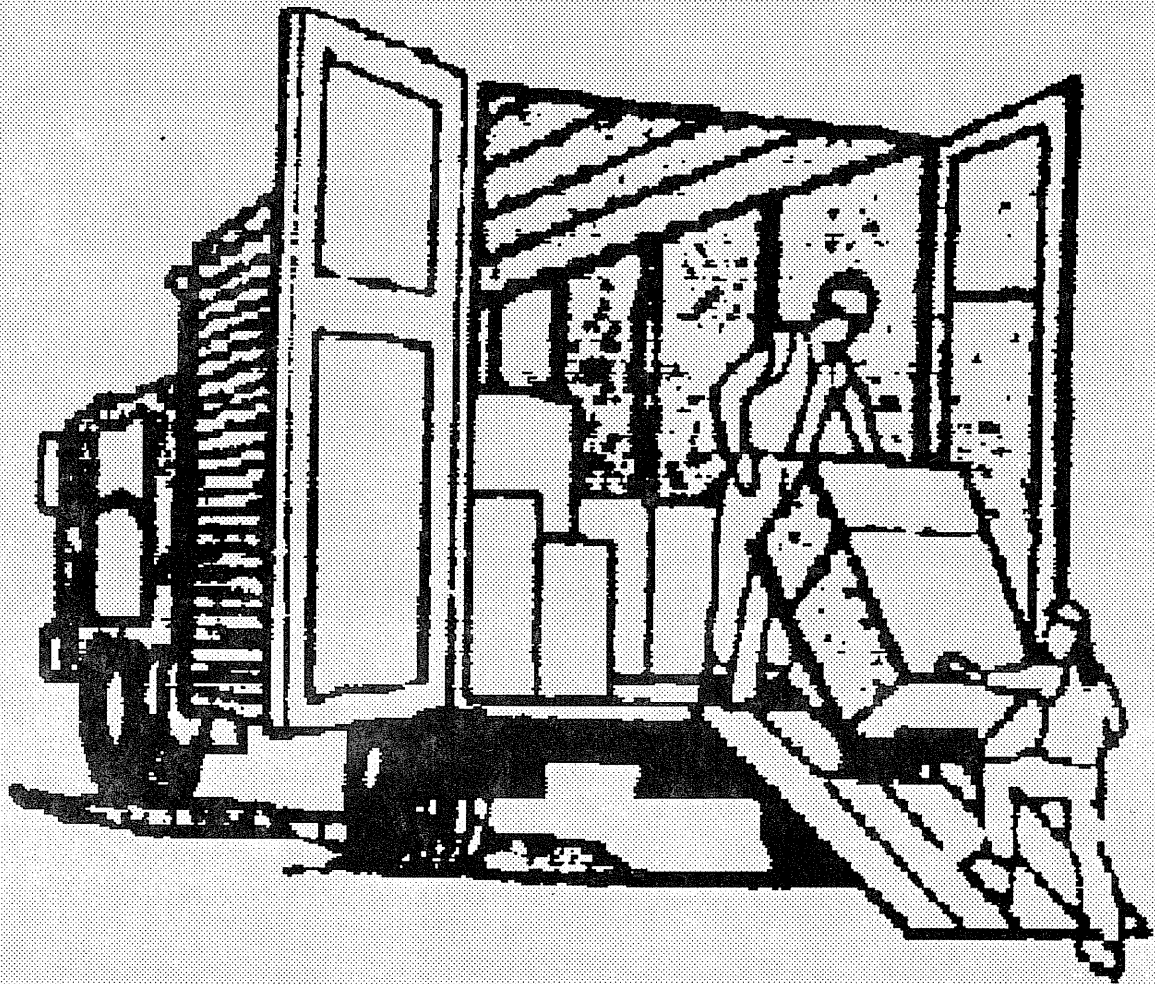


# TRSTimes

Volume 3. No. 4. - Jul/Aug 1990 - \$4.00



**MOVING DAY FOR TRSTimes**  
see inside for information

# LITTLE ORPHAN EIGHTY



The big news here at TRSTimes is that we've moved. What was a small office to start with, eventually became so crowded with computers, printers, disks, manuals, manuscript submissions, programs in various stages of progress, letters, and all the other good stuff that goes along with publishing a TRS-80 magazine, that I was constantly moving one pile of junk on top of another to get to the immediate work at hand. It was

getting more and more difficult to get anything done at all. Finally, it got to me - I just couldn't stand it any longer, so we started looking around for larger quarters.

For those of you living in other parts of the country, let me tell you that Southern California is a VERY expensive area to live; rent, as well as everything else, is sky high. I have often said that the only way anyone can afford to live here is to deal drugs or to knock over 7-11's on a regular basis (just kiddin' folks...).

Anyway, after looking for several months, we finally succeeded in finding just the right place - and at a good price. June 1 began the move and, though the city is different and the zip code may seem to be on the other side of California, the new place is only about 5 miles west of our old offices.

Being somewhat cheap, I decided to do everything myself (count wife and kids as unpaid labor); the result being that the move has now taken in excess of two weeks and my new office is even more cluttered than before; pictures, books, disk drives, tape recorders, monitors and other essential stuff are on the floor, stacked up against the walls, waiting for additional book cases and desks. It will get better - I'm told!

**Our new address is:  
TRSTimes magazine  
5721 Topanga Canyon Blvd. #4  
Woodland Hills, CA 91367  
(818) 716-7154**

Eric Bagai, a frequent contributor to these pages, has written a book about our favorite computer. He calls it: WHAT I DID WITH MY TRASH - ten years with a TRS-80. It is a collection of highly amusing and relevant essays. Eric, in his normal tongue-in-cheek manner, writes about everything from fictitious programming languages to building hackers. In between, he gives great advice on how to start (and keep) a users group, how to sell unwanted computers, power commands for Scripsit users, explains why SuperScripsit crashes files and more. My

personal favorite is an ad for 'FLOPPY POCKETS'. I think this fictitious product is a good idea.

WHAT I DID WITH MY TRASH is 76 pages and produced entirely using TRS-80 hardware and software. It is fun reading and deserves a place in every TRS-80 lovers collection. The book is \$5.95 and is available from: Flaming Arrow Press, Box 9747, North Hollywood, CA 91609.

It has been said that the Model 4 was not made for games. Further, our critics would have us believe that the computer user of today is not interested in games. Well, I believe them to be wrong on both counts.

First, when equipped with a high resolution graphics board, the Model 4 is as capable as most of the high priced machines, as anyone having seen Frank Slinkman's fine hi-res games will attest to.

Second, if the TRSTimes mail is any indication, Model 4 owners enjoy games as much as Model I and III users ever did. The problem, of course, is that not much gaming software has been written to run in Model 4's native mode.

As my Model 4's are not equipped with a hi-rez boards, I'll have to leave the 'fun-programming' for that medium to Frank and other capable people. However, since I have always enjoyed writing games, especially the ones of the puzzle genre, this issue will feature a program of just this variety for the Model 4, without the hi-rez board. If you have ever played Chess, you just might enjoy the challenge of QUEEN4.

As an aside, Tim Sewell just handed me issue 30 of TRSLINK. This particular issue of the great TRS-80 disk magazine featured a beautifully written Model 4 version of the Russian game: TETRIS. It is available commercially for all the latest computers, as well as Nintendo and Game-Boy. Believe me, the TRS-80 version is every bit as good as the commercial IBM version - and ours came free with TRSLINK. A big thank you to the author, David Arcand. Just another example of the potential of the TRS-80.

Before I close this column, I would like to thank the people who contributed material to this issue of TRSTimes. Roy Beck, who can write interesting things about almost any subject at a moments notice, delivered the M.A.D. software review, as well as telling us about hard disk essentials. Allen Jacobs reviewed the new TRS-80 book from Eric Bagai. Carol Welcomb, our lady hacker, explains how she added one meg of memory in her 4P. Being somewhat hesitant to lift a screwdriver, I should take hardware lessons from her. Alfred Airone translated Robert Doerr's CHAOS/BAS to run on Model I and III. He also brings us two hi-rez versions of CHAOS. Jim King fixes SHELL 2.0 to work with LS-DOS 6.3.1. Dennis Burkholz converted a PC program to our computers, and inspired the idea for the second TRSTimes contest. Thanks to all - and now, welcome to.....TRSTimes 3.4

# TRSTimes magazine

Volume 3. No. 4. - Jul/Aug 1990

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Article submissions from our 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 format is used. Also, please make sure that your name and address is written legibly on both hardcopy and disk label.

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# THE MAIL ROOM



## CONTOUR

Glad to see that you were able to fit my CONTOUR program into your May/June 1990 issue of TRSTimes. However, there was one little problem: In glancing through the program listing, I noticed that occasionally the less-than '<' and greater-than '>' symbols were missing. I found this in three different program lines:

Line 80 should end with:

```
ELSE IF A$ < > "M" GOTO 70
```

Line 230 should read:

```
IF LM < 0 OR LM > 900 GOTO 210
```

Line 1060 should end with:

```
:IF K < 0 GOSUB 1330
```

While a good programmer could probably catch and correct these typos, someone just keying in the program as written would end up with a non-working program.

Delmer D. Hinrichs  
Washougal, WA

*I extend my apologies to Mr. Hinrichs and the readers. Once again the '<>' gremlin got me. As mentioned before, the less-than and greater-than symbols are unfortunately used as format characters in Ventura Publishing. I have tried several ways of battling this problem and I thought I had it solved. I used LeScript to mark all occurrences of these characters, and then used the printout to change the lines manually once the text had been transferred to Ventura. I'm sure LeScript marked them correctly and I just missed them. Back to the drawing board.*

Ed.

## THE MUMFORD MICRO SPEED-UP BOARD

I have been an avid reader of your magazine ever since it came out & am very glad that support for the earlier machines still exists, at least in the 'States'. In this country our User Group is the only support there is for anything but the latest MS-DOS Tandy machine.

I am still using (amongst others), a much modified Model I that I bought back in April 1978. One of the modifications that I have is the Mumford Micro speed-up

board, bought in June '83. I don't know if that firm still exists, their address was: MUMFORD MICRO SYSTEMS, BOX 400, SUMERLAND, CA 93067.

My problem is that while I was doing some work on my keyboard some of the speed-up board wires came adrift & I don't know where they go. I looked for my copy of the manual, but can't find it. I tried several connecting points without any success, so what I would like you to do for me, if it is possible, is to find out if anyone can give me the connecting points for the board, or tell me if the firm is still in business.

Hoping to hear from you at your earliest convenience,  
E.C. Kilpatrick  
3a Gainsborough Street  
Sudbury, Suffolk  
CO10 6ET England

*Mumford Micro Systems still exists at the above address. Their phone number is (805) 687-5116.*

*I called the number and ended up talking to Brian who, when asked about the speed-up board, laughed and said that he hadn't thought about that item for years. He probably could not be of much help, he said, but he certainly would look around - maybe something would turn up. Very disappointing!*

*However, just before this issue went to print, Brian called me back and said he had searched through the warehouse and found some documentation on the speed-up board, which he promised to send to TRSTimes.*

*I will forward whatever Brian sends to you whenever I receive it. Meanwhile, if anyone out there in Model I land can help, please contact Mr. Kilpatrick at the above address.*

Ed.

## CLAN REVISITED

My "Clan" program is on TRSDOS and, according to the banner, it is version 1.3 Wed July 1981. I need a date patch to extend the date acceptance. I had not felt that I needed to worry about it, but apparently the program uses the system date in some of the error trapping routines, and now I am unable to make some record entries with 1988 dates.

Jim Savage  
Clinton, MS

*As I do not have the CLAN program, I am not able to give you a specific fix. However, I can tell you this: if CLAN refuses to accept dates after 12/31/87, the problem is not with TRSDOS 1.3. This DOS will accept any date until the very end of time. The problem must lie in the error routines themselves. If I am not mistaken, this program is written in Basic, so it should not be overly difficult to trace the program flow to where it asks for the date. At this point, check if the routine limits the date input. If so, change it*

to fit your needs.

*Should you have problems finding the bug(s), send me a printout of the particular module and I will do what I can (time permitting).*

Ed.

---

## MORE FROM ENGLAND

I am one of those people who must see inside any piece of equipment as soon as the guarantee is over, and I enjoy being able to tinker (successfully, I might add), so as soon as I got hold of a 4P, I had the lid off to see how to put double sided drives in, and like you, I was scratching my head until I found the two screws holding the handle.

I also discovered the need for what we call screw holders for inserting screws in awkward places. I dropped one screw into the works of one of the drives and spent a long time retrieving it, and so resorted to plasticine to hold the screw. Having a birthday a few days later, I was presented with a set of proper screw holders, so the next foray into the interior will not be so hazardous.

One of our members (NATGUG), a lady, uses a Model 3 to produce a translation of the bible in Persian - in BRAILLE!!! She works for a Missionary Society and works at home (well, near her home, using a friends spare room). She learned Basic at night school and wrote a word processor specifically for her type of work. She has a printer from her serial port, and the Braille Embossor from the Serial (RS232) port.

She brought some of her work to show us at Swindon a few weeks ago. We were suitably impressed, and one of our members is tidying up her program from her. I am hoping to persuade her to write an article about her work, unfortunately she is very dedicated and spends all her spare time in other good works, but I will try to get her interested. I was prompted when I read Carol Welcomb's interesting article in this latest TRSTimes.

Tom Ridge  
Surrey, England

*She sounds like a dynamite lady. TRSTimes would be VERY interested in hearing about her work. Make use of your persuasive powers, Tom!*

Ed.

---

## OTHER COMPUTERS

I have owned a Model 4 for years, but I have recently acquired a Radio Shack Pocket Computer and a Color Computer 3. Will there be coverage of these in future issues of TRSTimes?

Jack Carlson  
Louisville, KY

*I think we can safely rule out any coverage for the Pocket Computers. I do not own one, nor do I plan to get*

*one (well, maybe, if it's REAL cheap!!)*

The same answer goes out to the few who have asked about coverage for the Model II family of computers. If I don't own a particular machine, I have no way of producing material, nor can I check submissions. Thus, no coverage.

On the other hand, I do own a CoCo3 (...and a CoCo2 and an original CoCo with a chiclet keyboard...), but I really do not feel there is much sense in using up valuable Mod I, III & 4 TRSTimes page space on a machine that has had its own monthly magazine for years, the Rainbow, a fine publication which, incidentally, is published down in your neck of the woods. Besides, the CoCo is not a true TRS-80. It uses a 6809 chip, rather than our beloved Z-80 (don't scream!!)

But, as we do have many subscribers who also own CoCos, I will concede to this: Should I ever come across CoCo material which is of relevance to Mod I, III or 4, I will consider publishing it - but it must be of interest to the mainstay of our readers and, in the case of a program listing, it must be directly translatable to the Mod I, III or 4. No Assembly language programs - I really do not want to sweat over 6809 to Z-80 translations.

*This is also the policy on the Model 100.*

While I am at it, I might as well respond to the readers who would like more CP/M coverage. We will still cover CP/M, and we are waiting for YOUR articles.

Ed.

### TRS-80 NOSTALGIA?

Thinking guilty little thoughts  
about getting a 386?

Then you need:

### WHAT I DID WITH MY TRASH

(Ten years with a TRS-80)

A new book by Eric Bagai, bound in mercedes silver and filled with essays, parodies, weird rumors, mythic hacks, and genuine TRS-graphics. The way it was when love was a warm Z80—the way it should have been. Send \$5.95 (non-US: \$6.95) now to Flaming Sparrow Press, Box 9747, North Hollywood CA 91609. Add five cents for autograph.

Order yours today!

See? You're feeling better already..

# M.A.D. Software, Anyone?

By Roy T. Beck

Recently I received an advertisement from M.A.D. Software. After I stopped laughing over the company name, and noted they didn't choose D.A.M. as the sequence, I began to read their brochure carefully. They are offering a number of items related to the continued good health of our favorite machines, the Mod 3 and the Mod 4 family. Included are some items like spare ROM's, PAL chips, etc.

## AUTOBOOT YOUR HD

The item of greatest interest to me was the announcement of a new program, HBUILD6, to allow autobooting of the 4, 4D or 4P when using TRSDOS 6.3 and a hard drive together. As you probably know, RS has never done anything about autobooting from the HD. The 4P ROM has code for that purpose, but neither MISOSYS nor RS has made any serious effort to allow us to use that capability. PowerSoft once had hard disk drivers that would work with some version of TRSDOS 6.X, but later versions (6.2?) of the DOS destroyed that capability. Further, the MOD 4 and 4D ROM's do not even contain the autoboot code.

M.A.D. has recognized the desirability of this feature, and is offering packages to enable the autoboot feature. They offer the necessary software (HBUILD6) which modifies BOOT/SYS and SYS0/SYS. Since the 4P needs only the patching program, it is the easiest and least expensive way to go. They also offer new ROM's for the 4 and 4D which are required to go with the patch code. Of course this requires opening up of the machine to install the new ROM's.

## REQUIREMENTS

What do you need to implement this improvement?

- A Model 4, 4P or 4D with Z-80 or HD64180 CPU.
- A RS 5, 10, 12, 15, 20, or 35 Meg Hard Drive.
- A RS Hard disk controller board by Western Digital.
- A RS hard disk driver (TRSHD6) or MISOSYS hard disk driver (RSHARD6).
- TRSDOS 6.X or LS-DOS 6.3.X. (But see below).

Actually, there may be some workalike software and hardware around, but this is the officially supported list. If you have something which may be compatible, send a letter and SASE to M.A.D., explaining what you have, and they will comment. If you can obtain a RS Cat. No. 26-1138 hard disk controller, you can combine it with any bubble with an ST-506 interface. There are also some host adapters around which emulate the RS unit, and these plus a generic WD-1000 HDC MAY work. (No promises here,

check with M.A.D.). As for drivers which may work, I know nothing here, but clever hackers can do a little thinking.

## THE GOTCHA'S

Will this new autoboot ROM and patch allow everyone to autoboot? Sadly, no. There is a large amount of code and hardware which all must be compatible for autobooting to work. This includes the ROM, the ports used by the host adapter, the hard disk controller instruction set, BOOT/SYS, SYS0/SYS and the hard disk driver. Other factors are that the boot code has to be in a prescribed sector and head on the hard disk. Mod 3's and the Mod 3 mode of Mod 4's are excluded. HD's with controllers by Xebec, or any SASI/SCSI board or anything else which does not match the ports and code of the RS 5 Meg family of drives are all excluded. Also, Kim Watt's drivers formerly sold through PowerSoft will not work. (I tried). Some early production (1983) Mod 4's used an A ROM which is not compatible with autobooting. M.A.D. Software also offers the correct ROM to replace this early ROM for an additional \$8. Most Mod 4's and all 4D's already have the late model A ROM.

## THE AUTHOR

The author of this nice package appears to be Frank Durda IV, one of the members of the M.A.D. group. All of you Model 4P owners are already familiar with Frank's work. Why? Because he wrote the ROM in the 4P. Anybody who bothers to explore the 4P ROM will find Frank's initials embedded therein. What do you think the puzzling "fdiv", stands for? You got it! (Long ago JBO, of Northern Bytes fame and now Software Wizard of Montezuma Micro, wrote an article about that ROM, but even he guessed wrong about the meaning of fdiv)!

Knowing the original author of the 4P ROM is now the author of the autoboot code inspires confidence in me that he knows what he is doing! However, I have to report here that I did have some trouble. In fairness to Frank, he was inadvertently crossed up by our old friend Roy Soltoff.

## UNDOCUMENTED FEATURES

What happened is that Frank wrote the autoboot code some time ago. The code bears copyright dates of 1984 and 1986. Since then, Soltoff has purchased LSDOS 6.3, lock, stock and barrel, and when Roy updated 6.3.0 to 6.3.1, he changed all the system file passwords from the old .LSIDOS to .SYSTEM6. This removed the commercialism apparent in the old passwords, but had the side effect of interfering with Frank Durda's code! Frank's code accesses BOOT/SYS.LSIDOS and SYS0/SYS.LSIDOS. I tripped over this because I updated to 6.3.1 before I installed the new autoboot code. The autoboot code then would not work.

Being a hacker, I did a little head-scratching and investigating. A quick test shows that the password bytes for .LSIDOS are F637 and those for .SYSTEM6 are F471. Also, I noted that under 6.3.1, BOOT/SYS and DIR/SYS still have the old password of .LSIDOS, but SYS0/SYS and all the



other numbered SYS files have .SYSTEM6 as their password. Interesting. Looks like the easiest thing to do is to patch the password bytes of the SYS0/SYS entry on the system drive to F637, as expected by HBUILD6, and go from there. After installation of the autoboot code, I probably will change the SYS0/SYS password bytes back to F471 so as to leave no booby trap behind for me to fall into at a later date.

Success, my 35 Meg HD now autoboots! Just turn on the power and let it go. You don't have to hit F1, or ENTER, or anything. (It does speed up booting if you hit the ENTER key after powerup, as otherwise you must wait for timeout of a software loop of about 3 seconds duration in the ROM).

After conversion, the machine will still boot from a floppy in order to run CP/M, LDOS, etc. Just push F2 immediately after the RESET, and it will then boot from the floppy, just as it does now.

I did find one "undocumented feature", so far. After installing the autoboot, I tried to enable another logical drive. No soap. I had to uninstall the autoboot feature, (which is easy to do), enable the additional logical drives, SYSGEN, and then reinstall the autoboot. That worked OK, and I now have 4 floppies and 4 HD partitions auto booting. But one should not have to uninstall the autoboot in order to enable or disable drives. I have written to Frank about this, hoping he can offer an easy fix. The uninstallation routine was merely to insert the floppy boot disk in drive :4 and issue the command:

**BACKUP SYS0/SYS.SYSTEM6 SYS0/SYS.LSIDOS**

Leave BOOT/SYS as is. Now reconfigure the floppies as desired, SYSGEN :4 and run HBUILD6 again. This will allow you to change your system configuration, but I believe there should be a simpler method. Wait and see what Frank says in reply to my letter.

### THE COST

The price of the software, which is all you need for a 4P, is \$10; the new ROM for the 4 is \$10 and the one for the 4D is \$20. Be sure you order the correct ROM for your machine. Note! Installing DS drives in a Mod 4 does NOT make it a 4D as far as the ROM swap goes! M.A.D. also has ROM versions to work with XLR8ers; the new ROMs also improve Mod 3 mode operation of the Mod 4 and 4D, but there is no autoboot in the Mod 3 mode. The address is: M.A.D. Software, Box 331323, Ft. Worth, TX 76163

### HOW DOES IT WORK?

Some of you may want to know how Frank's program accomplishes its task of autobooting. I have not studied the code, so I cannot give any definitive analysis. Instead, I will ramble and philosophize a little. We all know, of course, that the BOOT ROM is the first code that gets executed upon powerup, and therefore there has to be some portion of the AUTOBOOT logic in the ROM. The 4P has a little bit of code in it which accesses the hard disk, first drive, first head, first sector. The code in that first

sector, in turn, has to have the smarts to proceed with the autoboot routine. But we know the code in that first sector is the BOOT/SYS file of the DOS, and as written by MISOSYS, there is no HD AUTOBOOT function in there. In fact, when booting the HD with a floppy boot disk, only the BOOT/SYS on the floppy is executed. The one on the HD is never used.

Another thing to remember is that the BOOT/SYS file is really a loader program to bring in other system files until the system can stand and run on its own two feet. I'm not an expert here, but I believe SYS0/SYS must be resident and executing for the machine to run without the BOOT/SYS file. If I am correct in this, then the autoboot function is partially in the ROM, partially in the BOOT/SYS on the HD, and partially in the SYS0/SYS file. I include the SYS0/SYS file for two reasons. One is that it has to know to access the HD for the other system files, and secondly I know that Frank accesses the SYS0/SYS file in his installation process, as mentioned above. Evidently, Frank modifies both the BOOT/SYS and SYS0/SYS files on the HD during the process of installation. Another item to take into account is the need for a CONFIG/SYS file which is always on the bootup floppy when a floppy is used. With autoboot, this file, which is created by SYSGEN, also has to be available on the hard drive, accessible by the autoboot function. HBUILD6 moves a copy of CONFIG/SYS from the floppy to the hard disk in the process of installing the autoboot.

### REQUIRED MOD 4 CHANGES

The 4 and 4D require new ROM's incorporating autoboot code equivalent to that in the 4P so the 4 and 4D will know to attempt access of a HD. As originally coded, the 4 and 4D ROM's know nothing about HDs and therefore never attempt to access one on the machine. Because the 4D ROM has some extra space available, Frank has written some new test code for the 4D. Unfortunately, it is not normally available under software control. You must open up the machine and shift a jumper in order to access this additional code, and you must restore the jumper to its normal position before the machine will run normally again. However, it's there for your use if you update your 4D ROM.

As I mentioned before, changing drives from SS to DS does not make a 4 into a 4D, because there are fundamental differences in the ROM's and boards of the two machines. The 4 does not have space for the additional code, therefore Frank cannot shoe horn it into a Mod 4. Due to some timing differences, he also has different ROMs for machines equipped with XLR8ers. I am not that familiar with these, either, but the differences are real and Frank has provided for them.

### CONCLUSION

In my opinion, this is a very desirable addition to our Mod 4 family of machines, and the price is right, too, especially for 4P owners. I recommend it highly.

-Roy-

# LEAGUE SCHEDULER

for Model I/III & 4 - printer

By Lance Wolstrup

Some years ago, when my oldest son, Alan, was playing little-league baseball, I inadvertently ended up being the league secretary. When the time came to volunteer, the other parents ducked very low in their seats and, by continuing to sit upright, I was IT - by default. Well, fair enough!

The week after this grand election victory, I met with the previous secretary. She explained that while most of the work was relatively easy, it was extremely time consuming. The difficult area of the job, she continued, would be the scheduling of the individual leagues. I should allow myself plenty of time for this 'monumental' task.

She showed me the forms that had been handed down from past secretaries to the next, giving the basic outline of how to match up teams in a round-robin league. They were, at best, awkward, so I grinned and told her not to worry: I was not going to have problems with the scheduling. She obviously didn't believe me, because she continued to explain how and where to cross off the forms as teams were being paired.

After politely listening to this for about 10 minutes, I just couldn't help myself. I asked her what the largest league they were able to schedule would be. She answered that the forms went "all the way up to 10 teams". "Great", I said, "what happens if a league has 12 teams?"

She didn't know. "Well, I do", I told her, "as a matter of fact, I can schedule a round-robin league of ANY size - WITHOUT forms."

I pushed the stacks of paper aside, grabbed a pencil and a fresh sheet of writing paper, and scheduled a 14-team league. It took a little better than two minutes.

She was either miffed or relieved... to this day I am not sure which.

To make a long story short, I realized that I would have a lot of paperwork. I have always had a natural aversion to this, so I ended up writing a series of TRS-80 programs to take care of all the tedious details.

This article will not bore you with the complete set of programs, as I feel that the appeal would be somewhat limited. It will instead concentrate on the one module that handles the scheduling of the league.

SCHEDUL/BAS (see program listing) will schedule a complete round-robin league consisting of anywhere from 4 to 22 teams. It is not limited to baseball only. It can be used for soccer, tennis, ping-pong, hockey, basketball or, for that matter, any type of event where each team or individual is paired against each of the other teams or individuals on a game by game basis.

To digress a moment, just how could I schedule a 14 team league in a very short period of time? Because I knew the algorithm!

Yes, no matter the size of the league, a round-robin schedule follows a distinct pattern. If you know it, you can schedule leagues with any number of teams. It is actually fairly simple. Let us establish the ground rules for matching up teams in this type of league.

- The term 'round-robin' means that each team meets each of the other teams once. Thus, if you have 'T' number of teams, each team would then play 'T-1' games ('T-1' because you cannot play against yourself.)
- A 'round-robin' league must always have an even number of teams. If you have an odd number of actual teams, you must add a 'dummy' team (called **\*\*BYE\*\*** or **\*\*IDLE\*\***, or any other appropriate name indicating that the opponent is not scheduled.)
- To be fair, each team should have as many home games as away games. This is only possible when the actual number of teams in the league is odd. If the number of teams is even, half the teams should play one more home game than away, while the other half of the teams should play one more away game than at home.

Now let's get on with the actual scheduling. Rather than crossing out team pairings on forms, we will schedule the first round of, for example, an 8-team league. This would be:

1-2

3-4

5-6

7-8

As you can see, the first round is not difficult. For leagues consisting of more than 8 teams, simply pair them in numerical order. Of course, the difficulty begins with the second round, and increases proportionally with each round - unless you know the algorithm.

We will consider the team listed to the left as being the home teams, and the team listed to the right as being the visitors. Therefore, in the above, team 1,3,5 & 7 play at home, while 2,4,6 & 8 play away.

**RULE #1:** Team #1 will ALWAYS be scheduled as part of the first game in a round. If it played at home in the previous round (listed to the left), it must then play away



in the current round (listed to the right). Team #1 will ALWAYS play the team that played away in the last game of the preceding round. Thus, the second round begins with: **8-1**

**RULE #2:** The team that played away in next to the last game of the previous round will now play at home in the current round against the team that played away in the last game of the previous round: **6-7**

Moving from the bottom going up, rule #2 holds until you get to the first game of the previous round. So far we have:

8-1  
6-7  
4-5

If the round is even (it is the second round, so it is even) rule #2 continues. The last game is therefore: **2-3**

The second round now looks like this:

**8-1**  
**6-7**  
**4-5**  
**2-3**

The third round (an odd round) moves team #1 back to playing at home against the team playing away in the last game of the previous round: **1-3** (rule #1)

Following rule #2 for the remaining teams, we get:

5-2  
7-4

**RULE #3:** Odd rounds treat the last game differently. Here the home teams of the previous round (the team that played team #1) will play at home against the team listed directly below in the previous round: **8-6**

Round 3 looks like this:

**1-3**  
**5-2**  
**7-4**  
**8-6**

Applying the rules for even rounds, round 4 will be:

**6-1**  
**4-8**  
**2-7**  
**3-5**

Applying the rules for odd rounds, round 5 will be:

**1-5**  
**7-3**  
**8-2**  
**6-4**

Round 6 is:

**4-1**  
**2-6**  
**3-8**  
**5-7**

Round 7 (the final round) is:

**1-7**  
**8-5**  
**6-3**  
**4-2**

This movement will hold true for any number of teams. The reason the last game of odd and even rounds are treated differently should not be difficult to understand; it is because team #1 plays at home during odd rounds, and away during even rounds.

Now that we have a concept of the scheduling algorithm, let's see just how SCHEDUL/BAS works.

After RUNNING the program from Basic, you will be asked how many teams you wish to schedule. You may type any number from 4 to 22 inclusive, and then press <ENTER>. Should you wish to exit the program at this point, don't type anything, just press <ENTER> and you will be returned to the Basic Ready prompt.

Typing a number in the range 4-22 allows you to type in the names of the teams. You may use up to 20 characters for each team name. While typing a team name you may use the <LEFT ARROW> key to delete mistyped characters to the left of the cursor. When satisfied that the team name is correct, press <ENTER> and the cursor moves to the entry for the next team name.

When all teams have been named we enter the 'edit' mode. You will be prompted to type 0 if you are satisfied with the names. If not, you can now retype any or all names, simply by typing the number associated with the team. The edit prompt returns after each edit, and continues until the 0 key is pressed.

Pressing the 0 key, followed by <ENTER> presents the next prompt, which asks for the name of the league. The league name can be up to 40 characters.

Typing the appropriate league name, followed by <ENTER>, brings us to the menu. Here we have a choice of pressing <C> to create a new league, <P> to print the schedule of the current league, or <Q> to quit and return to the Basic Ready prompt.

Pressing <P> <ENTER> brings you back to the initial prompt of 'how many teams you wish to schedule'.

Pressing <P> <ENTER> sends the current league schedule to the printer. Make sure the printer is ready before executing this command. When the schedule has been printed, you are returned to the menu where you can print another copy, schedule another league, or quit.

Pressing <Q> <ENTER> erases the screen and ends the program.

Happy scheduling!

# SCHEDUL/BAS

for Model I/III & 4 - printer

```

0 'SCHEDUL/BAS
1 '(c) 1990 Lance Wolstrup
2 'schedules any round robin league from 4 to 22 teams
3 '
4 '
5 IF PEEK(42) = 64 THEN CLEAR 5000:SW = 64
ELSE PRINT CHR$(15);:SW = 80
10 MX = 22:DIM T$(MX),P1(MX),P2(MX)
11 GOTO 100
19 'subroutines
20 H = 0:GOTO 23
21 H = INT((SW-LEN(A$))/2):GOTO 23
22 H = SW-LEN(A$)
23 PRINT@V*SW + H,A$;:RETURN
29 '
30 A$ = "":CU = 0:PRINT CHR$(14);
31 I$ = INKEY$:IF I$ = "" THEN 31
32 IF I$ = CHR$(13) THEN PRINT CHR$(15);:RETURN
33 IF I$ = CHR$(8) THEN IF CU = 0 THEN 31
ELSE PRINT@V*SW + H,I$;:H = H-1:CU = CU-1:
A$ = LEFT$(A$,CU):GOTO 31
34 IF I$ < CHR$(32) THEN 31
35 IF CU = L THEN 31
36 PRINT@V*SW + H,I$;:A$ = A$ + I$:
H = H + 1:CU = CU + 1:GOTO 31
39 '
40 FOR X = 1 TO T STEP 2:
LPRINT TAB(5) T$(P1(X));TAB(TL + 7)"- ";T$(P1(X + 1));
LC = LC + 1:NEXT:LPRINT:LC = LC + 1:RETURN
49 '
50 PG = PG + 1:LPRINT:LPRINT:
LPRINT TAB(5)N$;TAB(67)"Page ";PG:
LPRINT:LPRINT:LC = 6:RETURN
59 '
60 FOR Z = LC TO 66:LPRINT:NEXT:RETURN
99 'main body of program
100 CLS
110 V = 0:A$ = "TRSTimes presents:":GOSUB 20:
A$ = "LEAGUE SCHEDULER":GOSUB 21:
A$ = "(c) Lance Wolstrup":GOSUB 22:
V = 1:A$ = STRING$(SW,131):GOSUB 20
120 V = 3:A$ = CHR$(31):GOSUB 20:
A$ = "How many teams do you wish to schedule (4-22) ":
GOSUB 20:H = LEN(A$):H1 = H
130 H = H1:A$ = CHR$(30):GOSUB 23:L = 2:GOSUB 30:
T = VAL(A$):IF A$ = "" THEN CLS:END
ELSE IF T < 4 OR T > 22 THEN 130
ELSE A$ = CHR$(31):GOSUB 20:
V = 0:A$ = STRING$(18,32):GOSUB 20:
A$ = "Enter team names":GOSUB 20
150 FOR X = 1 TO T:IF X > 11 THEN V = X-9:H = SW/2
ELSE V = X+2:H = 0
160 PRINT@V*SW + H,USING"##";X;:PRINT" ";:NEXT

```

```

170 L = 20:FOR X = 1 TO T:IF X > 11 THEN V = X-9:
H = SW/2 + 4 ELSE V = X+2:H = 4
180 A$ = "":GOSUB 23:GOSUB 30:T$(X) = A$:NEXT
185 V = 0:A$ = STRING$(18,32):GOSUB 20:
A$ = "Edit team names":GOSUB 20
187 V = 15:A$ = CHR$(30):GOSUB 20
190 A$ = "Press number of the team to edit, or press 0
when correct":GOSUB 21
200 L = 2:H = INT((SW-LEN(A$))/2) + LEN(A$) + 1:
A$ = CHR$(30):GOSUB 23:GOSUB 30
205 IF A$ = "" THEN 190 ELSE F = 0:
FOR X = 1 TO LEN(A$):A = ASC(MID$(A$,X,1)):
IF A < 48 OR A > 57 THEN F = 1
210 NEXT:IF F THEN 190
220 IF A$ = "0" OR A$ = "00" THEN 260
230 A = VAL(A$):A$ = CHR$(30):GOSUB 20:
A$ = STRING$(20,32)
240 IF A > 11 THEN V = A-9:H = SW/2 + 4
ELSE V = A+2:H = 4
250 GOSUB 23:A$ = "":GOSUB 23:L = 20:GOSUB 30:
T$(A) = A$:GOTO 187
260 V = 15:A$ = CHR$(30):GOSUB 20:
A$ = "Enter name of league: ":GOSUB 20:
H = H + LEN(A$):L = 40:GOSUB 30:N$ = A$
300 V = 0:A$ = STRING$(14,32):GOSUB 20:
A$ = "Print schedule":GOSUB 20
310 V = 15:A$ = CHR$(30):GOSUB 20
320 A$ = "C = Create new league, P = Print current
league, Q = Quit ":GOSUB 21:H = H + LEN(A$):H1 = H
330 H = H1:A$ = CHR$(30):GOSUB 23:GOSUB 30
340 IF A$ = "C" OR A$ = "c" THEN 120
ELSE IF A$ = "P" OR A$ = "p" THEN 400
ELSE IF A$ = "Q" OR A$ = "q" THEN CLS:END ELSE 330
400 A$ = CHR$(30):GOSUB 20
410 IF T/2 < > INT(T/2) THEN T = T + 1:T$(T) = "*****"
420 FOR X = 1 TO T:P1(X) = X:NEXT
430 TL = 0:FOR X = 1 TO T:L = LEN(T$(X)):
IF L > TL THEN TL = L
440 NEXT
500 PG = 0:GOSUB 50
510 GOSUB 40
520 FOR Y = 2 TO T-1
530 FOR X = 1 TO T:P2(X) = P1(X):NEXT
540 IF Y/2 < > INT(Y/2) THEN 600
550 P1(1) = P2(T):P1(2) = P2(1)
560 FOR X = 1 TO T-2 STEP 2
570 P1(X+2) = P2(T-X-1):P1(X+3) = P2(T-X)
580 NEXT
590 GOTO 650
600 P1(1) = P2(2):P1(2) = P2(T)
610 FOR X = 1 TO T-2 STEP 2
620 P1(X+2) = P2(T-X-1):P1(X+3) = P2(T-X)
630 NEXT
640 P1(T-1) = P2(1):P1(T) = P2(3)
650 GOSUB 40:IF LC = 52 THEN GOSUB 60:GOSUB 50
660 NEXT
670 GOTO 320

```

# The Trouble with Being Confident

## (or how to put One Meg in your Gate Array Model 4P)

By Carol L. Welcomb



I suppose that I ought to have been more skeptical about adding one-MEG of memory to my 4P. After all, I have a couple of them, so it came down to deciding which one made the task easier. One has a Radio Shack hi-res board, with a little extender cable (due to bad connectors in the 34-pin socket), while the other 4P has the Micro-Labs board. The Micro-Labs board is larger than the Radio Shack board, but I like the M-L board better.

Well, I decided to upgrade the 4P with the Radio Shack board, since I knew I already had it equipped with a cable extender. I had ordered chips (32-256k 100ns, from JDR Microdevices), plus the MEM board from ANITEK.

Now the fun began, I thought. A couple of hours of soldering, and I'd have this 4P EXACTLY the way I wanted it. Not quite true.

First, I own a non-gate Model 4 with the MEM board, and the one for the 4P has very stubborn Z-80 pins on its tall connector. It stands quite high on the PC board when you've inserted it, plus the board itself comes very close to the edge of the modem-hi-res slot edge. However, being aware of that made the reassembly a little more delicate.

The soldering of the piggy-backed 256k chips went fine. You only need to remember that pin #4 on all 16 of the top chips must be bent upward and NOT touching the bottom chip's pin #4. No big deal there....

Being a true cynic, I decided NOT to totally reassemble the computer, but rather put in a few screws on the metal housing and fire it up. - Garbage on the screen. Where was the garbage coming from? Well, I knew that you can hit the **RESET** and . keys at the same time to do a RAM check on a 4P. I did that and had errors all over the place. I began to get a little paranoid by this time, since I had carefully used electrical tape all over the metal housing where I suspected the stacked RAM chips could touch it.

I yanked the computer apart and looked (with a flashlight) to see how closely the chips in the ORIGINAL bank of memory were to the housing. Since the instructions for the MEM board said to bend the #4 pins up, I did that.

Rather than upward, however, it is a much better idea to bend them outward. It looks as if the #4 pins come very close to the chips they are next to, but it is FAR, FAR easier to solder the wire to the #4 pins when they are sideways. Just make sure that the #4 pins DO NOT TOUCH THE ADJOINING CHIPS!!!

The next part of this tale revolves around how to delicately place the hi-res board (with a 5 inch extender cable) on the left side of the MEM board. I found that placing the hi-res board too closely to the MEM board resulted in the hi-res board placing a slight pressure on the edge of the MEM board. This created a problem, so I resolved that by using the 2 screw holes on the PC board immediately to the upper left and lower left of the MEM board. This will allow your hi-res board to sit on the edge of the DB25 serial port, not affecting its use.

Of course, I have simplified this, as it was a process which kept me up very, very late one night and into the following day. I doubted my abilities to solder, and that's always scary. I believe that ANITEK could have made the directions a little easier, regarding the old ALPHA TECH instructions sent with the MEM board. Perhaps a little warning that the inner bank of piggy-backed chips MUST have their #4 pins bent more like a 90 degree angle, to avoid any pressure placed upon the chips when the metal housing is put back together. The outer bank of chips (where you add the additional 64k on a stock machine) avoids contact with the metal housing, so it is more important to check your main bank.

There is a happy ending... the 4P runs extremely fast now. I added the Z-80B chip, and the U148 pal chip assembly that the timing fits into for the timing. Now, the machine plugs along at 6.41 Mhz. Plus, when I put all the system junk into RAM, I can load SuperScripsit in 1.5 seconds, as opposed to the 13 seconds it takes to load it by disk drive. So lately, I sometimes just load SuperScripsit and watch it (once in a while, I use it, too!).

I am not certain if I will take the plunge, and get another MEM board plus a MEG for the other 4P, since the Micro-Labs board will be more of a challenge to alter the placement of hi-res, but curiosity will most likely get the best of me, I will become spoiled to the speed and memory I have now, and I will be FORCED to upgrade the other 4P.

So, if any of you are considering upgrading your 4P, and feel comfortable about soldering, then do it. Just watch out for those #4 pins in the main bank of RAM chips!

# HINTS & TIPS

## MORE CHAOS

(for Model I/III)

By Alfred C. Airone

I want to say how much I enjoy TRSTimes. I find something (usually several things) in each issue that interest or help me. I'm one of those diehard Model III users - no upgrades other than the RS graphics board - but I still get a kick out of it. I especially appreciate any Mod III, TRSDOS 1.3, and Z80 assembly language items.

The program CHAOS/BAS (by Robert Doerr, in the recent issue of TRSTimes) inspired me to edit the program so it could be run on Model III, as well as Model I. It is listed below as CHAOS1/BAS.

Also listed is CHAOS2/GRA. It is written in BASICG, and plays the Chaos Game that was illustrated on the NOVA episode.

CHAOS3/GRA is a further BASICG program that illustrates a simple mathematical equation that shows "chaotic" behavior. It's discussed in the book 'CHAOS: Making a New Science' by James Gleick.

### CHAOS1/BAS

```
10 DEFINT A-Z:B(2)=63:
A(3)=15:B(3)=RND(43)+10
20 Y=RND(15):X=RND(63):
IF X<(Y*B(3))/15 OR X>63-(Y/15)*(63-B(3))
THEN 20 ELSE CLS
50 U=RND(3):Y=(Y+A(U))/2:
X=(X+B(U))/2:PRINT @ (Y)*64+X," ";:
GOTO 50
```

### CHAOS2/GRA

```
0 CLR:RANDOM:DEFINT I,Q:SCREEN 0:I=1
10 X1=320:Y1=0:X2=120:Y2=200:X3=520:Y3=200:
' Set initial vertices
15 Q1=RND(639):Q2=RND(239):PSET(Q1,Q2)
20 Q=RND(3)
30 ON Q GOTO 110,120,130
110 Q1=X1+(Q1-X1)/2:Q2=Y1+(Q2-Y1)/2:
GOTO 200
120 Q1=X2+(Q1-X2)/2:Q2=Y2+(Q2-Y2)/2:
GOTO 200
130 Q1=X3+(Q1-X3)/2:Q2=Y3+(Q2-Y3)/2
200 PSET(Q1,Q2):I=I+1:IF I>5000 THEN END
210 GOTO 20
220 'This is a program in Radio Shack BASICG that
illustrates
```

230 'the 'chaos game', a procedure that was described by Dr.

240 'Michael Barnsley on the episode of NOVA which appeared during

250 'the week beginning Jan. 29. It illustrates how a

260 'random process can in certain cases lead to a highly

270 'structured result. The program calculates a randomly

280 'chosen initial point (line 15), then throws a three-sided die (line 20).

290 'The toss of the die determines one of the

300 'three initial vertices that are designated in line 10.

310 'The program then calculates the MIDPOINT between the starting

320 'point and the vertex chosen by the toss of the die.

330 'That new point becomes the new starting point, and the process is reiterated.

340 'As written (line 240) the program goes through 5000

350 'iterations (about 5 minutes) - you can alter it to more

360 'or fewer by changing that line. The resulting diagram

370 'is an example of an ATTRACTOR, although it is not

380 'a 'strange' attractor.

390 ' LOAD, RUN, and see for yourself!

400 ' Note: a few initial points often appear off of the main

410 'diagram - these points indicate the trajectory followed by the

420 'process before it gets 'captured' by the attractor.

### CHAOS3/GRA

0 '.....Chaos.....by Al Airone (AIRONEKELLY)

1 ' This short program (in BASICG) was inspired by a discussion in the

2 ' chapter entitled Life's Ups and Downs in the book

3 ' CHAOS: Making a New Science by James Gleick (c) James Gleick

4 ' 1987. The iterative function (found in line 308) is:

5 '

6 ' 
$$X_{n+1} = R \times \frac{X_n}{n}$$

7 ' 
$$Y_{n+1} = R \times \frac{Y_n}{n}$$

8 ' X is initialized at some value 0 < X < 1 and re-initialized

9 ' whenever the parameter R is increased. The function appears well-behaved

10 ' at first: when the parameter R becomes 3, the function's behavior becomes chaotic and surprising.

12 '

```

13 ' You can change the initialization of X by changing
A(1) = .05
14 ' to A(1) = some other value (lines 308 and 370). As
I've written the program,
15 ' X is initialized at .05. As written, the program dis-
plays
16 ' the graph of each iteration of the function without
17 ' clearing the screen: eventually, you will see about
17
18 ' accumulated graphs. Removing the REM at the
19 ' beginning of line 363 causes each graph to be
erased
20 ' before a new one is produced.
21 '
22 ' To see the program in action, just LOAD and RUN
!!!
23 ' -----
24 '
25 '
28 CLS: CLEAR1500: DIMA(50): MX = -999:
C = 1: ZX = 0: Z = 1: ST = -1:
BL$ = "
29 SCREEN0
30 GOSUB50: GOTO200
50 'Construct graph
60 LINE(10,0)-(10,170):
LINE-(620,170):
LINE-(620,0)
70 FORI = 0TO17:
LINE(7,I*10)-(12,I*10):
LINE(617,I*10)-(622,I*10):
NEXTI
80 FORI = 1TO18:
LINE(10 + I*32,167)-(10 + I*32,172):
NEXTI
90 GLOCATE(0,0),0: PRINT#-3,"1":
GLOCATE(10,180),0: PRINT#-3,"1":
GLOCATE(138,180),0: PRINT#-3,"5":
GLOCATE(298,180),0: PRINT#-3,"10":
GLOCATE(458,180),0: PRINT#-3,"15":
GLOCATE(200,190),0: PRINT#-3,"Iterations"
190 RETURN
200 GLOCATE(20,220),0:
PRINT#-3,"Press any key to begin.": GOSUB1000
300 GLOCATE(20,220),0: PRINT#-3,BL$
308 A(1) = .05: R = 2.5
309 A(Z + 1) = R*A(Z)*(1-A(Z))
310 IF A(Z + 1) > MX THEN MX = A(Z + 1)
311 IF A(Z + 1) < 0 THEN MN = A(Z + 1)
312 Z = Z + 1: IF Z > 20 THEN Z = 1: GOTO330
313 GOTO309
330 X1 = (0/20)*610 + 10:
Y1 = 170-(A(1)/(MX-MN))*170:
X2 = (1/20)*610 + 10:
Y2 = 170-(A(2)/(MX-MN))*170:
LINE(X1,Y1)-(X2,Y2),C,,ST
340 FORI = 3TO21
345 X3 = ((I-1)/20)*610 + 10:

```

```

Y3 = 170-(A(I)/(MX-MN))*170
350 LINE-(X3,Y3),C,,ST
360 NEXTI
363 REM IF ZX = 0 THEN ZX = 1: C = 0:
FOR K = 1 TO 200: NEXT K: GOTO 330
ELSE ZX = 0: C = 1
370 R = R + .1: A(1) = .05: Z = 1: IF R <= 4.1 THEN 309
400 GLOCATE(20,200),0:
PRINT#-3,"That's all! (Higher values of R cause over-
flow error).": GLOCATE(20,220),0:
PRINT#-3,"Press any key to END."
401 Z$ = INKEY$: IF Z$ = "" THEN 401
402 END
1000 Z$ = INKEY$: IF Z$ = "" THEN 1000
ELSE RETURN

```

## SHELL 2.0 & LS-DOS 6.3.1

### Model 4

By Jim King

I decided that I liked both LS-DOS 6.3.1 and Stephen Milliken's SHELL so much that I bought my own legal copies of both.

I then attempted to install SHELL on 6.3.1. This proved unsuccessful. I got a 'File Access Denied' message.

Firing up my trusty disk-zapper, I investigated the INSTALL/CMD program included on the SHELL disk. Sure enough, INSTALL/CMD tries to copy SHELL into SYS13/SYS.LSIDOS.

This will work just fine with TRSDOS 6.2 and LS-DOS 6.3.0, but Roy Soltoff changed the passwords of the SYS files in LS-DOS 6.3.1 from LSIDOS to SYSTEM6. This causes the INSTALL/CMD program to fail.

Simply zapping the new password into INSTALL/CMD did not work since SYSTEM6 is one character longer than LSIDOS.

Only one thing left to do: Change the SYS13/SYS password from SYSTEM6 back to LSIDOS.

I got out an old 6.2 master disk and read the directory entry of SYS13/SYS. I found this on track 20, sector 9. The two-byte hash code of the password is always located at relative position 16 & 17 of the directory entry. The two bytes are F6 37, the hash code of LSIDOS.

Inserting my LS-DOS 6.3.1 disk, I looked in the exact same place. There the two bytes are F4 71, the hash code of SYSTEM6. By changing F4 71 to F6 37, I effectively changed the password of SYS13/SYS from SYSTEM6 to LSIDOS.

The INSTALL/CMD program from SHELL 2.0 will now do its job without a hitch.

I happened to use ZAP from MultiDos to perform the above surgery, but just about any zap program could have been used as well.

If you don't own a 'zapper', or are timid about using one, you may change the password directly from DOS, using the ATTRIB command.

Issue the following command from DOS:  
ATTRIB SYS13/SYS.SYSTEM6 (OWNER="LSIDOS")

This also changes the password from SYSTEM6 to LSIDOS, and may be a bit easier for the feint of heart.

Should you for some reason wish to change the password of SYS13/SYS from LSIDOS back to SYSTEM6, you can zap F4 71 into the directory entry of SYS13/SYS, replacing F6 37.

Or you can issue the DOS command:  
ATTRIB SYS13/SYS.LSIDOS (OWNER="SYSTEM6")

I heartily recommend that you leave the password as LSIDOS, as the programmable key function (shift-1 through shift-5) specifically uses this when writing back to the disk. There may still be other portions of SHELL that requires the correct password, though I haven't run into those as yet.

I now enjoy both LS-DOS 6.3.1, a really fine DOS, and SHELL 2.0, which is probably the most useful utility in my software collection.

## SHELL 1.8 & LS-DOS 6.3.x Model 4

By Lance Wolstrup

Those of you wanting SHELL 1.8 to work with LS-DOS 6.3.x have probably been frustrated by the error message: '\*\*\* TRSDOS 6.2 IS REQUIRED! \*\*\*'.

The problem is that SHELL 1.8 is written so it will execute only from TRSDOS 6.2. I am assuming that Stephen Millikin-Randolph, like the rest of us, believed that TRSDOS 6.2.1 would be the last DOS for Model 4, making it the standard for all time. Thus, SHELL 1.8 was written using SVC's (SuperVisor Calls) not available until 6.2, and to prevent his program from crashing if run from an earlier version of TRSDOS, Stephen makes SHELL 1.8 check to make sure the DOS environment is 6.2. Little did any of us anticipate the coming of, not only one, but two DOS upgrades.

To make SHELL 1.8 work with LS-DOS 6.3.x you have a choice. You can either patch SYS0/SYS on LS-DOS 6.3.x so SHELL 1.8 will think it has found TRSDOS 6.2, or you can patch SHELL 1.8 so it will not care which DOS it is executed from.

In my opinion, patching SHELL 1.8 is more elegant (and safer), but you decide which you wish to use.

### Patching SYS0/SYS

Memory location 85H contain the version number of the DOS. If you go to Basic and PRINT PEEK(&H85), you will get 98 from TRSDOS 6.2.x, and 99 from LS-DOS 6.3.x. Doing a little decimal to hexadecimal conversion it becomes obvious that 98 is 62H and 99 is 63H. This is the

location that SHELL 1.8 checks. If it finds 62H there, it happily executes the rest of the program. If it finds any other value, it gives the above error message and returns to DOS. A quick fix for LS-DOS 6.3.x, while in Basic, would be to POKE &H85,98. Return to DOS via the SYSTEM command, and then enter SHELL 1.8. It works like a charm.

This method, of course, is only good until you reboot. We need to make it permanent - like this:

- 1. INSERT A WORKING COPY OF LS-DOS 6.3.x IN DRIVE :0 AND PRESS <RESET >
- 2. FROM DOS READY
  - a. IF LS-DOS 6.3.0 TYPE:  
PATCH SYS0/SYS.LSIDOS (D00,91 = 62;F00,91 = 63)
  - b. IF LS-DOS 6.3.1 TYPE:  
PATCH SYS0/SYS.SYSTEM6 (D00,91 = 62;F00,91 = 63)
- 3. PRESS <RESET >

You can now execute SHELL 1.8 to your hearts delight. It thinks it is running from TRSDOS 6.2.

### Patching SHELL 1.8

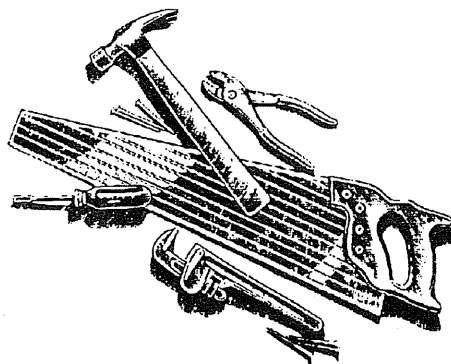
Though the above patch to SYS0/SYS works, I am not crazy about changing the operating system, unless it is absolutely necessary.

In this case it is NOT. Rather than changing the version number of the DOS, we can patch SHELL 1.8 so it will not care if it runs on TRSDOS 6.2.x or LS-DOS 6.3.x. Here's the patch:

- 1. INSERT DISK WITH COPY OF SHELL18/CMD AND SHELL/OVL IN A DRIVE.
- 2. TYPE:  
PATCH SHELL18/CMD (D00,F2 = 18;F00,F2 = 28)

SHELL 1.8 will now run with TRSDOS 6.2.x and LS-DOS 6.3.x.

(Note: It will also attempt to run on TRSDOS 6.1, TRSDOS 6.0 and DOS PLUS. It will, however, crash, so only use TRSDOS 6.2, LS-DOS 6.3.0 or LS-DOS 6.3.1.)





# Essentials of a Hard Disk System

By Roy T. Beck

The intent of this article is to mention and briefly describe all the bits and pieces which are essential to successful implementation of a hard drive on your TRSDOS computer. I speak not as an expert, but as one who has had to struggle through all of the above on his own, who thereby has acquired a small fund of knowledge, and who wishes to codify and pass this along to others.



## HARDWARE

### Computer

I am speaking strictly of the Radio Shack Models 1, 3, 4, 4D, and 4P. I include the Model 1 because it is possible to run a hard drive on it, although I have not personally done so. Of course, there are very few persons still using the Mod 1, but some of those who are doing so may wish to contemplate use of a hard drive on it. I know a man in Virginia who presently runs a good-sized business on half a dozen Model 1's, and is now planning to add HD's to them.

The available hard drive packages were mostly all originally designed to operate on the Model 3. When the Mod 4 and its siblings arrived, we found that RS had carefully designed the Mod 3 I/O bus into the 4, so of course the hard drives available for the Mod 3 also worked with the Mod 4.

As for the Model 1, RS retroactively created the Cat No 26-1132 package to graft the Model 3 package onto the Model 1. The 26-1132 package contains a special "pregnant cable" which adapts the Model 1's 40 line system bus to the 50 line I/O bus required by the Model 3 Hard drives. Beside some additional documentation, the kit also included LDOS Version 5.1.3 for use on the Model 1, plus the necessary drivers to allow LDOS to talk to the Hard Disk Controller (HDC) in the Master Hard Drive Box. The Model 1 has to either be one of the modified early setups or include the later (redesigned) Expansion Interface; the earliest ones probably won't work. (They were not even reliable with floppy drives).

### The Hard Drive Assembly (The Bubble)

The actual hard drive is often referred to as the "bubble" because of the dust-tight cover over the platters and heads. Any dust particle inside here will be fatal to the drive. Don't ever remove the cover over the platters (*curiosity has killed a few cats!*)

The bubbles which we can use in the TRS80's are the 5" bubbles having an ST-506 interface. This includes everything from the TANDON 600 family used in the old original 5 Meg boxes up through about 70 Meg drives. The real limits are 1024 cylinders (tracks) and 8 heads. Within those parameters, your HDC and DOS can live happily.

Be aware, also, that bubbles have four drive selects, just like floppies. Some are set by jumpers, some by DIP switches. Be sure you know which select line you are using. Normally you will use #1 if you have only one bubble, but if you have slave drives connected to the HDC in addition to the master drive, be careful you don't have two bubbles on the same select line. It won't work! The select lines are #26, 28, 30 and 32 in the 34 line ribbon cable, corresponding to drive selects #1, 2, 3, and 4, respectively.

Just for the heck of it, the other night, I gathered up all the HD bubbles I could find laying around, and successfully formatted all of them with TRSDOS 6.3.1 plus M.A.D. Software's Autoboot program. Every one of them worked on the gate array 4P I was using. Included were two 40 Meg Quantum Q540's, a 20 Meg Tandon TM-702AT, (identified as being intended for an IBM AT), and two 5 Meg Tandon TM-602's. All of these were operated through a WD-1010 HDC. I had to juggle stepping rates on the small Tandons to get them to work, but the larger drives all stepped just fine at the 10 microsecond rate. These drives all had different head and cylinder counts, but by setting them up properly, they all worked.

I did not write up this just to boast about having several different bubbles on hand, but to document my efforts to learn what works and what doesn't. As I have mentioned elsewhere, I also have a 12 Meg Tandon TM-603SE (with only 4 good heads, for 8 Megs capacity) working reliably in an old VR DATA box. I formerly had two 5 Meg Tandon TM-602's in that same box, sharing the Xebec HDC. All of this goes to show there is a lot of possible interchangeability when you learn what is critical and what is not. After correctly interfacing the hardware, the remaining critical factor is the software drivers which interface the hardware to your DOS.

## The Hard Disk Controller

The hard disk controller (HDC) is the card (actually a small, specialized computer in its own right) which converts parallel signals from the host adapter to serial signals for the hard disk (the bubble).

The HDC's used in the RS product line are either of two boards manufactured by Western Digital. While the boards were especially designed by WD, the logic on them corresponds closely with WD's generic WD-1000-05 board. The unique feature of these boards is the host adaptor built onto them which was designed specifically for the Model 3 I/O port. The early board, used in the 5 Meg boxes is identified as the 8X300 board, so-called because a CPU chip with that number is on the board. It can also be identified by its size; it is approximately 8" x 11". The later board, used in most of the 15 Meg and larger RS boxes uses the WD-1010 board, again called after a chip on it. This board is smaller, about 6" x 7". Being the same "footprint" as the drive, it can be mounted right on a drive. This later board is also sometimes identified as the WD-1000-TB1, because this notation shows in the Technical Service Manual for this board.

The input cable from the computer is of course 50 line to match the computer I/O port. One of the two output cables to a bubble is 34 lines. This cable "daisy chains" to all the bubbles in your system, maximum four. There is a second set of output cables, 20 lines each, which serve the bubbles. There must be a separate 20 line cable for each bubble.

Another popular line of HDC's found on boxes made by aftermarket vendors is the Xebec S-1410A card. This is also about the size of a drive, and can be mounted on one. However, there are several very significant differences between the Xebec board and the WD boards mentioned above.

First, the Xebec board is a generic board, and has NO host adaptor. Instead, it has a SASI/SCSI interface (which also happens to be 50 lines), which CANNOT connect directly to a TRS. Instead, a separate host adapter must be connected between the computer and the HDC. Since both the computer and the Xebec board use 50 line cables, the Xebec board can be misleading. Trust me, there must be a host adapter between them for the system to function. The host adapter has only a small amount of logic on it, perhaps a dozen chips, so it is not a huge cost item. Availability is the problem. Rob Stewart of Storage Power may have units you can use. MISOSYS is also producing a host adapter which will work with either the Xebec card or (I believe) an ADAPTEC HDC. Check their ads.

The other major difference between the Xebec and the WD HDC is the instruction set. The two HDC's have nothing in common, and therefore the driver must be written for the specific HDC it is to work with.

Still another approach by some vendors was to use the WD-1000-05 generic board plus a proprietary host adaptor. In this case, the RS drivers probably won't work, as different vendors used different I/O ports. RS uses ports C0-CF (hex). Some of the other vendors used 78-7F. RS ports C8-CF correspond exactly with the 78-7F used by others, but RS also included the three ports C0, C1 and C2 for some control purposes. C2 can be ignored, but I believe the other two have to be correctly handled by the software. A good hacker should be able to solve this problem.

## The Host Adapter

As I mentioned above, the RS WD boards include the necessary host adapter. No other hardware is required between the R/S HDC and the computer.

The generic Xebec and Western Digital HDC's require a separate host adapter, as mentioned above. The aftermarket vendors designed and fabricated their own to suit their ideas. I have seen a wide variety of these things, and they differ too much to be swapped around casually. The driver program must match the host adapter. The differences mainly involve which I/O ports are decoded. These vary from one host adapter to another.

## The Power Supply

A power supply is obviously necessary to operate the HDC, the bubble, and the host adapter if it is a separate card. Usually only +5 and +12 volts are required.

## A Case to House All the Above

A case to house all the hardware is an excellent idea. Cooling is the major concern; the air flow should be routed over all the heat generating devices, ideally entering near the coolest ones and exiting over the hottest ones. This keeps all the parts as cool as possible, which extends their operating life. Also, a dust filter is a good idea, although not mandatory. A quiet fan is a better neighbor than a noisy one.

## SOFTWARE

### The DOS

Naturally, a DOS is required for your system to operate at all. What DOS should you choose for HD operation? The choices really are few in number. The DOSes for which drivers are available are as follows, to the best of my knowledge:

Model 1:	Model 3:	Model 4, 4D, 4P
LDOS 5.1.3	LDOS 5.1.x-5.3	LS-DOS 6.x
NEWDOS80 v2.5	NEWDOS80 v2.5	DOSPLUS IV
DOSPLUS 3.5	DOSPLUS 3.5	MULTIDOS
(I'm not sure about availability of drivers for this one)		

## The Driver

A driver for your software is essential. Radio Shack supplied drivers with its boxes, but these drivers were minimal in abilities, and only work with the genuine WD/RS HDC's. They do work, no problem, just lack of flexibility.

Roy Soltoff has several drivers available. He has a very flexible one for use with the WD/RS box, a similar one for the VR DATA HARD DISK III which uses the Xebec S-1410A HDC, and of course an improved one for use with his own new hard drive package, which uses versions of the Xebec and Adaptec HDC's.

Another source used to be PowerSoft, with drivers written by Kim Watt. Now that Soltoff (MISOSYS) has bought out PowerSoft, I am not sure these are still available. My guess is they are. (Why should Soltoff refuse to sell a good product?) Kim offered three different drivers. One was for the genuine RS box, (which also supported Autobooting of the 4P with some versions of TRSDOS 6). A second driver was written for use with drives using the Western Digital generic WD-1000 controller board and non-RS host adapters. Their ads said this worked with Percom (Aerocomp), MTI, Compukit, Micro-Design, Level 4, Prometheus and some others. The third driver was specifically for use with the PERCOM PHD sold by PERCOM and Aerocomp. This driver was for use with the Mod 4 and 4P (but apparently not the Mod 3).

I have also heard, recently, that HD drivers are available for Multidos, written, I presume, by Vern Hester, the author of Multidos. Storage Power (Rob Stewart) is advertising these.

If you are into CP/M, Montezuma Micro has drivers available for a whole flock of HDC's and bubbles for use with the Model 4 only. Both the 4 and the 4P run very nicely, thank you, with CP/M. Good ol' boy Jesse Bob Overholt (JBO) put CP/M V2.2 onto the Mod 4, and did it well.

All of the above are (I believe) still commercially available. Then, there are the products of companies no longer with us. This list is too long to detail here. The only ones I will mention are the ones by DOSPLUS. I know they supplied drivers for their DOSPLUS V3.5 and DOSPLUS IV on Radio Shack drives. They (or someone) also supplied drivers for the Xebec HDC, but I don't know which version of DOSPLUS.

Some further scraps of information. M.A.D. Software has just recently offered (publicly) an autoboot patch for use with TRSDOS 6.X on the Mod 4 family. Its principal limitations are that you must use either a WD/RS HDC or Soltoff's new package; you must use TRSDOS 6.2 or later; and you must change one ROM in the 4 or the 4D. The software works as is with 4P's.

Note also, that with clever installation of DOS' and their partitions, it is possible to put more than one DOS on the same HD at the same time. I presently have LDOS 5.3, TRSDOS 6.3 and CP/M happily cohabiting on two different drives, one with a Xebec HDC, the other with the WD/RS HDC. They work! I have not yet installed DOSPLUS on those drives, as I don't usually use it; but I could! Still better, because of commonality of the directory structure, LDOS and TRSDOS 6 can share a partition. I do this also. I believe the same is true for DOSPLUS Mod 3 and 4, but I haven't tried it yet.

## THE GOTCHA'S

There are numerous hardware and software constraints to be aware of. The original Radio Shack boxes use the WD HDC boards, and either of these will connect to four bubbles, maximum, with up to 1024 cylinders and eight heads each. The Radio Shack drivers will allow use of all four bubbles (one master and three slaves), but the software is not very flexible.

If you do any hardware "mixing and matching", be aware that the 4 wire power cable to the WD-1010 HDC is wired differently than the (apparently) identical cable which supplies power to the bubble. DON'T INTERCHANGE THEM! If you fail to catch this difference, I guarantee that you will smoke something! The early WD-1000-8X300 also has this problem, so look out for the possibility of wrong connections, even where the connecting plugs appear identical.

Another small detail with the 8X300 board; There is a mounting screw almost centered in the HDC board. There MUST be an insulating washer between the underside of the board and the metal post which supports the board. This washer is plastic, nearly invisible, and easily lost. If you fail to note its absence, the board will ground out on the metal post and WILL NOT work. Verify the insulating washer is correctly located when you reinstall that board. There is no such problem with the later board, only the early, big one.

Avoid the 8.4 Meg RS Hard drive. It has an incompatible HDC and an 8" bubble in it which will not work with the rest of the RS equipment, and is therefore unusable on the Model 4, at least not without a lot of hacking. This drive was an early design for the Model 2, is incompatible with all other TRS HD's and is of no easy use to us. Avoid it, no matter how low the price!

The better drivers from Roy Soltoff (MISOSYS), and Kim Watt (formerly PowerSoft, now MISOSYS) allow more flexible drive partitioning, but are limited to two bubbles maximum, the master and one slave. Actually, with the large bubbles now available, this is not much of a constraint, but you should be aware of it.

Many (not all) aftermarket vendors used the Xebec S-1410A hard disk controller board, and it has its own share of quirks. First, it is physically limited to two bubbles (one master, one slave), and therefore the software available for it is correspondingly limited. However, the drivers will still accommodate eight heads and 1024 cylinders per bubble, and these can be divided into 4 logical partitions in the DOS. Soltoff has a driver (VRHARD) available for use on the Xebec board in the VR DATA HARD DISK III box; it may work on some other boxes, I am not sure. Soltoff wrote his driver in such a way as to require both bubbles connected to a Xebec board be identical. That is, same stepping rate, same number of heads and cylinders, etc. He did this to simplify his driver, and we must accept that.

Another interesting quirk of the Xebec HDC is the available FORMAT commands. I am not sure if it's inherent in the HDC, but both JBO and Soltoff implemented it in a somewhat restrictive fashion. The restriction is that you cannot do a low-level format on individual tracks; you must reformat the ENTIRE drive in order to reformat any portion of it. The software will warn you of this, but be cautious. Note also that if you divide a bubble between two or more DOS', the restriction applies across ALL the DOSes on the bubble, not just the one you are working with.

Another minus is that no one (that I am aware of) has written autoboot routines for the Xebec HDC, except M.A.D. Software's version for the new MISOSYS Hard Drive setup mentioned above. It's certainly not an impossibility, it just seems not to have been done. Anyone want to undertake the task?

## VENDORS

Where can you buy the necessary hardware? There are several vendors supplying new hard drive setups. Alphabetically these are:

**Aerocomp**  
Box 223957

Dallas, TX 75212 (214) 637-5400

*These are all new, with software by JBO. John Lancione, the owner, says his equipment all has FCC certification.*

**MISOSYS, Inc.**  
Box 239

Sterling, VA 22170 (703) 450-4181

*These are all new, except the HDC's, which are not necessarily new.*

**Storage Power**  
10391 Oakhaven Dr.  
Stanton, CA 90680 (714) 952-2700  
*These are all new.*

Used hardware is really where you find it. Swap meets are a great place to find reusable equipment. (I just found a 40 Meg HD bubble for \$10, and would you believe it, it formatted and operates with NO bad sectors!) Sometimes you get lucky! Most large communities have newspapers consisting of want ads to buy and sell everything under the sun in the way of household and other belongings. In the Los Angeles area, a few are The Penny Saver and The Recycler. By scanning publications like these regularly, you may come upon usable items.

A few people regularly buy and sell used equipment. Some I know about are:

**David Dalager**  
1313A Timberlake Dr.  
Arlington, TX 76010

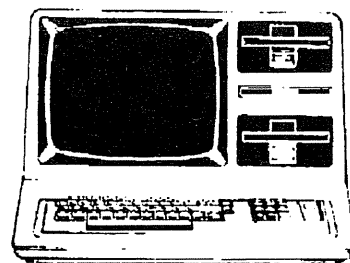
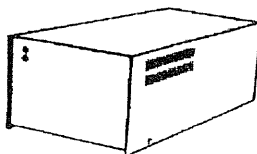
**Pacific Computer Exchange**  
1031 S.E. Mill, Suite B  
Portland, OR 97214 (503) 236-2949

And don't forget our TRS publications, TRSTimes, Computer News 80, and TRSLink. These all carry business and personal ads.

## IN CLOSING

Having used floppies only until about a year ago, I can say that hard disks are a marvelous upgrade. But, don't neglect making backups of your hard disk files. It is too easy to become complacent (translation: fat, dumb and happy) about the reliability of your hard disk. They are NOT perfectly reliable, and must not be completely trusted. (Would you trust one and only one floppy with your valuable files?) Make backups regularly, at least of the data files, documents, etc which you would have to reconstruct the hard way in case of loss. Most programs can be reloaded from the original disks, but data is a different matter. Be cautious and rigorous about your backups, and you will enjoy many happy hours with your hard disk-equipped TRS. Happy computing!

-Roy-



# BIRTHDAY FUN

for Model I/III & 4

By Dennis Burkholz

First, let me point out that BIRTHDAY/BAS doesn't do anything useful. It is fun, just for the sake of being fun.

Second, I didn't write the program -- rather, I found it in the IBM section on a local BBS. As it was one of the few programs there written in Basic, I downloaded it.

The program was not particularly well written and, since no one wanted to admit authorship, I began to play around with the code. I removed some useless GWBasic-only instructions and began tightening up some of the very lax routines, adding others to keep the program from crashing. One thing led to another and, before I knew it, it was running on my TRS-80 Model 4, both in Model 3 and 4 mode. Being rather generic, I assume it will also run on a Model I.

Type in BIRTHDAY/BAS and have some fun with it. Feel free to modify it any way you wish. As a matter of fact, I would be interested in seeing just how fancy the TRSTimes readers can make this program.

*Sounds good to me. We all need a fun summer project, so here it is: The second TRSTimes contest.*

*We will award an original Radio Shack game (I/III) to the fanciest and/or most innovative version of BIRTHDAY/BAS. The winner will be announced in the Nov/Dec issue. There is only one rule: The program must run on Model I, III and 4.*

-Ed.

## BIRTHDAY/BAS

```
10 'BIRTHDAY/BAS
20 DIM Z$(12),L(12),N(60),Y$(7)
30 DIM G$(12),H$(32)
100 FOR I = 1 TO 12:READ Z$(I):NEXT
110 FOR I = 1 TO 12:READ L(I):NEXT
120 FOR I = 1 TO 7:READ Y$(I):NEXT
130 FOR I = 1 TO 12:READ G$(I):NEXT
140 FOR I = 1 TO 32:READ H$(I):NEXT
200 CLS:PRINT"Type in today's date (MM/DD/YY) ";;
INPUT DT$
201 IF MID$(DT$,3,1) < > "/" OR MID$(DT$,6,1) < > "/"
THEN 200
202 X1 = VAL(LEFT$(DT$,2))
203 Y1 = VAL(MID$(DT$,4,2))
204 Z1 = VAL(RIGHT$(DT$,2))
205 IF X1 < 1 OR X1 > 12 THEN 200
206 IF Z1/4 = INT(Z1/4) AND X1 = 2 AND Y1 > 29
THEN 200
207 IF Z1/4 < > INT(Z1/4) AND X1 = 2 AND Y1 > 28
THEN 200
```

```
208 IF X1 = 1 OR X1 = 3 OR X1 = 5 OR X1 = 7 OR X1 = 8
OR X1 = 10 OR X1 = 12 THEN IF Y1 > 31 THEN 200
209 IF X1 = 4 OR X1 = 6 OR X1 = 9 OR X1 = 11
THEN IF Y1 > 30 THEN 200
210 IF Y1 < 1 THEN 200
400 Z1 = Z1 + 1900
410 XF = X1:YF = Y1:ZF = Z1:GOSUB 1220:U = ND
420 PRINT
430 PRINT"Today is ";Y$(U-7*INT(U/7) + 1);"DAY"
435 PRINT
440 PRINT"Hi, I'm your TRS-80."
450 PRINT"What's YOUR name";
460 INPUT N$
470 I = INSTR(N$," ") - 1
480 IF I < 0 THEN K$ = N$:GOTO 580
490 K$ = LEFT$(N$,I)
500 PRINT"Are you usually called ";K$
510 INPUT A$
520 GOSUB 1140
530 ON NA GOTO 540,560,510
540 PRINT"What do you like to be called";
550 INPUT K$
560 PRINT"So your full name is ";N$;", but you"
570 PRINT"like to be called ";K$;","
580 PRINT"How old are you, ";K$;
590 INPUT A$
600 A = INT(VAL(A$))
610 IF INT((A-5)/95) = 0 THEN 640
620 PRINT"Come on, ";K$;", you're pulling my leg."
630 GOTO 580
640 PRINT"So you are";A;"years old."
650 PRINT"Would you like to know how many days old
you are";
660 INPUT A$
670 GOSUB 1140
680 ON NA GOTO 690,720,660
690 PRINT"I don't care. I'll tell you anyway":GOTO 730
720 PRINT"OK, I'll tell you."
730 PRINT"In what month were you born";
740 INPUT M$
741 FOR X = 1 TO LEN(M$)
742 IF ASC(MID$(M$,X,1)) > 96
AND ASC(MID$(M$,X,1)) < 123
THEN MID$(M$,X,1) = CHR$(ASC(MID$(M$,X,1))-32)
743 NEXT
750 FL = 0:FOR X = 1 TO 12
760 IF M$ = Z$(X) THEN FL = 1:XX = X:X = 12
770 NEXT:IF FL THEN X = XX:GOTO 800
780 PRINT K$;", you may be nice, but you can't spell."
790 GOTO 730
800 PRINT"On what day";
810 INPUT YY$:Y = INT(VAL(YY$))
820 Z = Z1 - A
830 IF INT((Y-1)/L(X)) = 0 THEN 870
840 IF (X-1)*(Y-28)*(Z-4*INT(Z/4) + 1) = 1 THEN 870
850 PRINT"Come on, ";N$;
", you're giving me a hard time."
860 GOTO 800
```

```

870 CLS:XF=X1:YF=Y1:ZF=Z:GOSUB 1220:W=ND
890 XF=X:YF=Y:ZF=Z:GOSUB 1220:V=ND
900 IF W=>V THEN 920
910 Z=Z-1
920 IF ABS(W-V)>30 THEN 990
930 ON SGN(W-V)+2 GOTO 940,980,960
940 PRINT"You have a birthday coming up in only";
V-W;"days!"
950 GOTO 990
960 PRINT"Your birthday was only";W-V;
"days ago. Congratulations!"
970 GOTO 990
980 PRINT"Happy birthday, dear ";K$;
", happy birthday to you."
990 XF=X:YF=Y:ZF=Z:GOSUB 1220:V=ND
1000 PRINT"You were born on ";
Y$(V-7*INT(V/7)+1);"DAY, ";Z$(X);Y;" ";Z
1010 PRINT"which makes you";U-V;"days old."
1020 PRINT"You were born on the day";V;
"AD, and on Jan. 1, 2000"
1030 PRINT"you will be";730480!-V;"days old."
1040 PRINT"How about that!!!"
1050 PRINT
1060 GOSUB 1350
1070 PRINT"Well, ";N$;
1080 IF N$=K$ THEN 1100
1090 PRINT" (alias ";K$;)"
1100 PRINT" It has been nice chatting with you."
1110 PRINT"Good bye"
1120 END
1140 NA=1
1150 IF LEFT$(A$,1)="N" OR LEFT$(A$,1)="n"
THEN 1200
1160 NA=2
1170 IF LEFT$(A$,1)="Y" OR LEFT$(A$,1)="y"
THEN 1200
1180 NA=3
1190 PRINT"A simple Y or N will do"
1200 RETURN
1220 ND=YF-1:FOR I1=1 TO XF-1:
ND=ND+L(I1):NEXT
1230 I1=INT(ZF/100)
1240 IF ZF<>INT(ZF/4)*4 THEN 1290
1250 IF ZF/100=I1 THEN 1290
1260 IF ND>59 THEN 1290
1270 IF XF=3 THEN 1290
1280 ND=ND-1
1290 ND=ND+36524!*I1+INT(365.25*(ZF-100*I1))
1300 RETURN
1350 R1=RND(12)
1360 R2=RND(12)
1380 IF R1=R2 THEN 1360
1390 R=1
1400 X=4:GOSUB 1570
1410 PRINT"You were born under the ";H$(NR);
" of ";G$(R1)
1420 X=4:GOSUB 1570

```

```

1430 PRINT"and ";G$(R2);". You are a basically ";
H$(NR)
1440 X=3:GOSUB 1570
1450 PRINT"person but ";H$(NR);
1460 GOSUB 1570
1470 PRINT " you ";H$(NR)
1480 GOSUB 1570:N1=NR:X=4:GOSUB 1570:
N2=NR:X=2:GOSUB 1570
1490 PRINT H$(N1);" with ";H$(N2);H$(NR)
1500 X=5:GOSUB 1570
1510 PRINT H$(NR);
" for the next week. I predict you will soon"
1520 X=4:GOSUB 1570
1530 PRINT H$(NR)
1540 PRINT
1550 RETURN
1570 NR=RND(X)+R-1
1580 R=R+X
1590 RETURN
2000 DATA JANUARY,FEBRUARY,MARCH
2005 DATA APRIL,MAY,JUNE,JULY,AUGUST
2010 DATA SEPTEMBER,OCTOBER
2015 DATA NOVEMBER,DECEMBER
2020 DATA 31,28,31,30,31,30,31,31,30,31,30,31
2030 DATA THURS,FRI,SATUR,SUN
2035 DATA MON,TUES,WEDNES
2040 DATA the Moon,the Sun,the Earth
2045 DATA the planet Mercury,Venus,Mars
2050 DATA Jupiter,Saturn,the planet Uranus
2055 DATA the planet Neptune
2060 DATA the planet Pluto, Peanut Butter
2070 DATA juxtarotation,contraposition
2075 DATA contrasting phases,transposition
2080 DATA satisfied,happy,interesting,tolerant
2090 DATA often,occasionally,sometimes
2100 DATA tend to be,are,are inclined to be
2110 DATA short of patience,uneasy,at odds
2120 DATA others.,close friends.,younger people.
2125 DATA those in authority.
2130 DATA " Beware of "," Avoid "
2140 DATA Apple pie,being alone,dark places
2145 DATA strangers,unusual situations
2150 DATA be taking a trip you have not made before.
2160 DATA be meeting someone you will know for the
rest of your life.
2170 DATA make several important decisions involving
others.
2180 DATA become ill if you do not lessen your unusual
activities.

```





# What I Did with My Trash

## Ten Years with a TRS-80

(Eric Bagai - Flaming Sparrow Press, Box 9747, North Hollywood, CA 91609)

A Review by Allen Jacobs

For the ones who don't know, SAGATUG is the acronym for the San Gabriel Tandy Users Group. Anyone who attends SAGATUG meetings knows that I usually get there a "little" late. The June meeting was certainly no exception. Everyone was in the "meeting room" having a RAM session when I arrived at the "machine room" on the other side of the glass partition, dragging in one of my Model 4/P's and a non-operational 5 meg hard drive for Roy Beck to take a look at. It was then that I discovered a number of copies of gray paperback books next to nearly everyone's machine at the meeting.

At first, I thought they might have been copies of the "lost" issue from Volume One of "The Alternate Source". Possibly, they were bound copies of the latest version of some fractal generating program for the MS-DOS rhinoceri who remain faithful members of the group. Instead, they turned out to be copies of Eric Bagai's new book: What I Did with My TRASH - Ten Years with a TRS-80.

The book is essentially a charming compilation of some of Eric's best articles on computing, edited and commented by himself. His introduction to each article provides its relevance and places it within the whole of the work. Some of the introductions also contain an additional insight or two.

For those who don't know him, Eric Bagai is the leader of the Valley TRS-80 Hacker's Group (VTHG), which is sufficient introduction for now. Those who know him better, know that a proper introduction for him would be larger than this review. I still discover new things about him occasionally, such as things he has done and people he knows. After all, I have known him for "only" 8 years.

While the book is easily described, it is hard to characterize. That is because of its depth. In spite of this, it is easy to read. You will find yourself wanting to complete it in a single two hour session. So, make sure you have enough time for that. The book is 76 pages long, including illustrations.

It is written completely in prose, but somehow when you're done, you will know that you have read a poem. Most of it is light. Some of it is dark. Some of it examines areas of gray. All of it together forms a highly resolved and fully textured image of the first ten years of the personal computer revolution.

The book's frame of reference is not from the usual corporate historical viewpoint. Those kinds of books usually start their chronology with the Babbage Mathematical Engine and end with Microsoft OS/2, and more often than not, overlook Unix. Instead, this book is from

Eric's point of view, as an early TRS-80 "hacker" (a "user" like the rest of us). It is about the beginning of the personal computer age, and represents Eric's efforts to humanize that information revolution. He also desires to put into perspective the implications, that information technology presents, to both society and self.

For those reasons, and the practical need for hard information exchange, Eric co-founded, attends, and/or leads TRS-80 computer clubs. He contributes his own special rationality, philosophy, effort, time, and friendship to every meeting. It is also one reason why he writes. He has brought these same qualities to his book.

Eric pictures the computer as a potential means of individual empowerment within society, as was the invention of movable type (ie.: printing and its implications for the common man). One might say that if the pen is mightier than the sword, then the computer (ie.: the entire information age) is mightier than the pen.

From all this, it sounds as though the book must be very heavy reading in order to relate such a message. Imagine all that in just 76 pages! However, that isn't the case, at all. It is just my review that is getting to be that way. The book itself is largely light hearted and humorous and does not address itself to any of the things I have mentioned, directly.

Here are the book's subjects, on an essay by essay basis:

The book pokes fun at the pomposity, pretense, and technical obfuscation (ie.: bull) used by those struggling to sell their piece of software. Usually there was the promise that it is "the last program you will ever need", as in the spoofish article: "Squamish - A product description (not a review)".

The same light is shown upon the equally touted, though fictitious, computer language: "GW-North: a review".

Humorous hyperbole, to match our initial over expectations at the beginning of the information age, abounds in the: "Valley TRS-80 Hacker's Group Schedule of Topics for Future Meetings".

The book provides everything you need to know about a user group, and the users in it. Eric should know, since he has the experience. His thorough analysis and methodology is presented in: "How to Start (and Keep) a User Group".

Included, is a list of the: "Bylaws of the Valley TRS-80 Hacker's Group". The bylaws are demonstrably successful because they are currently in effect at the group. They

work. With obvious minor modifications, they might be useful to your club if you require formal rule systems.

Private enterprise is not forgotten in the advertisement from Creative Design Craft for: "Floppy Pockets". If you want to know what they are, find your original Multidos 1.6 System Disk and look at the sleeve it came in.

The op-ed (ie. opinion-editorial) piece included in the book entitled: "The Real Hackers" was published in the Los Angeles Times.

With an eye to the practical, "The Lost Powers of Scribes" are explored, as "legend" has it.

Alas, "Dear Helen" falls into the software abyss known as Superscripts, while Eric attempts to save her.

Realizing that change is the nature of the information age, the book instructs you on the eminent eventuality: "How to Sell Your Trash".

Printing the unprintable, considering the unthinkable, and testing the limits are not the only subjects examined in a surprising discussion of: "The First Hackers". Is human behavior more pervasive than we think?

Finally, the book lists its "Credits".

Although few will know why, I found the "Credits" section of the book personally touching, because I discovered a little bit of myself within it. Admittedly, a book review is not the place to evaluate my own influence on the writings of the author, but I must accept the responsibility for that influence. So, even if my best efforts at the time only served to increase the chaos of the moment, then my only salvation can be that those chaotic efforts occurred long ago...

It is admittedly difficult to be objective about a book through which, the period it covers, the reviewer has lived. However, I could not help realizing what a pleasure it has been to be a member of the club, a friend of the author, and a part of the book I was reading. Nor could I overlook how much more I and other members have actually received from the club than most of us put into it. It is obvious that many of the apparently "free" dividends we have enjoyed have actually occurred because of the work and the heart of Eric.

While Eric's writings are unique, TRS-80 "hacker types" everywhere will relate to virtually every essay in the book. I recommend it, both objectively and enthusiastically.

(Price \$5.95 - available from: Flaming Sparrow Press, Box 9747, North Hollywood, CA 91609)



## 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 6 disks for the Model I & III, and 3 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, diskname/bas, menu/cmd, ripper3/bas, sky2/bas, sky2/his, space/cmd, stocks/bas, trs13pat/bas, vidsheet/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, othello4/bas, scroll4/cmd, scroll4/src, setdate6/cmd, setdate6/doc, setdate6/fix, spaceadv/bas, taxman/bas, utilbill/bas, utilbill/doc

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### TRSTimes PD-DISKS

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# QUEEN FOR A DAY

## Model 4 game

By Lance Wolstrup

Chess, the grandest board game of them all, has always held a certain fascination for me. As a kid and a young man I made it a point never to turn down a game; I seem to remember that at one time I had games with seven different people going by mail. Alas, for the past few years I just haven't had sufficient time to indulge in this pleasant pastime - somewhere along the line my enthusiasm was transferred to programming and the TRS-80.

Recently, I ran across a book called BASIC COMPUTER GAMES by David Ahl (1978 Workman Publishing). Amongst many others, it contained a game called QUEEN, based on the permissible moves on the chess queen. This caught my eye, so I read through the program listing - not bad! Though it was written for MITS Altair Basic, it had potential.

After procrastinating for a couple of days (I prefer to call it '*clearing my mind for a new project*') I sat down with the 4P and began to write. The concept of the game, of course, is identical to the original, but the code is entirely new and different, and written especially for the Model 4.

The object of QUEEN4 is to move a graphic block (which we will call the 'queen') to the bottom left square of 8x8 chess-like gameboard. The queen may move just like the queen in chess with the exception that it cannot move up or to the right. In other words, it must always move towards the bottom left square (square number 57).

The TRS-80 is a very formidable opponent. As a matter of fact, it is so good that if you make just one teenie-weenie mistake, you'll get your pants severely kicked - no prisoners taken - no mercy!

To compensate for the devastating ruthlessness of the machine, you are given one advantage: you get the first move; that is, you get to choose where on the board to place the queen. The piece may be placed at any of the top eight squares (1-8), or at any of the rightmost eight squares (8-64). After the initial position of the queen is chosen, the computer makes its move, and play then alternates between you and the TRS80.

The program begins by showing the gameboard with its sixtyfour squares, numbered 1 to 64. To the right of the gameboard are the credits and a short description of the rules. Pressing <ENTER> begins the play.

You are now prompted to place the queen on the board. Remember, the queen must be placed on one the top row squares, or on one of the squares on the extreme right side. If any but these are chosen, an error message telling you that the 'move is illegal' will appear. You will then have the opportunity to make a legal move.

After you have placed the queen in a legal starting square, the machine will think for a short period, and then

make its move. You are then prompted for your next move. Again, if you attempt to move to a square not conforming to the rules, the 'illegal move' error message appears, and you can make your legal move. The one placing the queen on the bottom left-most square (square number 57) is the winner.

After the winner has been declared, you are asked if you wish to play another game. Pressing 'Y' starts a new game; pressing 'N' erases the screen and ends the play.

Unless you are a real 'chess-sharpie', I venture to say, you'll get blown out of the water. So, to help you devise a winning strategy, the numbers of the squares used in the game are erased. This way you can trace the moves of the game and, quite possibly, see where you messed up.

Line 3 of the program listing might be of interest to Model 4 Basic programmers. This line disables the bank switching of the screen, thus making the screen constant for much faster and smoother writes. (*a discussion of this technique can be found in the 'HUNTING FOR BURIED TREASURE' column in TRSTimes 1.6. - Nov/Dec 1988*)

Of equal interest are lines 260 and 720. Both are potential exit routines so, if the exit option is chosen, the screen bank switching is restored, and the memory taken up by the constant screen is released back to Basic.

The more observant of you will notice that, other than turning the cursor on or off, the PRINT statement is hardly used. This might seem odd, especially since QUEEN4 is very screen oriented. The trick is that I routed almost all screen writes to the subroutine in line 23. There, the cursor is positioned according to the value of variable V\*80, to which is added the value of variable H. This way, should any of you decide to translate the program to Model I & III, most of the screen handling can be changed easily to their 64 column screen. Simply change the 80 to 64.

Finally, the routine in lines 40-48 is the multiple keystroke INKEY\$ routine which replaces the INPUT statement (*credit for the original version of this routine goes to Bill Harrison - from TRSTimes 1.1. - Jan/Feb 1988*). I use a multiple keystroke INKEY\$ routine, rather than INPUT, because of the graphic screen display. The INPUT statement has a nasty and undesirable habit of erasing portions of the display.

0 'QUEEN4/BAS for Model 4

1 '(c) 1989 TRSTimes & Lance Wolstrup

2 '

3 CLEAR,&HF7FF:POKE &H78,134:OUT &H84,134

4 DEFINT C-Z:FL=9

5 B0\$=CHR\$(151)+STRING\$(5,131):

FOR X=1 TO 8:B1\$=B1\$+B0\$:NEXT:

B1\$=B1\$+CHR\$(171)

```

6 B0$ = CHR$(149) + STRING$(5,32):
FOR X = 1 TO 8:B2$ = B2$ + B0$:NEXT:
B2$ = B2$ + CHR$(170)
7 B0$ = CHR$(181) + STRING$(5,176):
FOR X = 1 TO 8:B3$ = B3$ + B0$:NEXT:
B3$ = B3$ + CHR$(186)
8 B$ = CHR$(191)
9 BL$ = CHR$(170) + STRING$(3,191)
10 GOTO 100
23 PRINT@V*80 + H,A$,:RETURN
30 V = INT(A/8.1)*3 + 1
31 IF A/8 = INT(A/8) THEN H = 43
ELSE H = (A MOD 8-1)*6 + 1
32 RETURN
35 A = VAL(A$):A$ = STRING$(4,32):
GOSUB 23:RETURN
40 A$ = "":PRINT CHR$(14);
41 L = 0:FL = 0
42 I$ = INKEY$:IF I$ = "" THEN 42
ELSE IF I$ = "Q" OR I$ = "q" THEN FL = 1:RETURN
ELSE IF I$ = "N" OR I$ = "n" THEN FL = 2:RETURN
43 IF I$ = CHR$(13) THEN PRINT CHR$(15);:RETURN
44 IF I$ = CHR$(8) AND L = 0 THEN 42
45 IF I$ = CHR$(8) THEN L = L-1:A$ = LEFT$(A$,L):
PRINT CHR$(8);:GOTO 42
46 IF I$ < CHR$(48) OR I$ > CHR$(57) THEN 42
47 IF L = 2 THEN 42
48 PRINT I$;A$ = A$ + I$:L = L + 1:GOTO 42
50 A$ = "Illegal move - press < ENTER > ":GOSUB 23:
PRINT CHR$(14);
51 I$ = INKEY$:IF I$ < > CHR$(13) THEN 51
ELSE PRINT CHR$(15);:RETURN
60 V = 13:H = 50:GOSUB 50:A$ = CHR$(30):
GOSUB 23:V = 8:GOSUB 23:RETURN
100 PRINT CHR$(15):CLS:V = 0:H = 53:
A$ = "TRSTimes presents: QUEEN4":GOSUB 23
110 V = 1:H = 53:A$ = "Adapted and rewritten for":
GOSUB 23:V = 2:A$ = "Model 4 by Lance Wolstrup":
GOSUB 23:V = 3:H = 52:
A$ = STRING$(LEN(A$) + 2,140):GOSUB 23
120 V = 4:H = 53:A$ = "Original version of QUEEN":
GOSUB 23:V = 5:H = 52:
A$ = "appeared in the book 'BASIC':GOSUB 23:
V = 6:A$ = "Computer Games' by D.H. Ahl":
GOSUB 23:V = 7:A$ = STRING$(LEN(A$),131):
GOSUB 23
130 V = 8:A$ = "The game of QUEEN4 is based":
GOSUB 23:V = 9:
A$ = "on the permissible moves of":GOSUB 23:
V = 10:A$ = "the chess queen - along any":GOSUB 23
140 V = 11:A$ = "vertical, horizontal or dia":GOSUB 23:
V = 12:A$ = "gonal. The object of QUEEN4":GOSUB 23:
V = 13:A$ = "is placing the queen in the":GOSUB 23:
V = 14:A$ = "lower left-hand square #57.":GOSUB 23
150 V = 15:H = 53:A$ = "This game allows the queen":
GOSUB 23:V = 16:H = 52:
A$ = "to move only left, down, or":GOSUB 23:V = 17:
A$ = "diagonally down to the left.":GOSUB 23

```

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160 V = 18:A$ = "You are playing against the":
GOSUB 23:V = 19:A$ = "computer, and you go first.":
GOSUB 23:V = 20:A$ = STRING$(LEN(A$),131):
GOSUB 23
170 H = 0:V = 0:FOR Y = 1 TO 8:A$ = B1$:GOSUB 23:
V = V + 1:A$ = B2$:GOSUB 23:V = V + 1:
A$ = B3$:GOSUB 23:V = V + 1:NEXT
180 V = 1:H = 1:FOR Y = 1 TO
64:PRINT@ (V,H),USING"###";Y,:PRINT STRING$(2,32);:
H = H + 6:IF Y/8 = INT(Y/8) THEN V = V + 3:H = 1
190 NEXT
200 IF FL = 9 THEN V = 22:H = 54:
A$ = "Press < ENTER > to play " + CHR$(14):
GOSUB 23 ELSE 220
210 I$ = INKEY$:IF I$ < > CHR$(13) THEN 210
ELSE PRINT CHR$(15);:H = 50:
A$ = STRING$(30,32):FOR V = 8 TO 22:
GOSUB 23:NEXT
220 V = 21:H = 52:A$ = STRING$(28,131):
GOSUB 23:V = 22:
A$ = "Q = Quit" + STRING$(8,32) + "N = New game":
GOSUB 23
230 V = 9:H = 52:A$ = CHR$(30):GOSUB 23:
A$ = "Place the queen":GOSUB 23:V = 10:
A$ = "at square number: ":GOSUB 23
240 GOSUB 40:A = VAL(A$):
IF A > 8 THEN IF A/8 < > INT(A/8) THEN GOSUB 60:
V = 10:H = 70:A$ = CHR$(30):GOSUB 23:GOTO 240
250 H = 52:A$ = CHR$(15) + CHR$(30):
FOR V = 9 TO 10:GOSUB 23:NEXT:
IF FL < > 1 THEN 270 ELSE V = 9:H = 55:
A$ = "Quit - are you sure?":GOSUB 23:V = 10:
A$ = "Type Y to confirm " + CHR$(14):GOSUB 23
260 I$ = INKEY$:IF I$ = "" THEN 260
ELSE IF I$ = "Y" OR I$ = "y" THEN CLS:
POKE &H78,135:OUT &H84,135:CLEAR,&HFFFF:END
ELSE PRINT CHR$(15);:H = 52:A$ = CHR$(30):
FOR V = 9 TO 10:GOSUB 23:NEXT:GOTO 230
270 IF FL = 2 THEN V = 9:H = 60:
A$ = "Resetting...":GOSUB 23:GOTO 180
280 IF A < 1 OR A > 64 THEN 230
290 GOSUB 30
310 A$ = BL$:GOSUB 23
320 V = 9:H = 56:A$ = "Your move: " + STR$(A):
GOSUB 23
330 '
340 V = 11:H = 52:A$ = "TRS-80's move: " + CHR$(14):
GOSUB 23
350 PRINT"thinking...":FOR X = 1 TO 5000:NEXT:
H = 67:A$ = CHR$(15) + STRING$(12,32):GOSUB 23
360 IF A = 5 OR A = 32 OR A = 20 OR A = 38 OR A = 42
OR A = 51 THEN Z = RND(10):
IF Z > 6 THEN A$ = STR$(A + 8):GOTO 450
ELSE IF Z > 3 THEN A$ = STR$(A + 7):GOTO 450
ELSE A$ = STR$(A-1):GOTO 450
370 C = 0
380 FOR X = 7 TO 1 STEP -1:M = A + 8*X:GOSUB 500
390 IF C = 1 THEN X = 1:A$ = STR$(M):GOTO 440

```

```

400 M=A-X:IF M<INT(A/8.1)*8+1 THEN 440
ELSE GOSUB 500
410 IF C=1 THEN 390
420 M=A+7*X:IF M=INT(M/8) THEN 440
ELSE GOSUB 500
430 IF C=1 THEN 390
440 NEXT
450 PRINT CHR$(15);
451 GOSUB 30
460 GOSUB 35
470 GOSUB 30
480 A$=BL$:GOSUB 23:V=11:H=67:
A$=STR$(A):GOSUB 23
490 PL=1:IF A=57 THEN 690 ELSE 520
500 IF M=57 OR M=51 OR M=42 OR M=38 OR
M=20 THEN C=1
510 RETURN
520 V=9:H=63:A$=CHR$(30):GOSUB 23:
H=56:A$="Your move: "+CHR$(14):GOSUB 23:
SOUND 0,0
530 GOSUB 40:PRINT CHR$(15);
540 IF FL<>1 THEN 560 ELSE H=52:
A$=CHR$(30):FOR V=11 TO 13:GOSUB 23:
NEXT:V=11:H=55:A$="Quit - are you sure?":
GOSUB 23:V=12:A$="Type Y to confirm "+CHR$(14):
GOSUB 23
550 I$=INKEY$:IF I$="" THEN 550
ELSE PRINT CHR$(15);:
IF I$="Y" OR I$="y" THEN POKE &H78,135:
OUT &H84,135:CLR,&HFFF:CLS:END
ELSE H=52:A$=CHR$(30):FOR V=11 TO 12:
GOSUB 23:NEXT:GOTO 520

```

```

560 IF FL=2 THEN H=52:A$=CHR$(30):
FOR V=9 TO 13:GOSUB 23:NEXT:
V=9:H=60:A$="Resetting...":GOSUB 23:GOTO 180
570 IF A=VAL(A$) OR VAL(A$)<1 OR VAL(A$)>64
THEN 610
580 IF VAL(A$)<A THEN IF VAL(A$)<INT(A/8.1)*8+1
THEN 610 ELSE 620
590 IF (VAL(A$)-A)/8=INT((VAL(A$)-A)/8) THEN 620
600 IF (VAL(A$)-A)/7=INT((VAL(A$)-A)/7) THEN
IF VAL(A$)/8=INT(VAL(A$)/8) THEN 610 ELSE 620
610 GOSUB 60:GOTO 520
620 GOSUB 30
640 GOSUB 35
650 GOSUB 30
665 A$=BL$:GOSUB 23
670 IF A=57 THEN PL=0:GOTO 690
680 GOTO 310
690 V=14:IF PL=1 THEN H=61:A$="TRS-80 wins":
GOSUB 23:FOR X=0 TO 7:SOUND RND(8)-1,0:NEXT:
ELSE H=63:A$="You win":GOSUB 23:
FOR X=5 TO 1 STEP -2:SOUND X,0:NEXT
700 H=52:A$=CHR$(30):FOR V=20 TO 22:
GOSUB 23:NEXT
710 V=16:H=57:
A$="Another game (Y/N) "+CHR$(14):
GOSUB 23
720 I$=INKEY$:IF I$="N" OR I$="n" THEN CLS:
POKE &H78,135:OUT &H84,135:CLR,&HFFF:END
ELSE IF I$="Y" OR I$="y" THEN PRINT CHR$(15);:
H=52:A$=CHR$(30):FOR V=9 TO 16:GOSUB 23:
NEXT:GOTO 180 ELSE 720

```

## NEW PROGRAMS

from  
the Valley TRS-80 Hackers' Group  
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for Model I, III & 4

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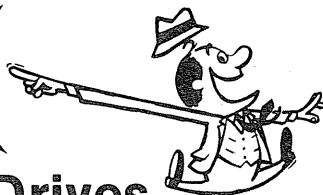
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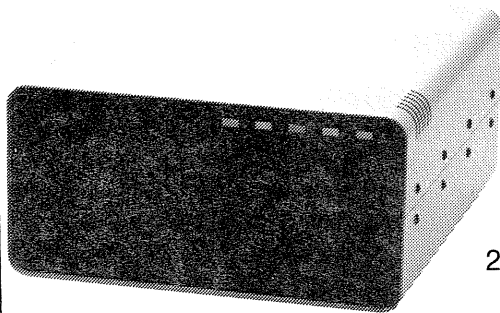


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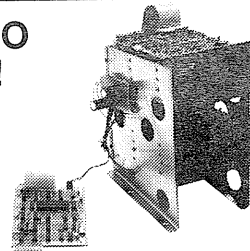
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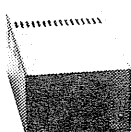
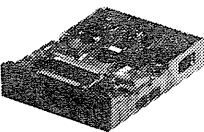


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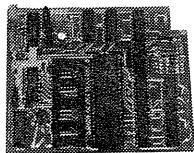
### CABLES - CASES - DOS

IBM ext floppy cable (drives C/D)	\$39
TRS-80 2-drive floppy cable	24
TRS-80 4-drive floppy cable	34
6" floppy ext cable, gold contacts	12
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CP/M System Prog Manual, Model 4	5	<b>TRS-80 BOOKS</b>	
Monte's Mail (newsltr), Vol 1 #1, Vol 2 #1		Games & Graphics for the TRS-80	\$1
Specify Volume	Each Volume 1	Inside Level II	1
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**GAMEDISK#2:** crams2/cmd (chase), falien/cmd (arcade), frankadv/bas (adv), iceworld/bas (adv), mini-golf/bas (putt-putt on the trs-80), pingpong/cmd (1 or 2 player arcade game), reactor/bas (simulation), solitr2/bas (another good solitaire card game), stars/cmd (2 player race game), trak/cmd (maze).

**GAMEDISK#3:** ashka/cmd (d&d), asteroid/cmd (arcade), crazy8/bas (card game), french/cmd (space invaders in french), hexapawn (board), hobbit/bas (adv), memalpha (adv), pyramid/bas (good solitaire card game), rescue/bas (arcade), swarm/cmd (arcade).

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Welcome to my FIRST ANNUAL CLOSET CLEARANCE for the TRS-80 Models 1, 3, 4. All items are available on a "make offer" basis, just like an auction. The best bids win. Please bid only on individual items except where package/batch items are noted. The usual rules: no overbids, no syndicates, no multiple bids on the same items. Bidding is closed on August 1st, 1990. Bids must be sent by USPS snail-mail and include a telephone number and street address. Postcards are fine, but might arrive too late. Winners will be notified by mail or phone & offered a choice of shipping methods & charges.

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65 Game tapes - bid as one batch.  
30 Mag tapes (Load80, CLOAD, Softside) - bid as one batch.

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Model 1 Disk Drive conversion unit: drive, DOS, Manual, etc. in original box, untouched.  
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40 Meg HD bubble - CMS K-40.  
10 Meg QCS HD w/ cables, controller, LDOS driver and HD Profile Plus - minimum bid \$200.  
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Orchestra-90: Everything except the box it came in.

### SOFTWARE: BUSINESS N' STUFF

Mail-V (Mailing list) - M1/3 Micro Architect  
One-D Mailing List - M1/3 Instant Software  
Business Mailing List - M1/3 RS#26-1558  
Target PlannerCalc - M4 RS#26-1512  
Formation - M3&4 modes RS#26-1527  
Timetable - M3 Software Guild  
Easy Calc - M1/3 Instant Software  
Tax/Saver II - M1  
Checkwriter-80 - M3 RS#26-1584  
Business Checkwriter - M3 RS#26-1585  
Check Management System - M1/3 Instant Software  
Inventory S (Stock-Invoicing) - M1/3 Ramware/TSE  
Inventory + - M1/3 Eduware  
General Ledger I V1.1 - M3 RS#26-1552  
Home-office Record-keeping System - M1/3 Eduware  
Cash Register 80 w/ Inventory - M1/3 Eduware  
Acct III (Accounts receivable) - M1/3 Micro Architect

### DATABASES & SPREADSHEETS

AFM Automatic File Manager - M1/3  
AFM Automatic File Manager - M1/3 BETA VERSION  
AUK's CFS - M1/3  
Profile III Plus - M3 RS#26-1592  
PFS File - M4 RS#26-1518  
PFS Report - M4 RS#26-1517  
Find It Quick - M1/3 Instant Software  
Tallymaster - M1/3 Prosoft  
Multiplan (v.1.07) - M4 RS#26-1530  
Visicalc - M3  
Visicalc v.2.09.02 - M4 RS#26-1520  
Intro to VisiCalc Spreadsheets - M3 (Book & Disk) Anbarlian  
UltraPX - M1/3 C.I.E.

## DOSs & LANGUAGES

DosPlus - M3 v.3.3  
DosPlus - M3 v.3.4/4.0  
DosPlus - M3 v.3.5  
Multidos v.1.7 - Model 1 dd Alphabit Comm.  
Multidos v.1.7 - M4 Alphabit Comm.  
Multidos v.1.71 - M3 Alphabit Comm.  
Model 4/4pP Disk Manual - w/ QRC, Introd., v.6.1.0  
Model 4 Disk Manual - w/ QRC, Introd., v.6.2.1  
Model III Disk Manual - RS#26-211 v.1.3  
CBASIC Language (v.2.8) - M4 (RS#26-2217)  
NewBasic - M1 Comp. Infor. Exchange  
COBOL - M1/3 RS#26-2203  
PASCAL - M1/3 RS#26-2211  
CP/M Plus - M4 RS#26-2216

### PRIVATE UTILITIES

J&M Disk Diagnostic Programs - M3/4 SS  
Faster v.1.2 - M1/3 Prosoft  
Toolbelt 6.0 for TRSDOS 6.x - M4 Breeze/QSD  
BLINK: BASIC Link Facility - M1 Racet Computes  
Super Duper - M1/3 WittSoft  
Disk-Tape Exchanger - M1/3 Instant Software  
Disc Scope - M1/3 Instant Software  
RPM - M1/3 Prosoft  
Z80 Zap/cmd - M1 Ramware  
Tasmon - M1/3 TAS  
RSM-2/2D Relocator - M1 Small Syst. Software  
DLDIS Disk Labeling Disassem - M1/3 Instant Software  
Super Utility Plus - M1/3 Breeze/QSD  
Editor/Assem-Plus & Z-Bug - M1 Microsoft Disk & Cass  
DSM Disk Sort Merge - M1 Racet Computes  
Utility - M1 Ramware/Nepenthe  
Monitor 5 - M1/3 Software Guild  
IRV with Superkeyboard - M1 Programmer's Guild  
TRS80 Floppy Disk Diagnostic - M1 Ramware

### DISK CATALOGING

Disk Cataloger - M1 Hayden Software  
Master Directory - M1/3 Instant Software  
Findisk-II (Disk Indexer) - M1 Documan Software

### WORD PROCESSING

Allwrite - M4 Prosoft  
NewScript v.1.7 (w/daisy suppl) - M3 Prosoft  
Powerscript - M3/4 Powersoft  
Superscript - M1/3 Acorn-Scriptit patch  
Qwerty Daisy (Scriptit patch/driver) - M1/3 for DWPII, Med Sys  
Scriptit (cassette version) - M1 RS#26-1505  
Disk Scriptit - M1 RS#26-1563  
Scriptit - M4 RS#26-1596  
Superscriptit - M3  
LeScript (v.1.63) - PC/XT & Tandy 1000  
Electric Pencil (Manual Only) - M1 cass. 1978 (1st ed.)  
Proof Reader/Proof Edit - M3 Aspen  
Electric Webster (w/grammar & hyph) - Specify M1/3/4 and the word processor you want to use with it.

### GRAPHICIZING

Power-Draw- M1/3 Powersoft  
Dotplot-80 - M1/3/4 Cass & Disk  
Dotwriter 4.0 - M1/3/4  
Dotwriter Letterset Ref/design - M1/3/4

### HOME STUFF

Creative Cuisine - M1/3 Apparat  
Computer Chef - CP/M Software Toolworks  
Home Budget - M1/3 Software Guild  
Home Accountant - M3 Continental Software

### TOYS

Defense Command - M1/3 Big Five  
Cyborg - M3 Computer Shack  
Master Reversi - M1/3 Instant Software  
Sledge of Rahmul/Merlin's Treas. - M1/3 Adventure Intl.  
Monty Plays Scrabble - M3 #26-1954  
Armored Patrol - M1/3 Adventure Intl.  
Monty Plays Monopoly - M3 Personal Software

Eliza - M1/3 RS#26-1908  
Eliminator - M1/3 Adventure Intl.

### MODEL 100

Starblaze 100 - M100-cassette RS#26-3840  
Calculator - M100-cassette RS#26-3827  
Executive Calendar - M100-cassette RS#26-3833

**Almost all software includes original disks and docs**  
**Exceptions have either original disks or docs**

### DISKS WITHOUT DOCS

\* = INCLUDES HELP

Hyperzap - M1/3 Hypersoft  
\* Hypercross - M4 Hypersoft  
Maxi Manager - M3 Adventure Intl.  
Newclock-80 - M1 Alpha Products  
Super Terminal - M1/3 D. Lindbergh Inst Sftwre  
Anysort 3.2 - M1 Programma Intl.  
Trakcess III - The Alternate Source  
Copycat 3 - M3/4 Omnisoft research  
\* Dos Tamer-Multidos 1.6 - George Fischer  
\* Dos Tamer-Newdos/80 v.2 - George Fischer  
Basic Faster & Better Demo - Rosenfelder (see books)  
Basic Faster & Better Library - Rosenfelder (see books)  
Versafiles v.1 - W. Schroeder RS#26-1604  
Inventory Control - M1/3 RS#26-1553  
Visicalc - M3 RS#26-1569  
Zork 1 - Infocom RS#26-1951  
\* Interlude - Syntonic Software  
Dynamic Data Base - M1 Ramware/TSE  
Print Spool - M1 Ramware/TSE  
File Manager 80 - M1 Ramware/TSE  
Cyborg - Superdirectory - M3 Computer Shack

### DOCS WITHOUT DISKS

Super Utility Plus Manual -M1, 1981/82 Kim Watt  
Super Utility Tech Manual (1982) Kim Watt  
Super Utility (Manual only, 1st edition) 1980 Kim Watt  
LeScript v.1.3 (Manual only) Anitek  
TRS-80 Microcomputer Technical Reference Hbk RS#26-2103 (M1)  
TRS-80 Model 4 Technical Reference Manual RS#26-1110 (Model 4)  
TRS-80 M3 Operation & BASIC Ref Manual - RS  
TRS-80 M3 Oper. & BASIC Lang. Ref Manual RS#26-2112  
User's Manual for Level 1 (1st ed., 1st print) Lien, 1977  
Level II BASIC Reference Manual, RS 1st ed.  
Level II BASIC Reference Manual, RS 2nd ed. RS#26-2102

### BOOKS

AT&T 5310/5320 Printer Manual - AT&T  
TRS-80 Level II BASIC - Albrecht RS#62-2061  
BASIC Conversions Handbook: Apple/TRS-80-Pet  
TRS-80 Pocket Handbook - Barden (spiral)  
TRS-80 Assembly Language Programming - Barden RS#62-2006  
Programming Techniques for Level II BASIC - Barden RS#62-2062  
Business Programming Applications - Barden - RS#62-2074  
More TRS-80 Assembly Language Programmi.-Barden - RS#62-2075  
Successful Software for Small Computers - Beech  
Mostly BASIC: Applications for your TRS-80 - Berenbon  
Computer Graphics - 29 ready-to-run programs-Chance  
TRS-80 Programming in Style - Dwyer & Critchfield  
Computer Programming in BASIC for Everyone - Dwyer & Kaufman  
Microsoft BASIC Decoded & Other Mysteries - Farvour  
How to Write a TRS-80 Program - Faulk  
Data File Programming in BASIC - Finkel & Brown  
BASIC Programming for Business - Forkner  
More Subroutine Sandwich - Grillo & Robertson  
Subroutine Sandwich - Grillo & Robertson  
TRS-80 Assembly Language - Howe  
TRS-80 Graphics - Inman RS#62-2063  
TRS-80 Graphics for M1/3 Kater & Thomas RS#62-2087  
The Custom TRS-80 & other Mysteries - Kitsz  
Mod4 by Jack - Klein  
MX Printer Manual with GRAFTRAX+ - Lien  
The BASIC Handbook: Encycl. of BASIC Lang. - Lien

Learning Level II - Lien

The TRS-80 Model 100 Portable Computer - Lien RS#26-3819  
BASIC - Marateck  
The McWilliams II Word Proc. Inst. Manual - McWilliams  
BASIC Programs for Scientists & Engineers - Miller  
BASIC for Business, M2/3 - Parker  
TRS-80 Disk BASIC for Business, M2/3 - Parker  
TRS-80 Disk & other Mysteries - Pennington  
Some Common BASIC Programs - Poole & Borchers  
Encyclopedia for the TRS-80, 5 vols. -Pub: Wayne Green  
Disassembled Handbook for the TRS-80 - Richcraft  
BASIC Better & Faster & other Mysteries - Rosenfelder (see disks)  
32 BASIC Programs for the TRS-80 - Rugg & Feldman  
The BASIC Workbook - Schoman  
Programmer's Guide to LDOS/TRSDOS V.6 - Soltoff  
Getting Started With TRS-80 BASIC, M1/3/4 - Stewart  
57 Practical Programs & Games in BASIC - Tracton  
Multiplan Home & Office Companion - Tymres/Antoniak  
Visicalc Applications - Williams  
Multiplan Applications - Williams  
80 Micro's Review Guide - 80 Micro

### MAGAZINES

**(bid for complete set, except as noted)**

80 Microcomputing Magazine - Complete set incl Anniversary issue.  
80 Microcomputing Magazine - Individual issues: \$2 each - 1st come  
The Alternate Source Magazine: Issues 1-19 w/BTIs & updates  
The Alternate Source Collection Vol. 1: TAS issues 1-6, bound reprint  
The Alternate Source Collection Vol. 2: TAS issues 7-12, bound reprint  
TRS-80 Microcomputer News - 1st year, Original 1st two issues, 1978  
TRS-80 Microcomputer News - 2nd year, Orig. issues, complete 1979  
TRS-80 Microcomputer News - 3rd year, Orig. issues, complete 1980  
TRS-80 Microcomputer News - Next 3 years, Orig. issues 1/81-6/84  
TRS-80 Microcomputer News - 1st 3 years, Reprint RS#26-2115  
DosPlus News Information Center Micro Systems - All 82 & 83 issues!  
Northern Bytes, Vol 5 #1-7  
Computronics Magazine, Issues 29-60

### Yes, but what does this all mean?

What this means is that in the course of a lot of horse trading in the last ten years I've acquired a lot of stuff and I am running out of room in which to put OTHER stuff that I'd rather have to clutter my life up with.... with which to clutter my life up.... up with which my life is really cluttered. Yeah, what he said.

This does not mean that I'm abandoning the TrashAD world for a mess of PCs; even for a mess of Amigas. I am now, and until the great thump doth us part, committed to my M4D+s & M4p+s. For example my current projects are Mod4 Postscript, and a Mod III virtual NeXT (the 4 hack is trivial).

So if you see something you like in my closet, just say so.

**ERIC BAGAI**  
**BOX 9747**

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DMP 200 .....	\$155
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DW II Sheet Feeder (New) .....	\$245
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## Software and Miscellaneous

MD 3 Scriptsit Dictionary .....	\$22
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MD 3 Fortran .....	\$45
MD 3 Pascal .....	\$45
MD 3 Profile .....	\$15
MD 3 Profile Plus .....	\$29
MD 3 Scriptsit Disk .....	\$29
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MD 4 Allwrite .....	\$45
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MD 4 W-2 Writer .....	\$29
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MD 4 Real Estate Loans Analysis .....	\$34
MD 4 T.K. Solver .....	\$45
MD 4 TRS 80 Computer Graphics .....	\$35
MD 4 Video Tex Plus .....	\$39
MD 4 Superscriptsit .....	\$55
Mod 4 TRS DOS & Manual .....	\$24
Mod 4/4P Technical Reference .....	\$29
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# PACIFIC COMPUTER EXCHANGE

1031 S.E. Mill, Suite B • Portland, Oregon 97214

# ATTENTION TRSDOS 1.3. USERS!

**ANNOUNCING "SYSTEM 1.5.", THE MOST COMPREHENSIVE 1.3. UPGRADE EVER OFFERED!  
MORE SPEED!! MORE POWER!! MORE PUNCH!!**

While maintaining 100% compatibility to TRSDOS 1.3., this DOS upgrade advances TRSDOS 1.3. into the 90's!  
SYSTEM 1.5. supports 16k-32k bank data storage and 4MGHZ clock speed (4/4P/4D).

**DOUBLE SIDED DRIVES ARE NOW 100% UTILIZED! (all models).**

CONFIG=Y/N  
TIME=Y/N  
BLINK=Y/N  
LINE='XX'  
ALIVE=Y/N  
TRON=Y/N  
TYPE=B/H/Y/N  
SLOW  
CPY (parm,parm)  
SYSRES=Y/N  
SPOOL=H/B.SIZE  
SPOOL=N  
SPOOL=RESET  
SPOOL=CLOSE  
FILTER \*PR.IGLF  
FILTER \*PR.FILTER  
FILTER \*PR.FIND  
FILTER \*PR.LINES  
FILTER \*PR.TMARG  
FILTER \*PR.PAGE  
FILTER \*PR.TOF  
FILTER \*KI.ECHO  
ATTRIB:d.PASSWORD

CREATES CONFIG BOOT UP FILE  
TIME BOOT UP PROMPT ON or OFF  
SET CURSOR BOOT UP DEFAULT  
SET \*PR LINES BOOT UP DEFAULT  
GRAPHIC MONITOR ON or OFF  
ADD an IMPROVED TRON  
HIGH/BANK TYPE AHEAD ON or OFF  
2 MGHZ SPEED (MODEL III'S)  
COPY/LIST/CAT LDOS TYPE DISKS  
DISABLE/ENABLE SYSRES OPTION  
SPOOL is HIGH or BANK MEMORY  
TEMPORARILY DISABLE SPOOLER  
RESET (NIL) SPOOL BUFFER  
CLOSES SPOOL DISK FILE  
IGNORES 'EXTRA' LINE FEEDS  
ADDS 256 BYTE PRINTER FILTER  
TRANSLATE PRINTER BYTE TO CHNG  
DEFINE NUMBER LINES PER PAGE  
ADDS TOP MARGIN to PRINTOUTS  
NUMBER PAGES, SET PAGE NUMBER  
MOVES PAPER TO TOP OF FORM  
ECHO KEYS to the PRINTER  
CHANGE MASTER PASSWORD

DATE=Y/N  
CURSOR='XX'  
CAPS=Y/N  
WP=d.Y/N (WP)  
TRACE=Y/N  
MEMORY=Y/N  
FAST  
BASIC2  
SYSRES=H/B/'XX'  
MACRO  
SPOOL=D.SIZE='XX'  
SPOOL=Y  
SPOOL=OPEN  
FILTER \*PR.ADLF=Y/N  
FILTER \*PR.HARD=Y/N  
FILTER \*PR.Orig  
FILTER \*PR.RESET  
FILTER \*PR.WIDTH  
FILTER \*PR.BMARG  
FILTER \*PR.ROUTE  
FILTER \*PR.NEWPG  
FILTER \*KI.MACRO  
DEVICE

DATE BOOT UP PROMPT ON or OFF  
DEFINE BOOT UP CURSOR CHAR  
SET KEY CAPS BOOT UP DEFAULT  
WRITE PROTECT ANY or ALL DRIVES  
TURN SP MONITOR ON or OFF  
BASIC FREE MEMORY DISPLAY MONITOR  
4 MGHZ SPEED (MODEL 4'S)  
ENTER ROM BASIC (NON-DISK)  
MOVE/SYS OVERLAY(s) TO HI/BANK MEM  
DEFINE ANY KEY TO MACRO  
LINK MEM SPOOLING TO DISK FILE  
REACTIVATE DISABLED SPOOLER  
OPENS, REACTIVATES DISK SPOOLING  
ADD LINE FEEDS BEFORE PRINTING 0DH  
SEND 0CH to PRINTER (FASTEST TOF)  
TRANSLATE PRINTER BYTE TO CHNG  
RESET PRINTER FILTER TABLE  
DEFINE PRINTER LINE WIDTH  
ADDS BOTTOM MARGIN to PRINTOUT  
SETS PRINTER ROUTING ON or OFF  
SET DCB LINE COUNT TO 1  
TURN MACRO KEYS ON or OFF  
DISPLAYS CURRENT CONFIG INFO

All parms above are installed using the new LIBRARY command SYSTEM (parm,parm). Other new LIB options include DBSIDE (enables double sided drive by treating the "other side" as a new independent drive, drives 0-7 supported) and SWAP (swap drive code table #s). Dump (CONFIG) all current high and/or bank memory data/routines and other current config to a disk data file. If your type ahead is active, you can (optional) store text in the type buffer, which is saved. During a boot, the config file is loaded back into high/bank memory and interrupts are recognized. After executing any active auto command, any stored type ahead data will be output. FANTASTIC! Convert your QWERTY keyboard to a DVORAK! Route printer output to the screen or your RS-232. Macro any key, even F1, F2 or F3. Load \*01-\*15 overlay(s) into high/bank memory for a memory only DOS! Enter data faster with the 256 byte type ahead option. Run 4MGHZ error free as clock, disk I/O routines are properly corrected! Spool printing to high/bank memory. Link spooling to disk (spooling updates DCB upon entering storage). Install up to 4 different debugging monitors. Print MS-DOS text files, ignoring those unwanted line feeds. Copy, Lprint, List or CATalog DOSPLUS, LS-DOS, LDOS or TRSDOS 6.x.x. files and disks. Add top/bottom margins and/or page numbers to your hard copy. Rename/Redate disks. Use special printer codes eg: LPRINT CHR\$(3); toggles printer output to the ROUTE device. Special keyboard codes add even more versatility. This upgrade improves date file stamping MM/DD/YY instead of just MM/YY. Adds optional verify on/off formatting, enables users to examine \*01-\*15, DIR, and BOOT sectors using DEBUG, and corrects all known TRSDOS 1.3. DOS errors. Upgrade includes LIBDVR, a /CMD driver that enables LIBRARY commands, such as DIR, COPY, DEBUG, FREE, PURGE, or even small /CMD programs to be used within a running Basic program, without variable or data loss.

**By special arrangement with GRL Software,  
SYSTEM 1.5. is now distributed exclusively by TRSTimes magazine.**

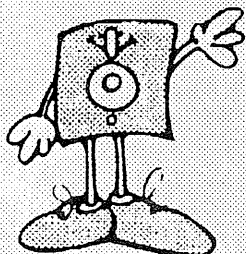
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# TIRED OF SLOPPY DISK LABELS? TIRED OF NOT KNOWING WHAT'S ON YOUR DISK? YOU NEED 'DL'



- 'DL' will automatically read your TRSDOS6/LDOS compatible disk and then print a neat label, listing the visible files (maximum 16).
- You may use the 'change' feature to select (or reject) the filenames to print. You may even change the diskname and diskdate.
- 'DL' is written in 100% pure Z-80 machine code for efficiency and speed.

'DL' is available for TRS-80 Model 4/4P/4D  
using TRSDOS 6.2/LS-DOS 6.3.0 & 6.3.1.  
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We sell complete hard drive units. They may cost a little more. However, we only use quality components such as Western Digital controllers (not some out of production parts), our own high speed host adapter, 60 watt power supply, room for a second hard drive or HH floppy, and quiet, time proven quality drives. Tandon (made by W.D.) Miniscribe and others, Seagate avail upon request. Hard disk units can be changed over to MS-DOS if desired. All Hard Drive units come complete with cables and driver of your choice, (LDOS Mod I/III, TRSDOS 6.x, LS-DOS 6.x, MULTIDOS \$10.00 Xtra)

10 Meg...\$ 425.00 15 Meg...\$ 495.00

20 Meg...\$ 545.00 30 Meg & up \$Call

Bare hard drive bubbles avail. CALL BBS

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Pkg of 25.....	\$ 9.95.....	\$ 25.95
100 5.25" Disk storage w/lock.....	\$ 11.95	
70 5.25" Disk storage w/lock.....	\$ 9.95	
40 3.5" Disk storage w/lock.....	\$ 8.95	
80 3.5" Disk storage w/lock.....	\$ 12.95	

## EXTERNAL DISK DRIVES

2 40 track HH DS DD.....	\$ 229.95
2 80 track HH DS DD.....	\$ 249.95
2 3.5" 80 track.....	\$ 269.95
1 80 track FH DS DD.....	\$ 119.95

## BARE DRIVES

40 track DS DD FH refurb 360k..	\$ 64.95
Replacement for SS Mod III & IV	
40 track DS DD HH. 360k.....	\$ 79.95
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3.5" 80 track. 720k.....	\$ 99.95

## DRIVE CASES W/Power supply

Hard Disk 1 FH or 2 HH w/fan...	\$ 99.95
Floppy 1 FH or 2 HH.....	\$ 59.95

## MOD IV MEMORY SETS

Caution some people do not specify new versus pulls.

8 4164-200ns new \$ 14.95/Pulls \$ 9.95	
8 4164-150ns new \$ 19.95/Pulls \$ 14.95	
Pal chip for non Gate/array	\$ 10.95

## MOD IV SPEED UP KITS

Non Gate array (5.1Mhz).....	\$ 34.95
Gate array (6.3Mhz).....	\$ 34.95