1:
    FOR X = 1 TO F
60 PRINT"ENTER NUMERATOR AND DENOMINATOR
    OF FRACTION #";X;":
70 INPUT N(X),D(X)
80 IF N(X) < > INT(N(X)) OR D(X) < > INT(D(X)) OR
    D(X) < 1 THEN 50
90 IF N(X) = 0 THEN D(X) = 1
100 'CALCULATE BDF AND THE FIRST NUMBER OF
    THE PRODUCTS
110 'ADF, CFB AND EBD.
120 DP(X) = N(X):DE = DE*D(X):NEXT X
130 'CALCULATE ADF, CFB AND EBD.
140 FOR S = 1 TO F:
    FOR J = 1 TO F:
        Z = Z + 1:
        K = S + J - 1
150 'P(S,J) = K MODULO F; IF ZERO, CHANGE TO F.
160 P(S,J) = K - F*INT(K/F):
    IF P(S,J) = 0 THEN P(S,J) = F
170 Q(Z) = P(S,J):
    NEXT J,S
180 'FIND WHICH DENOMINATORS TO USE TO
    COMPLETE PRODUCTS
190 'ADF, CFB AND EBD.
200 FOR X = 1 TO F:
    Y = F*X - F + 1:
    FOR C = 1 TO F - 1
210 Y = Y + 1:
    DP(X) = DP(X)*D(Q(Y)):
    NEXT C
```



```

220 'CALCULATE NU.
230 NU = NU + DP(X):
NEXT X:
D = 2
240 'MAKE NU AND DE RELATIVELY PRIME. FIRST
DIVISOR IS 2.
250 PRINT "SUM OF FRACTIONS";:GOSUB 340
260 IF NU/D = INT(NU/D) AND DE/D = INT(DE/D)
THEN 270 ELSE 280
270 NU = NU/D:DE = DE/D:GOTO 260
280 D = D + 2 + (D = 2) 'USE AS DIVISORS ALL ODD
NUMBERS.
290 'AVOID DIVISORS THAT ARE MORE THAN THE
SQUARE ROOT OF THE
300 'LARGER OF NU AND DE.
310 IF ABS(NU) > DE THEN A = ABS(NU)
ELSE A = DE
320 IF D > SQR(A) THEN 330 ELSE 260
330 GOSUB 340:END
340 NU$ = STR$(NU):DE$ = STR$(DE):
DE$ = MID$(DE$,2):PRINT " = "NU$/"DE$::RETURN

```

Recreations Collection

Last year or so I acquired some terrific TRS-80 recreations, such as Maxit, plus various logic puzzles, teasers, math-type games, and much more. In the interests of the TRS-80 community, I will offer the disk(s) to any reader of this publication for the grand total of \$6 plus \$2 shipping/handling.

In the alternative, to any reader who subscribes to my newsletter, Recreational & Educational Computing, I will offer the disk absolutely free. You must identify yourself as a reader of this publication, subscription must be for at least one year (\$27 -- see below), and this offer expires Sept. 30, 1991.

Recreational and Programming Challenge

All but one of one thousand Roman slaves are about to be executed. They stand in a circle, numbered 1 through 1000. The brutal guards shoot #2, #4, #6, etc., always alternating. Each fallen slave is pulled away. This process continues as the executions continue in alternate fashion around the circle. Whoever survives last is allowed to live. Which one is it?

For instance, if there were only $n = 6$ slaves, they would be eliminated in this order: 2, 4, 6, 3, 1. Thus, number 5 survives.

This is the Josephus problem. You might enjoy solving it for various values of n (n = number of slaves) besides 1000, writing a program, generalizing, and otherwise exploring.

Please send your comments, questions, solutions, improvements, programs (on disk as well as paper!), and your orders for the special disk offer and/or Recreational & Educational Computing. Write to:

Dr. Michael W. Ecker
TRSTimes' "Recreational Computing"
909 Violet Terrace
Clarks Summit, PA 18411

Until next time....
Happy Recreational TRS-80 computing!

Dr. Michael W. Ecker is a Penn State University math professor as well as a computer writer-reviewer and columnist with 300 publication credits. Mike is also Editor/Publisher of Recreational & Educational Computing and the TRS-80 columnist for Vulcan's Computer Monthly.

REC, from which these articles have been adapted, is in its sixth year and is available for \$27 per calendar-year of 8 issues, prepaid. It focuses on "mathemagic" and computer recreations. Readers are invited to try a trial subscription of three issues for \$10, creditable toward subscription.

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DOUBLE PRECISION FUNCTION ROUTINES

for Model I/III and Model 4 (Multidos)

By Jim E. King

Did you know that SQR, LOG, EXP and the trig functions still give single precision results when you DEFDBL? The result looks like double precision, but the last 10 digits are garbage.

When I discovered this I decided to write subroutines that would calculate these functions, even though Radio Shack sold a program that does it. I got out my old Math Tables from the Handbook of Chemistry & Physics, and on pages 243 & 244 are all of the series expansions except square root.

The subroutines are 14 lines, beginning at 9000, of 6 subroutines (825 bytes) that perform these calculations. They are all modular, stand-alone and do not call other routines. Use only the routine that you need. The Radio Shack program calls parts of itself, so you must load all of it.

The main program is set up as a calculator. Choose the function you want from the menu, key in the argument, and press <ENTER>. First a single precision ROM answer is displayed, then the double precision answer, and then the complementary routine is called to obtain the original argument for checking.

The number of iterations is shown on the left to count how many times the routine looped. Note that the angular arguments (WA) are all in radians. If you require degrees, multiply radians by 180/pi. A to the X power is included using LOG and EXP, but checked only by the ROM routines. All but the square root loop until the difference between two successive answers = 0.

Square Root is found by Newton's method:

$$W1 = (W0 + W/W0)/2.$$

W is the input; W0 is the first estimate, and W1 is the next closer approximation. Newton's algorithm converges so fast that if you let W0 = the result from the ROM routine, the algorithm need be repeated only twice to achieve 16 digits of accuracy. See line 9000.

The series expansion of the natural LOGarithm is implemented in lines 9010 and 9011.

The expansion of E to the X Power (EXP) is implemented in lines 9020 and 9021

SINe and COSine were done together because each series requires that the input angle be within 2pi radians. This is done in line 9030. Line 9031 implements the SINe expansion, and line 9032 the COSine expansion.

TANgent is calculated by calling the Sine-Cosine routine and then dividing (SIN/COS).

ArcTANgent was difficult because different series are required for $X > 1$ and $X < 1$. Line 9042 implements $X < 1$, and 9043 $X > 1$.

Not knowing when to stop, I added ArcSINe, lines 9050 & 9051. Besides, now it was easy.

Table I shows how to call the subroutines, and the additional variables used.

I picked the variable 'W' because I seldom use it in general programming.

Pi (WP) = 3.1415926535897932 (page 4/21 of the 2nd. Edition of the Level II Handbook).

WA is an angle variable.

'I' is used as a counter. You can use 'I' elsewhere because it is redefined in each of these routines. If 'I' is holding a value in your program, either save your value in another variable, or change 'I' in the routines to a different integer. (That is the inconvenience of writing in a language that has does not have local variables.)

Table I

Functions,	Other Variables	GOSUB
WY=Square Root(W) Error code if W<=0	None	9000
WY=Natural LOG(W) Error code if W<=0	I,W1,W2,W3	9010
WY=EXP(W) (E to the W power) Overflow if ABS(W)>.87.33	I,W1,W2,W3	9020
WY=SINe(WA), W = COSine(WA)	I,W1,W3,W8,W9	9030
WA=ArcTANgent(W)	I,W3,W5	9040
WA=ArcSINe(W) Error code if W>=1	I,W1,W2,W4	9050

The main advantage of these subroutines is that they are free, take less space, and you can include in your program only the ones that you need.

Unfortunately some of them take quite a while to converge to a solution, such as LOG and EXP for arguments far from 1, and ARCTAN and ARCSIN near 1. There are only a few ways that I can think of for increasing the speed: compile them, write them in assembly language, or adapt them to use the ROM solutions as a seed, or use quicker converging algorithms, if any. If you discover a way, please publish and let me know. Also, please inform me of any errors.

These routines are copyrighted with permission to use, copy, give away, and you may include them in programs that you sell, free of royalty provided credit to me is included with their usage.

Jim King, 20784 Medley Lane, Topanga, CA 90290
(213)455-2777

DBLPREC/BAS

```
0 CLS:H$="DOUBLE PRECISION ROUTINES":
GOSUB 3:H$="(C) (P) Jim E. King, 1980 (Angles in
Radians)":GOSUB 3:H$="Public Domain, Permission
to use and copy.":GOSUB 3:GOTO 96'DBLPREC
3 PRINT TAB(30-LEN(H$)/2)H$:RETURN
7 IF LEN(Z) THEN FOR L9=1 TO LEN(Z):
K9=ASC(MID$(Z,L9,1)):IF K9>96 THEN
MID$(Z,L9,1)=CHR$(K9-32):NEXT:RETURN
ELSE NEXT:RETURN
8 Z=INKEY$:IF Z=""THEN 8 ELSE
IF Z=CHR$(31)THEN END
ELSE GOSUB 7:RETURN
9 PRINT CHR$(29)STRING$(JU+1,27)CHR$(31)::
JU=0:RETURN
11 INPUT" For DSquareRoot(W>0), R =";W:
U=SQR(W):
PRINT" SqrRoot("W") = "U TAB(45)"R[2="U*U:
RETURN
12 INPUT" For DLn(X>0), X =";W:U=LOG(W):
PRINT" Ln("W") = "UTAB(37)"e["U") = "EXP(U):
RETURN
13 INPUT" For De[(X<87.337), X =";W:U=EXP(W):
PRINT" e["W") = "UTAB(37)"Ln("U") = "LOG(U):
RETURN
14 INPUT" For DSin(A) & DCos(A), A (Radians) =";WA:
V=SIN(WA):U=COS(WA):
PRINT" Sin("WA") = "V;TAB(30)"Cos = "UTAB(48)
"Tan = "V/U:
RETURN
15 INPUT" For DArcTan(X), X =";W:U=ATN(W):
PRINT" ATn("W") = "U Sin/Cos("U") = "
SIN(U)/(COS(U)+1E-8):
RETURN
16 INPUT" For DArcSin(-1<X<1), X =";W:
V=ATN(W/SQR(1-W*W)):
PRINT" ASin("W") = "V Sin("V") = "SIN(V):
RETURN
17 INPUT"A[X: A =";W:
PRINT TAB(30)CHR$(27)::
INPUT"X =";W5:W=ABS(W):
PRINT"A[X = "W[W5:
GOSUB 9010:W=W*W5:
GOSUB 9020:PRINT TAB(30)"DA[X = "WY:
GOTO 99
21 PRINT"DSqrRoot("W") = "WY::RETURN
22 PRINT(I-3)/2'DLn("W") = "WY:RETURN
23 PRINTI'De["W") = "WY:RETURN
```

```
24 PRINT I/2'DSin("WA") = "WY TAB(38)" DCos = "W
" DSin[2 + DCos[2 - 1 = "W*W + WY*WY-1:
W=WY/W:PRINT" DTan("WA") = "W:
RETURN
25 PRINT (ABS(I)-1)/2'DATn("W") = "WA;X
" = "FNWD(WA)"Degrees":
RETURN
26 PRINT (I-3)/2'DASin("W") = "WA;X
" = "FNWD(WA)"Degrees":
RETURN
90 PRINT ERR"ERROR-Line"ERL CHR$(24)"::
IF ERR=20 THEN PRINT"/0: Divide By 0":
RESUME 99
91 IF ERR=8 THEN PRINT"FC: Illegal Function Call"
92 IF ERR=10 THEN
PRINT"OV: Overflow or Underflow"
93 PRINT"See DOS manual, or page B/1 Level 2
manual":
RESUME 99
96 DEFINT I-L:DEFSTR X-Z:DEFDBL W:
WP=3.1415926535897932:
C$="Close":D$=" DiskDrive Door":X="Radians":
ON ERROR GOTO 90
97 DEF FN WD(W)=W*180/WP:
DEF FN WR(W)=W*WP/180 'Rad-->Deg;Deg-->Rad
99 PRINT" Sq<r>oot <L>n <e>[X Sin<C>os
Arc<T>an Arc<S>in A<[>X":GOSUB 8
110 IF Z="R" THEN GOSUB 11:GOSUB 9000:
GOSUB 21:PRINT TAB(45)"R[2="WY*WY
120 IF Z="L" THEN GOSUB 12:GOSUB 9010:
GOSUB 22:W=WY:GOSUB 9020:GOSUB 23
130 IF Z="E" THEN GOSUB 13:GOSUB 9020:
GOSUB 23:W=WY:GOSUB 9010:GOSUB 22
140 IF Z="C" THEN GOSUB 14:GOSUB 9030:
GOSUB 24:GOSUB 9040:GOSUB 25:W=WY:
GOSUB 9050:GOSUB 26
150 IF Z="T" THEN GOSUB 15:GOSUB 9040:
GOSUB 25:GOSUB 9030:
PRINT I/2'DSin/Cos("WA") = "WY/W
160 IF Z="S" THEN GOSUB 16:GOSUB 9050:
GOSUB 26:GOSUB 9030:
PRINT I'DSin("WA") = "WY
170 IF Z="[" THEN 17
199 GOTO 99
9000 WY=SQR(W):WY=WY/2+W/WY/2:
WY=WY/2+W/WY/2:
RETURN 'WY=Sqr(W)
9010 W2=(W-1)/(W+1):W3=W2:
WY=W2:I=3 '-----WY=Log(W)
9011 W1=WY:W3=W3*W2*W2:
WY=WY+W3/I:I=I+2:
IF ABS(WY-W1)>0 THEN 9011ELSE
WY=2*WY:RETURN
9020 W2=W:W=ABS(W):W3=1:
WY=1:I=0 '-----WY=Exp(W)
9021 W1=WY:I=I+1:W3=W3/I*W:WY=WY+W3:
IF WY<>W1 THEN 9021 ELSE IF W2<0 THEN
WY=1/WY:RETURN ELSE RETURN
```



```

9030 WA = WA/2:WP:WA = WA-FIX(WA) + 1:
WA = (WA-FIX(WA))*2*WP:WY = WA:W = 1:W8 = 1:
W9 = WA:I = 1:I2 = 1

```

```

'----- WY = Sin(WA) W = Cos(WA)

```

```

9031 W1 = WY:

```

```

FOR I1 = 1 TO 2:

```

```

I = I + 1:W9 = W9*WA/I:

```

```

NEXT:

```

```

I2 = -1*I2:WY = WY + I2*W9:

```

```

IF WY < > W1 THEN 9031

```

```

ELSE I = 0:I2 = 1

```

```

9032 W3 = W:

```

```

FOR I1 = 1 TO 2:

```

```

I = I + 1:W8 = W8*WA/I:

```

```

NEXT:

```

```

I2 = -1*I2:

```

```

W = W + I2*W8:

```

```

IF W < > W3 THEN 9032 ELSE RETURN

```

```

9040 IF W = 0 THEN WA = 0:RETURN

```

```

ELSE W2 = 1/W:W3 = W:I = 3:

```

```

IF W = 1 OR W = -1 THEN WA = SGN(W)*WP/4:

```

```

RETURN

```

```

9041 WA = W:

```

```

IF ABS(W) > 1 THEN WA = SGN(W)*WP/2:

```

```

I = 1:GOTO9043 ' WA = Atn(W)

```

```

9042 W5 = WA:W3 = W3*W*W:WA = WA-W3/I:

```

```

I = -1*SGN(I)*(ABS(I) + 2):

```

```

IF WA < > W5 THEN 9042 ELSE RETURN

```

```

9043 W5 = WA:WA = WA-W2/I:W2 = W2/W/W:

```

```

I = -1*SGN(I)*(ABS(I) + 2):

```

```

IF WA < > W5 THEN 9043 ELSE RETURN

```

```

9050 W4 = .5:I = 3:W1 = W*W*W:WA = W + W4*W1/I

```

```

'----- WA = ArcSin(W)

```

```

9051 W2 = WA:W1 = W1*W*W:W4 = W4*I/(I + 1):

```

```

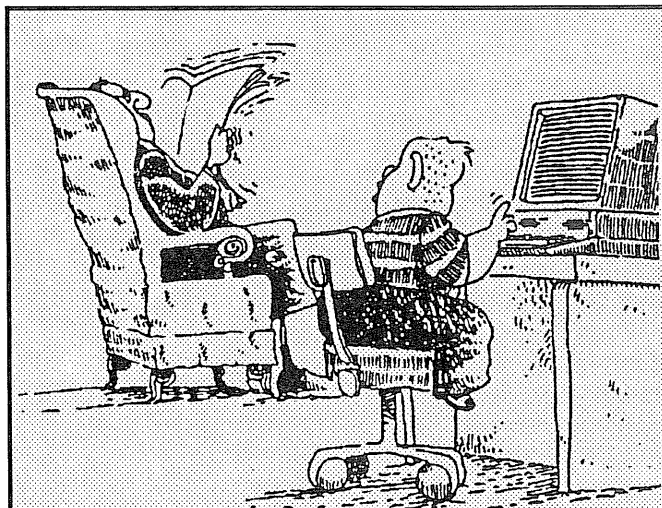
I = I + 2:WA = WA + W4*W1/I:

```

```

IF WA < > W2 THEN 9051 ELSE RETURN

```



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HINTS & TIPS

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Model 4 - TRSDOS 6.x. or

Model III - TRSDOS 1.3

By Johan Volgers

Here is a hi-rez program that will draw an exact circle on the screen. It can be used to check the adjustment of the video screen.

CIRCLE/BAS

100 'CIRCLE/BAS door Johan Volgers, September 1989

102 'Freely translated from Dutch:

104 'A High Resolution exercise for

106 'BASICG v6. (TRSDOS 6.x Model 4 mode) or

108 'BASICG v1.01 (TRSDOS 1.3 Model 3 mode).

110 '

134 ' ---- center, cirkel param, paint param ----

136 '

138 XM = 320:YM = 120

140 DI = 239:KL = 1:SH = 0:EH = 6.28315:XY = .5

142 P1\$ = CHR\$(15) + CHR\$(240):

REM 0000.1111B en 1111.0000B

144 P2\$ = CHR\$(51) + CHR\$(244):

REM 0011,0011B en 1100.1100B

146 P3\$ = CHR\$(85) + CHR\$(170):

REM 0101.0101B en 1010.1010B

148 '

150 ' ---- clear schermen (clear screen) ----

152 '

154 SCREEN 1:CLS:SCREEN 0:CLR

156 '

158 ' ---- maximale rechthoek (rectangle) ----

160 '

162 LINE(0,0)-(639,0),1:LINE(639,0)-(639,239),1

164 LINE(639,239)-(0,239),1:LINE(0,239)-(0,0),1

166 '

168 ' ---- maximaal vierkant (square) ----

170 '

172 LINE(80,0)-(560,0),1:LINE(560,0)-(560,239),1

174 LINE(560,239)-(80,239),1:LINE(80,239)-(80,0),1

176 '

178 ' ---- maximale cirkel ----

180 '

182 CIRCLE(XM,YM),DI,KL,SH,EH,XY

184 '

186 ' ---- inkleuren (coloring) ----

188 '

190 PAINT(1,1),P1\$,1:PAINT(638,238),P1\$,1

192 PAINT(81,1),P2\$,1:PAINT(559,1),P2\$,1

194 PAINT(81,238),P2\$,1:PAINT(559,238),P2\$,1

196 PAINT(XM,YM),P3\$,1

198 '

200 '

202 '

204 SOUND 7,0

206 '

208 GOTO 208

ANOTHER HIDDEN MESSAGE FROM RADIO SHACK

By Lance Wolstrup

Yes, indeed! Someone at Tandy did it again. A programmer on the Tandy staff, obviously a Star Trek fan, managed to bypass quality control and get a hidden message out to the rest of the TRS-80 trekkies.

The message is on the Model 4 TRSDOS UPGRADE ver. 06.02.00 to 06.02.01 disk. It is located on cylinder 0, sector 4, and you can read it with ZAP program (Super Utility, Utility 4, or other).

Below is a short assembly language program that will read cylinder 0, sector 4 of the disk in drive :1, and then display the text found.

SCOTTY/ASM for Model 4

	ORG	3000H	
;			
START	LD	HL,MSG	;point to msg
START1	LD	A,(HL)	;get chr
	OR	A	;is it end chr?
	JR	Z,START2	;if yes - jump
	LD	C,A	;transfer to C
	CALL	DSP	;display chr
	INC	HL	;next chr
	JR	START1	;repeat
;			
START2	LD	A,1	;svc #1
	RST	40	;wait for keystroke
	CP	13	;is it < ENTER >
	JR	NZ,START2	;no - go back
;			
	CALL	CLS	;erase screen
	CALL	RDSEC	;read sector
	CALL	DSPSEC	;display it
	LD	C,10	;send linefeed
	CALL	DSP	;to screen and


```

; RET ;return to dos
CLS LD C,28 ;home cursor
CALL DSP
LD C,31 ;erase screen
;
DSP LD A,2 ;svc #2
RST 40 ;display chr
RET
;
RDSEC LD A,49 ;svc #49
LD HL,BUFFER ;sector contents go here
LD D,0 ;cylinder 0
LD E,4 ;sector 4
LD C,1 ;drive :1
RST 40 ;read sector
RET
;
DSPSEC LD HL,BUFFER ;point to sector info
LD B,0 ;read all 256 bytes
DSPSE1 LD A,(HL) ;get byte
CP 32 ;if smaller than 32
JR C,DSPSE2 ;then skip it
LD C,A ;transfer byte to C
CALL DSP ;display it
DSPSE2 INC HL ;get next byte
DJNZ DSPSE1 ;repeat
RET
;
MSG DB 28
DB 31
DB 'To see the hidden message - '
DB 13
DB 'insert your TRSDOS UPGRADE'
DB ' disk ver 06.02.00 to 06.02.01'
DB 13
DB 'in drive :1 and press < ENTER > '
DB 0
BUFFER DS 256
END START

```

SEND PRINTER CODES TO SCRIPSIT

By Donald R. Goss

Since Scripsit does not allow for control codes to be sent to the printer, it is necessary for the user to send those codes before Scripsit is loaded. The program, PRINTER/BAS, will send control codes to change the pitch to either 5, 6, 8 1/4, 10, 12, or 16 1/2 characters per inch. It will also put the printer into the bold type mode for darker print if desired. It was written for use with the C.Itoh Prowriter, but should work with most of the dot matrix printers by substituting the proper control codes.

One word of warning: If the printer is not turned on before a menu selection is made, it may cause the program to hang up.

The program can be set to load automatically whenever the Scripsit disk is booted. Assuming that the program is saved under the name PRINTER/BAS:0, the following JCL (Job Control Language) file can be entered using the BUILD command:

```

SET *PD TO CLICK/FLT
FILTER *KI *PD
BASIC
LOAD"PRINTER/BAS:0"
RUN
//STOP

```

As a bonus, I've included the commands to set the keyclick on. I find it makes word processing easier since you get positive audible feedback on each keystroke. If you have named this JCL file STARTUP/JCL, you can enter AUTO DO STARTUP/JCL from the TRSDOS prompt and it will automatically execute each time the disk is booted.

You can create another JCL file (named SCRIP/JCL) that says simply:

```

SCRIPSIT
//STOP

```

If you choose to use this JCL you should change line 800 in the Basic program to read:

```
800 CLS:SYSTEM"SCRIP/JCL"
```

This will cause Scripsit to load automatically when you choose item 8 on the program menu.

PRINTER/BAS

```

10 C$=CHR$(15):E$=CHR$(27)
15 CLS:PRINT@103,"P R I N T E R   C O N T R O L S"
20 PRINT@345,"1) 10 characters per inch"
25 PRINT@505,"2) 12 characters per inch"
30 PRINT@665,"3) 16.5 characters per inch"
35 PRINT@825,"4) 5 characters per inch"
40 PRINT@985,"5) 6 characters per inch"
45 PRINT@1145,"6) 8.25 characters per inch"
50 PRINT@1305,"7) Bold type"
55 PRINT@1465,"8) Exit to TRSDOS"
60 PRINT@1788,"Enter your choice(s) ";
65 M$=INPUT$(1):M=VAL(M$):
IF M < 1 OR M > 8 THEN 65
70 ON M GOSUB 100,200,300,400,500,600,700,800
75 GOTO 15
100 LPRINT C$::LPRINT E$;"N";:RETURN
200 LPRINT C$::LPRINT E$;"E";:RETURN
300 LPRINT C$::LPRINT E$;"Q";:RETURN

```



```
400 LPRINT E$;"N";:LPRINT CHR$(14);:RETURN
500 LPRINT E$;"E";:LPRINT CHR$(14);:RETURN
600 LPRINT E$;"Q";:LPRINT CHR$(14);:RETURN
700 LPRINT E$;"I";:RETURN
800 CLS:SYSTEM
```

CONVERTING ELECTRIC PENCIL FILES TO ALLWRITE

By Jim E. King

Electric pencil files (/PCL) are not directly compatible with AllWrite. Unfortunately, Electric Pencil adds formatting information at the end of the ASCII text and Allwrite chokes on this. The /PCL file does initially load into Allwrite, but it then balks, issuing an error message.

I wanted to move my longer PCL files (10 grants and larger) over for the better formatting available in AllWrite, so I had to work around the above problem. Here is what I came up with.

Move the /PCL file over to a destination data disk, and then modify the end with a ZAP program (I use MultiDOS ZAP because it is the program with which I am the most familiar).

Use the File option and go to the end of the file.

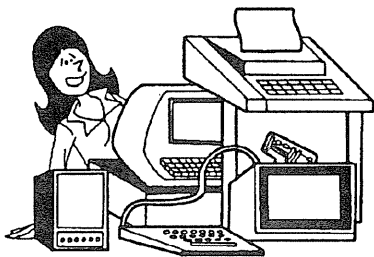
Look at the END of the ASCII text and note that the NEXT byte is 0D hex.

Using the modify command, change all bytes AFTER 0D to 00, then <Enter> and you are done.

Now reformat the text with Allwrite.

Many, Many Continuing Frustrations... (and Loving It!)

by Carol L. Welcomb



I became the lucky owner of a TRS-80 Model 12 this summer. While it didn't have the Arcnet board or the other extra goodies available, it did come complete with two double sided 1.2 Meg drives. No matter, I am satisfied in just trying to cross over the stuff and junk from the Model 4 to the Model 12. I even got

the LS-DOS 6.3.1 version for the Model 12, so I could have a common language. Sounds pretty fair so far, right? Well, I'm no big expert on assembly language, or for that matter,

debugging, so the many, many continuing frustrations began.

I constructed a null modem connector (which, for the parts involved cost me all of a \$1.23) and began to learn the COMM way of doing things. This was fun. BASIC programs were easily transferred between machines, and except for a few of the special character differences between the Model 12 and the Model 4, everything in the BASIC category was simple.

Next I wanted to be able to run the many /CMD files I've collected through the years I've owned TRS-80 computers. I was not certain on how to go about this, but after attempts at transferring them via the null modem, I knew that wouldn't work. (Probably why the manual says ASCII only files, right?) So, I disassembled the /CMD files with the Misosys DSMBLR (which is quite handy, and simple to use) and, after storing that information on a disk, I then transferred the /SRC files to the Model 12, and used a copy of EDTASM (in the original Model II language, TRSDOS 2.a) to reassemble.

It is important to note that Model II EDTASM will NOT work when it is CONVERTED from TRSDOS 2.a to LS-DOS 6.3.1. This is the part where I learned debugging (a little bit of debugging anyway). I knew the EDTASM4/CMD allowed Model III EDTASM to work on a Model 4, so I thought that if I used it on the Model 12, it might work. Unfortunately the entire structure of EDTASM for the Model 12 loaded into an entirely different area of RAM. Even moving it to the location of the Model 4 (START=567F, END=6FE3, TRA=5867) didn't work. Upon very close inspection of the EDTASM (for Model 2/12) I noticed many differences.

I then transferred a /SRC file from the EDTASM which, when used with the EDTASM4/CMD, runs well in Model 4 mode. Guess What? The EDTASM screen appears, but there is no keyboard input. Very frustrating! However, I know I'm getting closer, and I won't give up. There is so little written about the Model 2/12 TRS-80 computers, I thought I'd toss this in to see what you thought.

Now, I need to share the fact I've finally acquired an Orchestra-90. This was a big deal to me as I've always enjoyed the musical potential of computers. We have a small boom box, which is quite capable of irritating everyone else in the house when the Orch-90 is playing stereo music. I love it, but I'm not good at it yet.

Now that summer is over, I find myself returning to the computers more and more, it's like a hibernation period for me. I don't mind snow, but the bitter cold of winter is something I try to avoid. My eldest, who made use of an Amiga 500 while his friend was in Germany, has had to resume using a TRS. A bit of a letdown for him, but he isn't complaining. I believe I live in a home of potential Mac users, and that makes it difficult for them to understand me. I like a computer you can really get into, on all levels,

and they would vastly prefer a computer they could easily use. From what I've heard, Macs are easy to use, but I need more than that.

I would love to read an article by someone who has made use of a scanner for a Model 4. Like the hardware changes involved, the software development and interesting things. Are there any of you who have figured this out yet? So often I've wanted something I could stick in the TRS by simply scanning a page. The advantage to me is obvious, and especially since the prices of scanners have come down.

I haven't been ignoring BASIC programming on purpose, as it is a treat to create something that actually works the way I meant it to work. I have been preoccupied with the Model 12, and once I figure out all the techno stuff involved with that, and have things the way I want them, I can get back into the BASIC.

PLEASE, oh please, one of you hackers, write an article on scanners.

VIDEO CURE

By Orest Kowalyshyn

I would like to pass a hint along to the readers of TRSTimes concerning the Model 4. I have had video trouble with my computer; it would constantly blink on and off, and very often all types of characters (garbage) would fill the screen. I noticed that the voltage to the CRT would go on and off very quickly. To make a long story short, I used a pencil solder iron to resolder all the connections on the Model 4 power supply, as well as the connections to the CRT. Believe it or not, this cured the problem. I would recommend that a three-prong cord type solder iron be used in this type of procedure.

ZZZZZZZZZZZZ.....

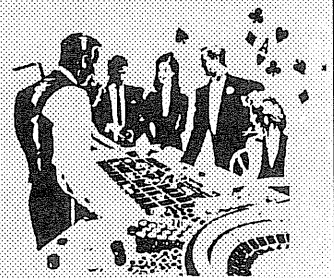
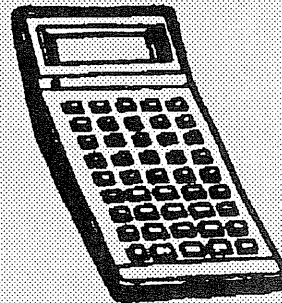
By Stacy A. Brennan

On a night when you have trouble going to sleep, turn on your Model I or III and type in the program listing below. I call it Z/BAS because when you RUN the program and study the screen display intensely, it has a hypnotic effect and is bound to put you to sleep within a few minutes.

```
10 CLS
20 A=RND(3)
30 X=RND(124)-1
40 Y=RND(48)-1
50 IF X>62 THEN X1=62-(X-62)-1
ELSE X1=62+(62-X)-1
```

```
60 IF Y>24 THEN Y1=24-(Y-24)-1
ELSE Y1=24+(24-Y)-1
70 ON A GOTO 80,130,130
80 SET (X,Y)
90 SET (X1,Y1)
100 SET (X,Y1)
110 SET (X1,Y)
120 GOTO 20
130 RESET (X,Y)
140 RESET (X1,Y1)
150 RESET (X,Y1)
160 RESET (X1,Y)
170 GOTO 20
```

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ALL ABOUT ALLWRITE pt.4

(well, almost)

By Dr. Allen W. Jacobs



Although I have Electric Webster with grammar checking, I often like to check for proper spacings on my own. The technique I use is applicable to other tasks. It generalizes to some uses in the editing of many ASCII files containing some non-ASCII characters. Strictly defined, all characters with values less than "128" decimal are considered ASCII. Those with values greater than this are non-ASCII or more properly called, binary. DO NOT TRY TO EDIT A PROGRAM FILE!

What I do is to search for a period and three spaces and replace them with a period and two spaces. I then search for a period and two spaces and replace it with a highly visible graphics character. The biggest is ASCII "191". I then use the SR* command to do a global search and replace. All the periods and one space can likewise be searched and replaced with, say ASCII "190's". In most documents, the occurrences of these can be inspected visually to see if they are correct. Periods and carriage returns can likewise be searched. Double spaces can be substituted in a like manner. Then, the file can be restored with the reverse substitutions. Once you have successfully used this technique, you will find other uses for it. Thus, our tool belt grows.

I have found that some documentation files, assembler source files, non-ASCII containing word processor files, and some printer files sent to a disk file are editable in a similar manner. Since I have encountered a number of them, I made a list of what every ASCII and non-ASCII character looks like when it's in the Allwrite editor. I then find out what character it is and usually either remove it, if it is line numbering, or substitute six to eight spaces or so for it. Experience has taught me that printers use ASCII "8" and "9" as tab characters. Files "cleaned up" in this manner

are usually not perfect but they are readable. If they are important, they are now editable. Don't you sense that some soft keys are forming? Yes, but I don't encounter enough of these files to have a well organized template to present to you. How about sending me one of yours?

Have you ever tried to find the "end of paragraph" markers in a search or find command only to be frustrated? That used to happen to me. Every time I tried to find the carriage return character (ASCII "13"), I couldn't enter it as the search argument because its use ENDS a search argument. The way to do it is to enter it as character number "013". The keystroke sequence is:

```
<BREAK> <F> <SPACE> <CLEAR> <: > <0>  
<1> <3> <ENTER>
```

I use this technique on the "data base" I use the most. You guessed it. This is another use I have for Allwrite. Think of it as the most disorganized and yet most used in-memory free form data base filing system I have. It used to consist of one file that has since grown to three. I call the file POKTNOTS. That stands for pocket notes.

I am always in the habit of putting notes on little pieces of paper and placing them into my pocket. Eventually, my pocket becomes quite full. To clean it out, I remove each of the notes and transcribe them into a sloppy looking text file. I use all upper case letters for clarity and so I don't have to worry about capitalization. Each subject is described using punctuation freely, with the exception of carriage returns. Only one carriage return is entered at the end of each subject. The file can be searched in the "find" mode or the "browse" mode.

To find an entry, I issue a find command with some word that I hope I remembered was in the entry. Within 1 or 2 seconds, the mess of information is searched and the cursor is placed where it first encounters an occurrence of the search argument. I have a telephone number file I use this way.

The second method I use is the "browse" method. I use the find ASCII "013" command as described above. I then replace it with ASCII "013" "013" "013". I then issue a <BREAK> <S> <R> <*> <ENTER> command, if soft key 0 has been reprogrammed. Every carriage return is replaced with itself and two more. The net effect is to expand the file while adding a minimal number of characters. As long as the file does not exceed memory, it is very readable. I then "browse" through it for what I want. I do

not save the file in this condition. I either "QUIT" the file without saving it or I reverse the above search and replacement arguments if I have edited the file. This improvised filing system works so well, I don't need any other free form database; and it is "100% compatible" with my word processor. It IS my word processor!

The rest of the things I currently have to share with you are smaller miscellaneous items and suggestions.

If you can't preserve a double space when a line is being justified at the end of a sentence, try adding a space to the left hand column of the next line so that it justifies correctly. That is not a bug. It just took me a long time to discover that THAT is how Allwrite determines whether to place one or two spaces after a sentence, if the line was split at the period.

Try editing the last command or finding out what it was with the <BREAK> <?> keys. It saves a lot of typing. It is also helpful in trying to figure out what a soft key is doing. But remember that more than one command may have been issued. The <BREAK> <?> command only reveals the LAST command line.

Here finally, is a soft key 7. I use it to enter tabular information to a column of entries, on a regular basis. What it does is duplicate a line so that a new entry can be made by altering a previous line. Place the cursor on the last line in the list and issue the soft key sequence. You will be on the new line you wish to alter. Another helpful technique is to set the tab line at the prospective columns you wish to alter. If the setup is involved, each time, consider saving both this soft key and the tab line settings. Both can be saved and later recalled at another session.

If you use Allwrite with Dostamer or Shell 2.0, you can eliminate having to type in the name of an existing file. Dostamer even appends the drive number to the end of the file specifier. With a hard disk or large ram disk, it's fun to edit multiple files without ever typing (or mistyping) a single one. Fast access drives, (ie. hard drives or ram drives) approach video game action.

To save "losing" a file on an unknown drive (usually the first available non-write protected drive), remember to cultivate the drive designation habit when entering any file specification associated with Allwrite. You will be happier for it. Fortunately, Dostamer does this for you.

If you are impatient with the slow cursor speed of Allwrite, you have two choices. If you are using TRSDOS6/LSDOS6, use SETKI to increase the repeat rate as fast as it will go. For text input and heavy editing, I use the DOSPLUS4 installation and set the Allwrite keyboard driver installation as fast as IT will go, which is a pretty good velocity. With that advice, you would think that I am a fast typist. On the contrary, I am so slow that if I had to

wait for the cursor, I would only be on line four of this article by now.

Here is another bit of advice you may already use. I include it here just in case you don't. The fact is that I include and write portions of text out of order. I also include files that I will later remove, after I have copied or moved items out of them. I like to separate these items visually so that I can find them and delete them relatively safely from the text I want to keep. My two favorites are horizontal lines made of the underline character and the large block graphic character. The underline is the easiest, and you probably use it. Just hold the <CLEAR> and <_> keys down on a new line and let them repeat until they almost cross the screen. Then, hit enter. My other favorite is:

```
<CLEAR> <:> <1> <9> <1> <F1> <Q>.
```

Hold <CLEAR> and <K> as you did for the underline. THAT line should serve as an adequate separator for just about anything! The ASCII characters "131" or "140" are a happy medium. If you are doing a lot of this, program it into a soft key, even if you don't save it. If "ASCII 191" is too "intense" for you, add a space to the soft key and hold it down when you use it.

```
<CLEAR> <:> <1> <9> <1> <SPACE> <F1> <Q>.
```

If you don't want these lines to print, use the soft key # (the one that places a ;cm in front of the line).

Vertical lines are somewhat less useful. If you want them, however, put the following keystrokes into a soft key:

```
<CLEAR> <O> <CLEAR> <:> <1> <9> <1> <DOWN ARROW> <LEFT ARROW> <CLEAR> <Q>.
```

Remember, however, that these lines will not look like that on virtually ANY printout, including Tandy DMP printers. THAT is why they are not too useful. My advice is to remove all vertical lines. You can remove or comment all horizontal lines, at your choice, to prevent them from printing. However, if you are Andy Levinson, you can make your printer do anything. Only in this last case, can you leave the lines in the text if it is mono spaced, your screen width equals your printer width, formatting is off, and they will print. My advice is don't waste your time. Chances are, you are not Andy.

I almost forgot a warning to you regarding "pushing the limit" during text entry. This entire article does not fit into memory. Rather, it resides in two files. While I was typing in "just one more screenful", I decided to justify the text with the screen about 3/4 full. Suddenly, Error 251, "No

more room in memory" appeared and I lost about 1.5K of text.

It occurs when the screen buffer of the editor writes to text memory. Basically, the screen can hold 1920 characters of information that will never make it to your file. Add to this any reserved high memory modules you may not know you have installed and I would get worried and just check. I would stop before I have 2K left. It's easy to advise you to take this precaution, after the fact, even though I forgot my own "rule of thumb". Please forgive me, I don't top out THAT often!

Use the status screen (type <BREAK> <S> <T> <ENTER>) often when you know you are getting close. I suggest the above command only in case you have reassigned <CLEAR> <9> to something else. That is almost what the soft key was originally programmed to type. It actually spelled out STATUS. When I type it myself, however, I just use the first two letters of the command. Of course, it works just fine.

I still have a couple of wishes for Allwrite such as a case change command, a previous word command, a kill to the next character command as in basic, and Unix like conditional searches such as, "search for this and NOT that".

I don't want to belabor such points, however, unless I have the time and ability to "fix" them.

As a final thought, after reading Gary Shanafelt's update on the capabilities of Allwrite with a laser printer, I can only say that I would be privileged to review the driver he wrote about. As it comes to pass, I have recently been placed in the vicinity of both a Laser Jet and a Desk Jet Printer. I do not own either of these types of printers myself.....(YET). However, I did get an advanced look at the original sample page that Gary Shanafelt sent to TRSTimes, thanks to our fearless editor. My preliminary review of the printout is.....WOW!

Anyway, since I am running out of steam and subjects, I would like to say that although I have voiced some criticisms about Allwrite I think that it is a spectacular program. It was well ahead of its time and it does an amazing amount of things in a small amount of memory (by today's standards): If I didn't like it, it wouldn't be the program I use, by far, the most on my TRS-80. If anything, Allwrite alone has saved me from needing a larger system. If I didn't use it, I wouldn't have been able to say as much as I have about it. I guarantee you that I am not the only user out there who feels this way. In fact, if you have read this far, you probably feel that way too.

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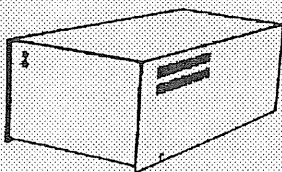
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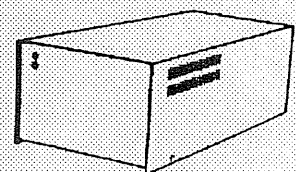
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A FAST SYSTEM DRIVE

128K MODEL 4 MEMDISK

By Lance Wolstrup

If someone offered to install an extra disk drive in your 128K Model 4, would you turn it down? Of course you wouldn't. Well, that extra disk drive has already been installed and, while it does not offer an abundance of data storage, it is very fast -- much faster than the speediest hard drive.

Except for LeScript, Visicalc and a handful of others, most Model 4 application programs will completely ignore the upper 64K of memory in your machine. This means that, most of the time, it is wasted. Now, since you paid for this memory, why not take advantage of it and speed up your machine?

Your LS-DOS system disk contains a file called MEMDISK/DCT. This file allows the unused upper memory banks to be configured as a high speed disk drive, known as a memdisk. When the memdisk is active you can copy files to and from it, just like a normal drive. The only thing to keep in mind is that when the machine is turned off or, heaven forbid, the electricity is discontinued for any reason, all files in the memdisk are lost. Be sure to copy important data from the memdisk to a real disk on a frequent basis.

To set up the memdisk, type the following directly from the DOS prompt:

SYSTEM (DRIVE = 6, DRIVER = "MEMDISK")

Because I have 3 floppy drives and a hard disk configured with 3 partitions, I use the next available drive slot for my memdisk -- drive :6 -- but you can use any unused drive number for your setup.

The above command executes the MEMDISK/DCT program and on the screen you will see:

<A> Bank 0 (Primary Memory)
 Bank 1
<C> Bank 2
<D> Bank 1 and 2
<E> Disable MemDISK

Which type of allocation - A, B, C, D, or E

If you want the largest possible memdisk, choose Bank 1 and 2 by pressing: **D**

You will now be prompted:
Single or Double Density <S, D> ?

Choose double density by pressing: **D**

Next you will be asked:
Do you wish to Format it <Y/N> ?

Press: **Y**. Fourteen cylinders of memdisk (0 through 13) will be formatted, verified and, if everything went correctly, a message will appear telling you:
MemDISK Successfully Installed.

This means that Memdisk is active and can now be treated as a regular drive. For example, typing **DIR :6** will display the directory of memdisk. Since no files reside here yet (other than the invisible BOOT/SYS and DIR/SYS files), the directory will be empty. Note that you have 57K of storage space.

Now, what can a memdisk be used for? The answer, of course, is that it can be used for just about anything your imagination will allow. Personally, I use memdisk to speed up DOS by reducing the system disk access.

Each time you issue a DOS library command, the appropriate overlay file must be loaded from the system disk in drive :0. As physical disk access is relatively slow, this takes time. To avoid this, I copy all my system files up to the memdisk with: **BACKUP /SYS:0 :6 (S)**

To finish, I now switch memdisk from drive :6 to drive :0, thus making DOS think it is the system drive. At the same time the normal drive :0 becomes drive :6. Issue the command: **SYSTEM (SYSTEM = 6)**

If it is too much trouble to issue these commands each time you boot, you can write a /JCL file to automate the process. The one I use is called STARTUP/JCL, and it lists as follows:

SYSTEM (DRIVE = 6, DRIVER = "MEMDISK")
D
D
Y
BACKUP /SYS:0 :6 (S)
SYSTEM (SYSTEM = 6)

Now, whenever you want a memdisk, you simply type: **DO STARTUP** from the DOS prompt or, if you want the memdisk active each time you boot, use the AUTO command by typing: **AUTO DO STARTUP**

That is all there is to it. Not overly difficult, and very much worth the effort.

more FROM 'OLD' ENGLAND

By Graeme Draper

I read with great interest Ted Barnes article from 'old' England in the Jan/Feb issue of the TRSTimes. As the person kindly referred to as a 'very knowledgable chap' I felt it appropriate to write with a slightly different perspective on TRS80 in the UK.

My love of Tandy equipment starts 2 or 3 years before Ted does, in about 1977, with one explanation as to the computer sales figures that Tandy was able to report at this time. As a teacher of Physics in a very large secondary school (11-18 year old pupils) I was always looking for ways to spice up the extensive practical work that we undertook. I know that many of my colleges around this rather small country were trying to do the same thing, and the arrival of the nearly affordable microcomputer looked like this would be possible.

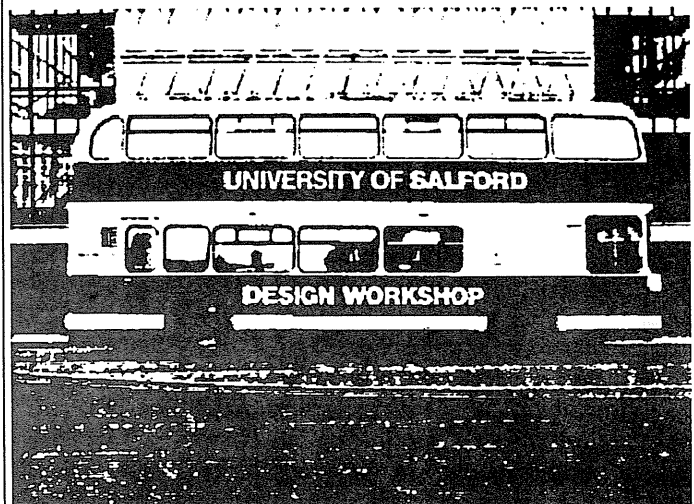
Some of us had been teaching BASIC for a number of years, often begging time on a mainframe or minicomputer at the local college, town hall or a friendly parents company. We had persuaded the examination boards to produce examination to test the new subject of Computer Studies which, although somewhat narrow, gave credibility to a new subject in the curriculum. At this time there were a few machines in the race, but it was the Commodore Pet series that was being pushed towards the education market. Towards the end of one financial year my education authority had some money to spend and there was no doubt that the microcomputer had to be bought - one machine between 19 secondary and 120 primary schools!

Investigating all of the Commodore agents revealed a minimum of 3 months waiting, and then you were often made to feel that they were doing you a favour. As a passing thought a local Tandy shop was approached who offered a Model 1 with a monitor, cassette recorder, a set of well written manuals AND a copy of Dancing Demon. This was too good to be true, but what closed the deal was the fact that it could go in the back of the car straight away.

This was the beginning and over the next 3 years mine became a 'Tandy' local education authority with every secondary and a number of primary schools buying Model 1 and then Model 3's. This pattern was obviously repeated in a number of the other 104 educational

authorities where little clusters of educational experts gathered after school to write software which by our standards in schools today was rather crude, but which often gave hours of pleasure and excitement as well as valuable educational experiences.

What happened to computers and information technology in British schools throughout the 80's is the subject of an article in itself, especially why Tandy lost a potentially massive educational market by ignoring a piece of design advice which they implemented a few years too late. What happen to me is that I got hooked. I now own a Model 1, three Model 3's, three Model 4's, 2 Model 16's, a Model 102 and 2 Buses, one double decker and one single decker. I have moved on from teaching children to training adults in Word Processing, Desk top Publishing and Computer Aided Design.



Although I spend many hours each day with 386 machines with Super VGA and 320 Meg hard disc, I still get the greatest thrill from making one of my old machines do what they were never intended for. As to being a very knowledgable chap, that is all relative, there are many members of NATGUG in the UK who know much more than me and I am sure that your readers in the States have a much greater breadth of knowledge about the TRS80 world, especially hardware from third party vendors which never made a great impact upon this country.

Oh yes, why the buses? I design and convert buses into fully equipped mobile computer classrooms and exhibition vehicles that can travel around the country teaching in areas where a suitable classroom is not usually available.

Graeme Draper is a consultant for Centre for Computers in Education and Training, and can be reached at University of Salford, Salford, M5 4WT, Great Britain.

Zorlof Word Processing System

by Fred Blechman

ZORLOF The Magnificent Word Processing System
Anitek Software Products
P.O. Box 361136
Melbourne, FL 32936
(407)259-9397
(See UPDATE at end. IMPORTANT!!!)

"Zorlof The Magnificent Word Processing System" is the unlikely name for an incredibly versatile, easy to use, inexpensive word processor. It seems to have most of the features of much more expensive and complex word processors, yet few of the disadvantages. Although, as with all sophisticated microcomputer programs, it will take some time and effort to learn to use all the features, you can have Zorlof up and running in a short time (AFTER you read through the manual) doing the most common things. From then on you add more and more features as you need them. I suppose there are some esoteric functions it won't perform, but I haven't found any yet that I need!

The first section of the manual, "Getting Started", is included on the Zorlof disk as sample text. This allows you to compare the text and formatting commands with the actual printed results - a very nice touch. You actually learn by example and use rather than just reading the manual. You can modify the sample text at will, trying out all kinds of variations, just to see what happens.

Over 50 Printers Supported

Word processing has developed a vocabulary of its own, but bear with me as I try to cover some of Zorlof's features. For one thing, many word processors are blind to the printer you're using, not allowing you to use many of the printer features. Zorlof supports over fifty popular printers - parallel or serial - and most of their features.

For example, on those printers that offer proportional character spacing, underlining, bolding, subscripts or superscripts, by simply specifying your printer designation at the beginning of your text Zorlof will send the proper character codes to your printer. The same applies to condensed and wide lettering, or even Grafrax italics. You can specify alignment of left margin, right margin, both margins or centering of any line or group of lines. You can set tabs or indent text on both the left and right side, and you can specify different margins for odd and even pages! If you've ever produced a manual or book, you can

appreciate how nice it is to be able to have the left and right pages formatted so the center margin is generous.

Page numbering is supported, of course, but you can also put titles and page numbers at the top or bottom (or both) of each sheet, and they can be different for odd and even pages. Each header or footer can run up to three lines. You can pause printing between pages when using single sheets, and you can merge a mailing list and data file with the text file to produce personalized documents. You can print all or any part or parts of a text with printer on-off commands in the text. Page lengths and line spacing are specified, as well as the placement of the first line on a page.

Although it may seem very complex to the casual reader, because of the large number of print formatting options, the built-in defaults give you plain-vanilla output without any commands at all! It's only when you wish something different than the normal default that you must specify. That's why it's so easy to get started with Zorlof.

Text Editing Functions

While the formatting capabilities of Zorlof are extensive, the majority of your effort will be in actually generating text on the screen. I'm happy to report that Zorlof is fast, logical and crash-proof. After using some other word processors that lost all text without warning, or dropped letters while word-wrapping to the next line, I was delighted to find neither of these problems with Zorlof. The key combinations used to delete characters, words or lines - or even blocks of text - were logical and simple. Inserting text or moving blocks of text is a breeze, and the cursor controls are rapid and efficient.

Some of the features available during text entry are outstanding. For example, you can get a disk directory - of any disk - at any time. By placing the cursor on any filename you can load that file at the text cursor position, making text merging a pleasure.

I use various letterheads as files, and load one in at the beginning of the text. If I'm writing a personal letter, a magazine article, correspondence regarding my Amway business, or a letter to a software customer, I use one of the four letterheads I've put on the Zorlof disk as separate files, and then go from there. The directory feature also allows me to kill obsolete files on any disk to make room for the current text file.

And, critically important if you have been using another word processor and already have a bunch of disk files in the "other" format, Zorlof loads any ASCII file into text! Boy, this was really important to me, since I had been using the Electric Pencil 2.0 for about a year and had numerous files I occasionally needed to update. They loaded perfectly into Zorlof and required virtually no

change to use with Zorlof. I now save them all as Zorlof files.

Actually, Zorlof can accommodate five different types of files - Zorlof, Apparat EDTASM, Radio Shack EDTASM, BASIC and ASCII. This means you should be able to use files from most other word processors, since most save their files in ASCII. Also, you can edit BASIC programs with word-processing convenience (if the file was saved in ASCII), and even have limited renumbering capability. Furthermore, you can save a Zorlof file in ASCII for use on other word processors! You can even display and edit any type of data or program file in "ZAP" (byte-hexadecimal) format. The possibilities are enormous.

I had serious problems with Electric Pencil keeping up with my hunt-and-peck typing during inserts or at the beginning of word-wrapped lines. I have yet to "outrun" Zorlof, even with bursts of high speed entry, and even in the insert mode, since it is written entirely in Z80 machine language with type-ahead key-stroke buffering.

Justification and word wrapping (moving a partial word to the next line when it won't fit on the current line) occur in real time on the screen. Reverse word-wrapping fills an incomplete line above the current line. At any time you can scroll the screen up or down, or you can go to the top or end screen of text without scrolling. You can dump the contents of the screen to the printer anytime. You can search text anytime for a string of up to 28 characters (including "wild-card" characters), or you can both search and replace a string with another string. Not only can you move blocks of text, but you can also copy blocks, or delete them.

Printer Preview

Perhaps one of the most convenient and frustration-saving features of Zorlof is its print-preview function. Instead of printing out the text only to find out halfway through that you omitted some kind of formatting command, you can preview the text on the screen. This will show headers, footers, page breaks, justification, line spacing and just about everything but type fonts, underlining, subscripting and superscripting (since the display can't show those). If you spot a problem, you can correct the text or printer commands BEFORE taking the time to print it out first.

Zorlof even allows access to special characters and printer codes that you may wish to use. Line width can be set from 5 to 128; if you specify more than the 64 characters the display can show on a single line, then two display lines will be used.

Two lines continuously resident at the top of the screen tell you the filename (which you can save to disk anytime), the line width (I use 62, for compatibility with my Electric

Pencil files), the number of words (right now this reads 1250, more than the editor wanted!), number of lines, and the free memory size. (Free memory with a 48K Model III is 25708 before any text is entered). There are also spaces to enter a "search" and "replace" string. Having these at the top of the screen is not at all distracting, as one might expect.

I was surprised that multiple printer copies could not be commanded directly. A print queue allows up to 13 files to be printed one after another, and you could make multiple copies of a single file that way. Also, if you have a hardware spooler that allows multiple copies, you could pre-program any number of copies. Also, the version of Zorlof I have (2.19D) does not allow you to exit Zorlof and return to the text; the only exit is pressing the computer RESET button. Exit/return, I understand, may be provided in a forthcoming release.

The 96-page detailed manual is excellent! It's bound in a three-ring binder that has pockets front and back for the disk and any notes of your own. A cardboard card acts as both an index and command summary. It lists 59 editing functions and 39 printer commands, with summary of use and manual page number for detailed explanation. Furthermore, in preparation for this article, I had occasion to call Anitek to verify some facts. Peter Ray, Zorlof's creator, was extremely helpful, and schedules appointment times for registered customers to call with questions. It appears that Anitek not only has a great product, but they provide the necessary support as well.

If you have the impression that I like Zorlof, you are close. Actually, I love it!

UPDATE 12/11/90: Although the foregoing article was originally written in 1983, I STILL USE ZORLOF for all my writing. I've written almost 500 magazine articles and five books about microcomputers using Zorlof on my TRS-80 Model III or 4!

I'm over here at TRSTimes as I write this on Lance's Model 4P, updating this and writing a special story for the magazine about using TRS-80s with an HP LaserJet II printer.

Unfortunately, ZORLOF is no longer being sold by Anitek. It was superseded years ago with "LeScript" for both the TRS-80 and IBM PC. LeScript has all the features of Zorlof and more - but takes up memory in my Model III and 4 that I don't want to lose - so I've stayed with Zorlof. If you are not committed to a word processor, try LeScript. Call the above phone number for the latest information and prices.

Best Wishes!....Fred Blechman

THE TRSTimes AUCTION

It is time to make some space in the TRSTimes storage room, so we are offering the following Model I, III, 4 & Color Computer items for sale in an auction format. We will accept bids by mail for any or all of the items listed up until June 25, 1991. The bidders with the best offers will at that time be notified by mail and arrangements for payment and shipping will be made (note that shipping cost will be extra).

Send your bid to:
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WOODLAND HILLS, CA 91367

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- LDOS 5.1.4 (disk & manual) from LOGICAL SYSTEMS, INC.
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- UTILITY PACKAGE #1 (disk only) from LOGICAL SYSTEMS, INC.
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- WITNESS (disk & manual) from INFOCOM
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- MONTE PLAYS SCRABBLE (disk & manual) RS 26-1954
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- SYSTEM DIAGNOSTICS 3 (disk & manual) from THE SOFTWARE GUILD
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- MODEL 4/4P DISK SYSTEM OWNER'S MANUAL (6.1 disk & manual) RS 26-0313
- TRSDOS VERSION 6 (6.2 disk & manual) RS 26-0316
- MODEL 4/4P DISK SYSTEM OWNER'S MANUAL (6.2 disk, 6.2 HARD DISK OPERATING SYSTEM INITIALIZATION disk & manual) RS 26-0316
- LS-DOS 6.3.0 (disk only - no manual) from LSI
- VISICALC (disk & manual) RS 26-1520
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- MULTI BASIC (3 disks - no manual) from ALCOR SYSTEMS
- ALLWRITE (disk - no manual) FROM prosoft
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- RADIO BALL (cassette) RS 26-3319
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- THE SECOND RAINBOW ADVENTURES TAPE (CASSETTE) FROM RAINBOW MAGAZINE
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BOOKS

- BASIC COMPUTER PROGRAMS FOR BUSINESS VOL. 1 from HAYDEN BOOK CO.
- THE SOFTSIDE SAMPLER from SOFTSIDE PUBLICATIONS
- PROGRAMS FOR BEGINNERS ON THE TRS-80 from HAYDEN BOOK CO.
- 1001 THINGS TO DO WITH YOUR TRS-80 from TAB BOOKS, INC.
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- INSIDE LEVEL II from MUMFORD MICRO SYSTEMS
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- SUPERMAP + from FULLER SOFTWARE
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- DISK INTERFACING GUIDE from WILLIAM BARDEN
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- COMPUTER GRAPHICS WITH 29 READY TO RUN PROGRAMS from TAB BOOKS, INC.
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- LEARNING LEVEL II from DAVID LIEN
- TRS-80 ASSEMBLY LANGUAGE from HUBERT S. HOWE, JR.
- TRS-80 ASSEMBLY LANGUAGE PROGRAMMING RS 62-2006
- Z-80 PROGRAMMING & INTERFACING BOOK 1 from BLACKBURG CONTINUING EDUCATION SERIES
- TRS-80 INTERFACING BOOK 2 from BLACKBURG CONTINUOUS EDUCATION SERIES
- HOW TO PROGRAM THE Z-80 from RODNEY ZAKS
- THE BASIC CONVERSIONS HANDBOOK FOR APPLE, TRS-80, AND PET USERS from HAYDEN BOOKS
- INTRODUCTION TO TRS-80 LEVEL II BASIC PROGRAMMING RS 26-2116
- 80 MICRO'S REVIEW GUIDE from 80 MICRO
- ESSENTIAL GUIDE TO THE TRS-80 from INFOWORLD
- INTRODUCTION TO T-BUG from DON & KURT INMAN
- THE MCWILLIAMS II WORD PROCESSOR INSTRUCTION MANUAL from PETER A. MCWILLIAMS
- INTRODUCTION TO TRS-80 DATA FILES (book & disk) from JOHN D. ADAMS
- TRS-80 DATA FILE PROGRAMMING RS 62-2085
- TRS-80 ADVANCED LEVEL II BASIC RS 62-2072
- 101 PROGRAMMING SURPRISES & TRICKS FOR YOUR TRS-80 COMPUTER from TAB BOOKS, INC.
- ASSEMBLY LANGUAGE GRAPHICS FOR THE TRS-80 COLOR COMPUTER from DON & KURT INMAN
- CP/M USER GUIDE from OSBORNE/MCGRAW-HILL
- OSBORNE CP/M USER GUIDE from OSBORNE/MCGRAW-HILL
- CP/M ASSEMBLY LANGUAGE PROGRAMMING from PRENTICE-HALL
- THE RAINBOW BOOK OF SIMULATIONS from RAINBOW MAGAZINE
- THE RAINBOW BOOK OF ADVENTURES from RAINBOW MAGAZINE
- THE SECOND RAINBOW BOOK OF ADVENTURES from RAINBOW MAGAZINE
- PROGRAMMING THE 6809 from SYBEK
- 6809 ASSEMBLY LANGUAGE PROGRAMMING from LANCE A. LEVENTHAL
- TRS-80 COLOR COMPUTER ASSEMBLY LANGUAGE PROGRAMMING RS 62-2077
- THE COMPLETE RAINBOW GUIDE TO OS-9 RS 26-3190
- 500 POKES, PEEKS 'N EXECS FOR THE TRS-80 COLOR COMPUTER from MICROCOM SOFTWARE
- RAINBOW MAGAZINE (from # 1)
- COLOR COMPUTER NEWS
- HOT COCO (all issues)



TRS-80 PUBLIC DOMAIN SOFTWARE BONANZA

We have bought collections of software from people leaving the TRS-80 world. As fast as we can, we are weeding out the good Public Domain and Shareware from the Commercial programs and the junk. So far, we have come up with 28 disks for the Model I & III, and 10 disks for the Model 4.

Model I & III

PD#1: binclock/cmd, binclock/doc, checker/bas, checker/doc, chomper/bas, cls/cmd, dduty3/cmd, driver/cmd, driver/doc, drivtime/cmd, mazeswp/bas, minibase/bas, minitest/dat, mx/cmd, piazza/bas, spdup/cmd, spdwn/cmd, vici/bas, vid80/cmd, words/dic.

PD#2: creator/bas, editor/cmd, maze3d/cmd, miner/cmd, note/cmd, poker/bas, psycho/cmd, supdraw/cmd, vader/cmd

PD#3: d/cmd, trsvoice/cmd, xmodem/cmd, xt3/cmd, xt3/txt, xthelp/dat

PD#4: cobra/cmd, disklog/cmd, flight/bas, flight/doc, narzabur/bas, narzabur/dat, narzabur/his, narzabur/txt, othello/bas, vid80x24/cmd, vid80x24/txt

PD#5: eliza/cmd, lu31/cmd, sq31/cmd, usq31/cmd

PD#6: clawdos/cmd, clawdos/doc, cocoxf40/cmd, dsknam/bas, menu/cmd, ripper3/bas, sky2/bas, sky2/his, space/cmd, stocks/bas, trs13pat/bas, vid-sheet/bas

PD#7: cards/bas, cities/bas, coder/bas, eye/bas, heataudt/bas, hicalc/bas, life/bas, moustrap/bas, ohare/bas, slots/bas, stars/cmd, tapedit/bas

PD#8: craps/bas, fighter/bas, float/bas, hangman/bas, jewels/cmd, lifespan/bas, varidump/bas, xindex/bas, xor/bas

PD#9: bublsort/bas, chess/bas, finratio/bas, homebudg/bas, inflat/bas, mathdril/bas, midway/bas, nitefly/bas, pokrpete/bas, teaser/bas

PD#10: ltc21/bas, ltc21/ins, lynched/bas, match/bas, math/bas, message/bas, message/ins, portfol/bas, portfol/ins, spellegg/bas, storybld/bas

PD#11: alpha/bas, caterpil/cmd, cointoss/bas, crolon/bas, cube/cmd, dragon/cmd, fastgraf/bas, fastgraf/ins, lunarexp/bas, music/bas, music/ins, planets/bas, volcano/cmd

PD#12: baccarat/bas, backpack/bas, backpack/ins, doodle/bas, dragons/bas, dragons/ins, king/bas, sinewave/bas, snoopy/bas, wallst/bas, wallst/ins

PD#13: atomtabl/bas, boa/bas, chekbook/bas, conquer/cmd, dominos/bas, morse/bas, mountain/bas, quiz/bas, signbord/bas, sketcher/bas

PD#14: autoscan/bas, checkers/bas, craps/bas, ducks/bas, isleadv/bas, nim/bas, rtriangl/bas, sammy/cmd, typing/bas, wordpuzl/bas

PD#15: budget/bas, corp/bas, corp/ins, fourcolr/bas, fullback/bas, grapher/bas, illusion/bas, jukebox/bas, ledger/bas, maze/cmd, reactest/bas, shpspre/bas, states/bas, tapecntr/bas, tiar/bas, tiar/ins

PD#16: amchase/bas, constell/bas, filemastr/bas, foneword/bas, geometry/bas, heartalk/bas, hid-numbr/bas, lgame/bas, marvello/bas, powers/bas, scramble/bas, speed/bas, subs/bas

PD#17: conundrm/bas, eclipse/bas, esp/bas, esp/ins, hustle/bas, jacklant/bas, mindblow/bas, othello/bas, pleng/bas, rubik/bas, trend/bas, ufo/bas, veggies/bas

PD#18: backgam/bas, chess/cmd, cosmip/cmd, distance/bas, hexpawn/bas, music/cmd, stokpage/bas, texted/bas, texted/ins, trex/bas, twodates/bas, wanderer/bas

PD#19: banner/bas, cresta/cmd, lander/bas, medical/bas, moons/bas, par/bas, parachut/bas, pillbox/bas, readtrn/bas, replace/bas, ship/cmd, solomadv/bas, space/cmd, survival/bas

PD#20: bomber/bas, bumbee/cmd, ciaadv/bas, dice31/bas, dice31/ins, diskcat1/bas, firesafe/bas, flashcrd/bas, hitnmiss/bas, mazegen/bas, mazes-cap/cmd, roulette/bas, seasonal/bas

PD#21: aprfool/bas, catmouse/bas, d/cmd, escape/bas, header/bas, kalah/bas, mathwrld/bas, nameit/bas, note/cmd, photo/bas, read/cmd, syzygy/bas, timeshar/cmd, timeshar/doc, trace80/cmd, trsdir/cmd, worm/bas, yatz80/bas

PD#22: arcade/bas, cube/cmd, eclipse/bas, lcd/bas, leastsq/bas, medical/bas, million/bas, pwrplant/bas, round/bas, subway/bas, tapeid/bas

PD#23: artil/bas, artil/ins, baseconv/bas, crushman/bas, dissert/bas, huntpeck/bas, jungle/bas, jungle/ins, messages/bas, monitor/bas, monster/bas, moons/bas, ohmlaw/bas, stockpage/bas, tictacto/bas

PD#24: baslist/asm, baslist/cmd, baslist/doc, cleaner3/cmd, cleaner3/doc, difkit1/bas, difkit1/doc, dirpatch/asm, dirpatch/cmd, e/cmd, ei/doc, i/cmd, newmap/bas, newmap/doc, varlst/asm, varlst/cmd, varlst/doc

PD#25: copy/bas, copy/doc, dirpw/asm, dirpw/cmd, dirpw/doc, dskfmt/bas, dskfmt/doc, himap/asm, himap/cmd, hurricane/bas, hv/bas, hv/doc, keydemo/bas, keyin/bas, keyin/doc, lazyptch/asm, lazyptch/doc, salvage/bas, salvage/doc, wpflt/asm, wpflt/flt

PD#26: constell/bas, divisor/bas, frame/bas, heatfus/bas, heatfus/doc, hicalc/bas, mathlprt/bas, mathquiz/bas, molecule/bas, morscode/bas, phyalpha/bas, phyalpha/doc, remaindr/bas, usa/bas, wiring/bas

PD#27: engine/bas, fraction/bas, geosat/bas, grades/bas, julian/bas, lunarcal/bas, mailist/bas, metaboli/bas, musictrn/bas, perindex/bas, potrack/bas

PD#28: chainfil/bas, citoset/bas, convnum/bas, cursors/bas, cursors/doc, datamkr/bas, deprec/bas,

gmenuii/bas, ledger12/bas, menui/bas, menuii/bas, mini-
ves/bas, ninteres/bas, refinanc/bas, regdepo/bas, rem-
bal/bas, rndbordr/bas

Model 4

M4GOODIES#1: day/cmd, day/txt, gomuku/cmd,
llife/cmd, llife/doc, writer/cmd, writer/doc, writer/hlp,
yahtzee/bas

M4GOODIES#2: arc4/cmd, arc4/doc, cia/bas,
etimer/cmd, index/cmd, index/dat, mail/bas, mail/txt,
trscat/cmd, trscat/txt, util4/cmd, xt4/cmd, xt4/dat,
xt4hlp/dat

M4GOODIES#3: convbase/bas, dates/bas, dctdsp/cmd,
dmu/cmd, dmu/doc, dskcat5/cmd, dskcat5/doc,
editor/cmd, editor/doc, fedit/cmd, fkey/asm, fkey/cmd,
fkey/doc, hangman/cmd, m/cmd, m/src, membrane/bas,
miniop2/cmd, miniop2/src, move/cmd, move/doc, othel-
lo4/bas, scroll4/cmd, scroll4/src, setdate6/cmd, set-
date6/doc, setdate6/fix, spaceadv/bas, taxman/bas,
utilbill/bas, utilbill/doc

M4GOODIES#4: word wizard - disk 1

M4GOODIES#5: word wizard - disk 2

M4GOODIES#6: word wizard - disk 3

M4GOODIES#7: calendar/cmd, castladv/bas, civil-
war/bas, crimeadv/bas, dctdsp/cmd, ed6/cmd, ed6/doc,
edittext/bas, fedit/cmd, mail/bas, mail/txt, scramble/bas,
states/bas, textpro/cmd, time4/bas, wizard/bas,
wizard/doc, worldcap/bas

M4GOODIES#8: books/bas, books/doc, dmu/cmd,
dmu/doc, hamcalc/bas, hamhelp/bas, network/bas, net-
work/doc, pirate/bas, pirate/doc, vmap/bas, vmap/doc,
vmap2/bas, vmap2/doc, zork1/doc, zork2/doc, zork3/doc

M4GOODIES#9: ft/cmd, ft/doc, pterm/cmd, pterm/doc,
r/cmd, r/doc, scrconv/bas, scrconv/doc, video4/asm,
video4/cmd

M4GOODIES#10: checker/cmd, crossref/cmd,
crossref/doc, ddir/cmd, diskcat/cmd, diskcat/doc,
division/bas, division/doc, getput/bas, getput/doc,
host/cmd, hv/bas, hv/doc, maszap4/cmd, maszap4/doc,
park/cmd, profile4/doc, protect/bas, protect/doc,
rename/bas, replace/bas, restore/bas, rm/bas,
scrndump/bas, scrndump/doc, super/hlp, vers/cmd

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Product Nomenclature	Mod III	Mod 4	Price S&H
AFM: Auto File Manager data base	P-50-310	n/a	\$49.95 D
BackRest for hard drives	P-12-244	P-12-244	\$34.95
BASIC/S Compiler System	P-20-010	n/a	\$29.95 B
BSORT / BSORT4	L-32-200	L-32-210	\$14.95
CON80Z / PRO-CON80Z.	M-30-033	M-31-033	\$19.95
diskDISK / LS-diskDISK	L-35-211	L-35-212	\$29.95
DISK NOTES from TMQ (per issue)			\$10.00
DoubleDuty		M-02-231	\$49.95
DSM51 / DSM4	L-35-204	L-35-205	\$49.95
DSMBLR / PRO-DUCE	M-30-053	M-31-053	\$29.95
EDAS / PRO-CREATE	M-20-082	M-21-082	\$44.95 D
EnhComp / PRO-EnhComp	M-20-072	M-21-072	\$59.95 D
Filters: Combined I & II	L-32-053	n/a	\$19.95
GO:Maintenance	n/a	M-33-100	\$49.95 B
GO:System Enhancement	n/a	M-33-200	\$49.95 B
GO:Utility	n/a	M-33-300	\$49.95 B
Hardware Interface Kit	n/a	M-12-110	\$24.95
HartFORTH/PRO-HartFORTH	M-20-071	M-21-071	\$49.95 B
LB Maintenance Utility-M4	n/a	L-50-515	\$19.95
LDOS 5.1.4 User Manual	L-40-020	n/a	\$15.00 D
LDOS 5.3 Mod3 Upgrade Kit	M-10-033	same	\$34.95
LED / LS-LED	L-30-020	L-30-021	\$19.95
Little Brother-M4 (Ver 1.0)	n/a	L-50-510	\$74.95 D
LS-DOS 6.3.1 Upgrade Kit - M4	n/a	M-11-043	\$39.95
LS-DOS 6.3.1 Diskette - M4	n/a	M-11-243	\$15.00
LS-DOS 6.3.1 Upgrade kit - M2/12/16		M-11-002	\$39.95 B
LS-Host/Term	n/a	L-35-281	\$39.95
LS-UTILITY	n/a	L-32-150	\$24.95
MC / PRO-MC	M-20-064	M-21-064	\$79.95 D
Mister ED	n/a	M-51-028	\$39.95 B
MRAS / PRO-MRAS	M-20-083	M-21-083	\$59.95 D
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PowerDraw	P-32-220	n/a	\$19.95
PowerDriver Plus (Epson).	P-50-200	P-50-200	\$17.95
PowerMail Plus	P-50-003	P-50-004	\$39.95 D
PowerMail Plus TextMerge	P-50-100	P-50-100	\$15.00
PowerScript	P-50-142	P-50-142	\$24.95
PRO-WAM	n/a	M-51-025	\$74.95 D
PRO-WAM Toolkit	n/a	M-51-225	\$29.95
Programmer's Guide DOS 6.	n/a	M-60-060	\$20.00 B
QuizMaster	L-51-500	n/a	\$19.95
RATFOR-M4		M-21-073	\$59.95 D
RSHARD - R/S HD driver	M-12-013	same	\$29.95
ST80-III	P-35-300	n/a	\$39.95
SuperUtilityPlus	P-32-132	P-32-104	\$44.95 D
SuperUtilityPlus CMD file diskette	P-32-832	P-32-804	\$20.00
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THE SOURCE 3-Volume Set	n/a	L-60-020	\$40.00 D
Toolbox/Toolbelt	P-32-203	P-32-245	\$24.95
UNREL-T80	same	M-30-054	\$29.95
UTILITY-I	L-32-070	n/a	\$19.95

TRS-80 Game Programs

Bouncezoids (M3)	M-55-GCB	\$14.95
Crazy Painter (M3)	M-55-GCP	\$14.95
Frogger (M3)	M-55-GCF	\$14.95
Kim Watt's Hits (M3)	P-55-GKW	\$9.95
Lair of the Dragon (M3/M4)	M-55-021	\$19.95
Lance Miklus' Hits (M3)	P-55-GLM	\$19.95
Leo Cristopherson's (M3)	P-55-GLC	\$14.95
Scarfman (M3)	M-55-GCS	\$14.95
Space Castle (M3)	M-55-GCC	\$14.95

Hardware

TeleTrends TT512P modem (M4P)	H-4P-512	\$74.95	E
XLR8er e/w 256K RAM (M4)	R-MB-004	\$182.00	F
Floppy drives (5.25" 360K 1/2 ht)	H-FD-360	\$75.00	D
Floppy drives (3.5" 720K 1/2 ht)	H-FD-720	\$85.00	B
Floppy Drive Case (2-1/2 ht drives)	H-FD-2SV	\$60.00	F
Hard drive kit e/w clock, 20Meg M3/M4	H-HD-020	\$475.00	?
Hard drive kit e/w clock, 40Meg M3/M4	H-HD-040	\$595.00	?
Hard drive joystick port option	H-HD-JSO	\$20.00	
Hard drive: Kalok KL320	R-HD-020	\$200.00	F
Hard drive: Seagate ST251-1	R-HD-040	\$320.00	F
Hard drive: Seagate ST157A (16B IDE)	R-HD-A40	\$320.00	F
Hard drive: Seagate ST-157N (SCSI)	R-HD-S40	\$350.00	F
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