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EDITORIAL COMMENT

Well folks, we finally did it. Spurred on by all the fine comments from users who have added 3-1/2" drives to their systems, we converted one of our work stations to all 3-1/2" double sided drives. This station now has a 3-1/2" 720K drive for the internal drive zero and drive one, and an external drive with two 3-1/2" drives. What a joy it is to have all this disk space to maneuver in while switching from drive to drive. It does mean that we have to have our system files on a 3-1/2" disk, but that leaves all that additional room for application files. Our other work stations, which we told you about in previous issues, still have two 5-1/4" internal drives and the external drives have one 5-1/4" and one 3-1/2" drive, or two 3-1/2" drives. These also create a very comfortable system. We can backup 5-1/4" disks from drive one to a 5-1/4" in drive 2, or to a 3-1/2" drive in 3. Plus we have a system to backup 3-1/2" to 3-1/2" disks. As one reader wrote when we installed 3-1/2" drives in his Model 4P, "I don't know how I lived this long without them."

One new product that we are introducing this month is a totally new program by David Goben for the operation of the SmartWatch or No Slot Clock. We have also made arrangements with the No Slot Clock manufacturer to supply us with the clock chip at a special price so that we can combine the new software and the clock chip at a price below what you would pay for the chip alone. We will tell you more about this program and the clock chip in other issues, but we are so excited about this project we just had to get some mention of it on the front page of this issue.

As you will notice in our advertising section we have taken on the job of distributing

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PostMaster and the MicrLabs High Resolution Board. This allows us to bring you some terrific package prices if you do not already have a high resolution board or PostMaster.

For those of you who already have PostMaster we have added additional Icon volumes to our File Cabinet Library and with the advent of David Goben's HiRes Utilities Package we are in the process of converting our File Cabinet High Resolution and MacPaint Library over so that it is comprised of /HR files only. This will take one of the processing steps out of the procedure you would have to go through to utilize these programs with the many images in the Mac/Paint Library to create high resolution printouts, or to use them to create icons for PostMaster.

Stay tuned as the year progresses. It may seem like we have had a busy winter lining up new and wonderful TRS-80 computing opportunities, but more is on the way and our spring looks like it will be just as busy.

We have so many things planned that it is very hard to keep quiet about them until they are ready for distribution. We are reminded of the little child who, once they have accomplished a major feat, can't wait to run home and yell "Hey look what I did."

Chris Fara has taken a break from his monthly column this month. He is hard at work on finishing up his genealogy program and from last reports should have it ready for distribution by the time you receive the April issue. He has promised to return next month with another of his always informative columns.

But you assembly language buffs have not been left out, so don't despair. Frank Slinkman has provided for this issue several assembly language routines for use in creating graphics.

REMINDER

If the last four digits on your mailing label are 92/03, then this is your last issue. Time to get your renewal in the mail.

News Items

M. A. D. SOFTWARE

In our December issue based upon information we received from a subscriber, we reported that M.A.D software was planning on discontinuing their production of TRS-80 products. The information was not totally correct. M.A.D software is not going out of business and they are discontinuing only part of their TRS-80 products.

Mike Durda of M.A.D has informed us that they will still produce HBUILD6, and associated XROM and XDROM, 4P-ROM products, but are discontinuing the Powersoft Series I components as of April 1st, 1992 and as of March 1st. 1992 the ROMs and Pals they purchased from Radio Shack.

For More Complete information on these products please write to:
M. A. D. Software
PO Box 331323
Ft. Worth, Texas 76163

There is no published business phone number to contact because this is a part time business.

We are sorry for any misinformation that we may have given in December. But M.A.D. tells us that "Roughly half of our 1991 orders came in the last two weeks of the year." So they can't be too upset that CN80 passed on the fact that they were still in business, even if the information was not totally correct.

We appreciate the input from our readers concerning any source of supply for our TRS-80 computers, so we can pass that information on to you. In this case we were unable to confirm the information originally provided. It was only after we published the December information that we heard from M.A.D.

ROMCLOCK4

PostMaster and HiRes Utilities Review
by David P. Miller

Since writing PostMaster, I've received many compliments on the program, but also a deluge of suggestions for improvement and requests for additional features. Many of the features are on a list for addition to a second version, and almost all are great ideas, but it will be quite awhile before the second version is available. Until now, my response has generally been "I'll put it on the list", but no immediate solution to most requests. Fortunately, David Goben has come to the rescue of both myself and PostMaster users with a comprehensive package of high-resolution utilities, many of which are specifically designed to address the needs of those wishing to create or modify PostMaster graphics.

I was flattered and considered myself fortunate that David selected me to take a first look at his utility package. Of course, there is a certain amount of self-interest in his decision. By having the author of PostMaster review his programs, he has placed himself squarely in the 'line of fire'! Who would be more likely to pick apart his utilities than the author of the program they are intended to work with?

Fortunately for all, the Hi-res utility package works admirably, continuing David's tradition of technical excellence. All the programs are easy to use and do the job well. Here's what I found:

The utilities specifically designed to provide PostMaster support encode and decode graphics quickly and efficiently, add the encoded graphics to the appropriate files, and provide quick and easy display functions to view the results of your work. The Decode utilities decode Border and Font files, transforming the graphics images to an ASCII file that can be modified easily on any word processor (no hi-res board needed!) Instead of squinting at the tiny dots on a hi-res screen, each 'on' dot is represented by a capital letter "O", and each 'off' dot by a period. This makes the figure easy to recognize and work with.

The individual segments of each graphics file, such as an individual Font letter or corner of a border, starts with a header to tell the compiler which portion is represented. An additional command that can be embedded within the ASCII file tells the compiler to continue the job with another file. This allows the user to work with decoded Font/Border files that would be too large to load into a word processor. Once the ASCII files have been created or modified, the Encode utilities will read the file and create PostMaster-compatible graphics files in short order. One of the most noticeable features of these utilities is the incredible speed with which they work. Since conversion of a graphics file to an ASCII format requires the representation of each graphic bit with a full character, an output file is over eight times as large as the original file. The speed of each operation seems to be almost entirely controlled by the speed of the hard drive or diskette drive being used.

Once a Font or Border file has been encoded, a pair of utilities will add them to any /MAP file with space for an additional entry. In addition to all this, David took the time to contact me while working on them to gain information about the next version of PostMaster. One of the features of the upcoming release will be the ability to utilize up to 45 each of Font and Border map files on a single drive. Using the information provided, David has insured that these utilities will be fully compatible with PostMaster II when it is released.

In addition to the utilities that manage Fonts and Borders, David has created a pair of programs that address the single most common request of PostMaster users: the ability to design Icons outside the PostMaster Icon Editor. The first, MAKEICN, displays the current contents of the hi-res screen with a moveable square. This square can be set to any of three sizes representing actual icon size, double icon size, and four times icon size. Once the square encloses the area desired, pressing the ENTER key causes the program to capture the image inside, and if larger than actual icon size, reduces the image. A prompt for the proposed icon name appears, then the file name to save it under, and a PostMaster-compatible icon is created and saved as a single-icon file taking only 1.5K on a floppy drive.

Once you are sure the icon looks as you intended, the second program, ADDICN, will

update an existing Icon file. This pair of utilities will allow you to capture anything that can be placed on the hi-res screen and create PostMaster icon files at will. Of course, in the process of reducing images, resolution will be lost, but that is a fact of life; some trial and error will be necessary to skillfully create icons from full-screen images.

To quickly check your work-in-progress, two additional utilities are provided. The first displays a single icon in the center of the hi-res screen, and the second displays all the icons and icon names on up to two hi-res pages. These utilities also allow you to view the contents of any Icon file that you wish to see.

The other utilities in the package are not specific to PostMaster users, but are designed to help you get the most from your hi-res graphics work in general. However, a few of them are indispensable when creating Icons. HRLOAD and HRSAVE lets you load and save standard, compressed, and super-compressed (/HR, /CHR, /SHR) files, and does so much more quickly than any comparable utility that I have seen. In addition, HRSAVE will accept a BLOAD-format file from a PC-compatible computer (ugh, hack, ptooey!) HRCLS will quickly clear the hi-res screen for future work, and HRVIEW turns the HR screen on to let you view the contents. All these programs exit politely, returning the text display to the previous state when done. HRFLIP reverses the contents of the screen for Icon capture or printing. Two programs, HRFXPRT and HRIBMPRT, allow printing of the hi-res screen quickly and easily on almost any Epson/IBM-compatible printer, in any of several print modes from 60-DPI, which takes almost a full page per screen, to an incredible 240x216 DPI mode that prints the image in a small corner of the paper with no loss of resolution. Another, HRLSRPRT allows the same feature with a Laser or DeskJet printer. I was, however, unable to test the printer programs due to the dinosaur equipment I'm using at the moment.

Two final utility programs merit special mention. Most programs that resize graphics on a hi-resolution screen provide only one algorithm to do the job. Normally, the resizing program looks for 'on' bits, and when reducing the image to 1/2 size, two 'on' bits in the original image are converted to one 'on' bit in the new image. Obviously, this method ignores the 'off' bits, and if the detail is presented in black on a lit background (like most /MAC files), a great deal of resolution can be lost. Likewise, a program that processes 'off' bits as detail would lose resolution if most of the image was off (the way PostMaster Icons are stored.) David overcomes any problems associated with this situation by providing TWO reducing programs; HRHALF1 to consider the 'on' bits as significant; and HRHALF2 to treat the 'off' bits as meaningful. By selecting the appropriate program (or a combination of them in multiple passes), an image can be resized with the minimum possible loss of detail.

Both HRHALF utilities accept additional parameters so you can tell it to process less than a full screen, in case you have already run HRHALF before the current pass. The decrease in processing time for 1/4th of the screen is vastly reduced from the already short time the program takes to process a full screen.

With this set of utilities, the prayers of a multitude of PostMaster users have been answered. If you have a single image in hi-res that you 'must have' converted to an icon, MAKEICN and HRHALF are worth the price of admission alone. Even without PostMaster, the hi-res screen utilities are of enormous help in doing hi-res work. If you happen to have Frank Slinkman's Scanner software and a Chinon 2000 scanner, you'll be in seventh heaven! Of course, it is also possible to import graphics files from other computer systems, display them on the screen, and create libraries of icons.

The only question now is: how will we store all the graphics files that are sure to result from these programs? Problems like that, I can handle! Maybe I should allow more than 45 MAP files to a drive...
-David P. Miller

A VISIT WITH DAVID GOBEN

by David Goben

CORRECTION

I had stated previously that the IBM mode on numerous printers was fully Epson compatible. However, as I read more printer manuals I see that this assumption is not wholly correct. It seems that there are actually 2 separate "IBM" modes. One is the IBM Graphics printer emulation mode (fully Epson compatible), and the other is the IBM Proprinter mode. Unfortunately numerous printer manuals do not make this distinction. If your printer has an "IBM" mode and the manual does not explicitly state the type of emulation, then you can check by looking in the printer code section for the IBM mode, and if the code support has commands which have lower case escape sequences, such as "ESC s (n)", then the printer supports virtually all of the Epson graphics printer commands. Font downloading and redefinition, as demonstrated last month, is another matter. Be it as it may, the IBM Proprinter supports most Epson commands, because the Proprinter command set is based upon the Epson standard. In fact, unless I'm mistaken, the graphic samples last month and the graphics information this month are compatible on both the Epson and the Proprinter. However, if your printer has a setting for Epson or IBM Proprinter emulation, choose the Epson mode, as it is much more powerful and you can do a lot more with it.

NEW HI-RES UTILITY PROGRAM

Since the release of my MODEL 4 HI-RES UTILITIES package, I have added another file to that package: HRIBMPRT/CMD. This addresses the IBM Proprinter and those printers which support this type of IBM mode. The commands were just different enough so that HRFXPRT/CMD would not work with it. Although I could have modified HRFXPRT to support both the EPSON and Proprinter with no additional work from the user, the many DPI (Dots Per Inch) settings supported by the Epson was not supported by the Proprinter, and so would cause problems if a person innocently typed in a resolution not supported by the Proprinter, and then suffered a fatal heart attack because their printer suddenly stated eating pages and hacking out garbage.

While I was in there, I enhanced HRFXPRT so that it supports another mode: 2144, which allows the printer to kick out a hi-res file at 144 x 144 DPI. This mode is supported only by those Epson compatible printers which support a 144 horizontal DPI mode "ESC * (7)...".

SCRIPSIT PRO SHIFT LOCK

For those of you who use SCRIPSIT Pro, I recently discovered I can set and reset the shift-lock with SHIFT-CTRL on the left side of the keyboard. I suppose this was added to help those who were used to typewriters which set shift-lock on the left. But it was left undocumented. You have to hold shift down first, before pressing CTRL.

DOODLING

I'm working hot and heavy on my new machine language mouse-oriented drawing program. It will require the use of a mouse and of course a mouse driver. It does =not= contain alternative keyboard controls. I've modeled its menuing after several MS-DOS and Macintosh programs. It runs entirely in the High-Resolution mode, which includes an intricate though friendly user interface. It features super-fast pull-down windows like you've never seen before. In the course of my experimentation I've found how to instantly update an entire screen, and how to speed up normally slow functions, including those functions which had ran slow even in machine language. Further, considering that I and others have pumped The File Cabinet full of public domain PostMaster fonts, and the fact that I have recently released my new POSTMASTER SUPPORT UTILITIES which includes a PostMaster font compiler, I have decided to support these PostMaster fonts in my drawing program, rather than follow the traditional route of using Dot-Writer fonts, which is now a dead fish in the water as far as availability to the new users. As PostMaster is not only actively supported, but is also a growing product, the course of using its font format is the only logical choice.

Speaking of high-resolution programs, aside from David Miller's new, yet to be released game (which I am anxiously awaiting), you are going to see several others released this year and next year. Hopefully this draw program will provide me with enough programming technology so that a technical

manual can be written which will allow those of you who wish to write programs using the Hi-Res screen and the mouse to do so quite easily.

But let's not forget lo-res doodling. Once things settle down you will finally see my Model 4 lo-res graphics support package released. I'm very excited about it, because it features easy to use machine language and BASIC interfacing. It even works quite well from my Model 4 Small C compiler. With Graphics4, lines, boxes, points, screen captures, etc. are a breeze.

POSTMASTER FONTS

For your information, a very small number of the 48 new PostMaster fonts I submitted to The File Cabinet are upper-case only fonts. For anyone who is familiar with typefaces, this would be more obvious. For example, the Broadway typeface (font) is upper case only. Lower case will not print out. However, due to the way that the current version of PostMaster is written, when you are typing the data for a line under the font, you will see text written in PM's resident editor font. Since the actual data for the lower case characters are null in the Broadway font, you will see only capital letters printed out on paper. Hint: If you see one of my fonts displayed in upper case only on the font selection screen in PostMaster, you can bet that the font is upper-case only. One way around this may have been to duplicate the upper case letters in the lower case area, as a couple of the fonts do, but hey! What do you expect for free? Lots of labor? (You paid only for the duplication service, not for my uncompensated work.) I =may= (note that I did not say =will=) upgrade these if I choose to use any of these few fonts in my new Hi-Res drawing program (which is shaping up beautifully). Better yet, I may cheat and just publish a small BASIC program which will do this conversion for you. Remind me if I forget. I've slotted such a program in my column schedule for next month.

SMALL-C

A lot of people are curious about computer languages. Aside from machine language, C is my next favorite. In cooperation with James E. Hendrix, who has greatly extended Ron Cain's original code and has gone public with it in a number of books, I have produced a fairly powerful near-full C (thus small-C) language compiler for the Model 4. It includes a library manager, a macro assembler, a linker, and the source code to all the programs (compiler, assembler, linker, etc.), all written in Small-C, of course. It is a great and truly =easy= introduction to this language. I and thousands of others have found the CP/M and MS-DOS versions of Small-C to be an invaluable bridge for those wanting to learn the language, as its syntax is quite easy to follow and remember. Those who have jumped with both feet into full C often flounder, because there is almost too much that you must absorb right away. Small-C on the other hand is bite-sized, yet allows you to produce very powerful and incredibly fast programs. Once you have mastered Small-C, then LC from MISOSYS should be your next step. LC is the best implementation of full C for the Model 4 I have ever seen. It has more power than any one person will ever use. But again, a simple introduction to this powerful language would be a boon, as otherwise you may become quite easily discouraged, and miss out on a truly powerful and friendly programming tool. Hopefully Small-C will fill that gap. The only thing that is holding up releasing Small-C and several other projects is the time required to write the manuals. Hopefully I will begin to find this time soon.

HI-RES EPSONS

Last month I described Epson graphics and how to define your own near letter quality letters. Now let's get into the nitty-gritty on letter formation.

The draft mode on at least the 9-pin printers is hacked out at a graphics resolution of 60 DPI (Dots Per Inch) horizontally, and 72 DPI vertically. This is the default resolution, and prints out quite fast because each characters fits within an 8 x 8 cell. Because of this, the printer has to make only one pass to print a complete text line. The printer head uses only 8 of its 9 pins, and so each vertical column on each line can be printed using only 1 internal graphics code. Since it is printing text at 60 DPI, the head can move quite rapidly. Granted, some printers use 9 pins for the draft mode, but they also print slightly slower because they have to send out 2 internal graphics code to print one column of 9 dots (a byte can only hold 8 bits, thus

supporting 8 pins in one byte).

Near letter quality prints text at a resolution of 120 DPI x 144 DPI. This mode slows the printer down for 2 reasons. First, the horizontal resolution is doubled. Therefore it must send twice as much information to print a line's worth of data. Second, it must print this data in 2 passes because the letters to be printed have a vertical height of 18 dots. How near letter quality works is that every other vertical dot is composed into 2 bytes (1 byte plus 1 extra bit for the 9th pin). This data is then sent to the printer. The other vertical bits are ignored in the first pass. In this first pass we print only half the vertical dots, or 9 dots worth of data. This is printed at a vertical resolution of 72 DPI (default). Once the line is printed, the paper is advance only 1/216th of an inch, and then the other 9 bits of each vertical column are composed and printed during the second pass. Once this second pass is printed, the paper is advanced 35/216th of an inch. This advance is for the default 6 lines per inch. 8 lines per inch would use an smaller advance value of 26/216th.

To clarify this, on the first pass, of the 18 vertical dot positions we can assign, the printer only uses bits 1, 3, 5, 7, 9, 11, 13, 15, and 17, making 9 bits for our 9-pin printer head. After the line is printed, it is advanced 1/216th of an inch, and bits 2, 4, 6, 8, 10, 12, 14, 16, and 18 are compiled together for the second 9-pin pass.

What some of you may have noticed during this discourse was the references to the graphics mode. This is due to the fact that a dot-matrix printer (and lasers, deskjets, etc.) actually prints nothing =except= graphics (even the old dot matrix printers which did not support user-defined graphics codes). It is just that the printer selects graphics modes and codes internally in a ROM package inside the printer. It simply arranges graphics which are shaped like text characters. Fortunately for us this ROM also features a fairly intelligent user interface that removes all the definition headaches. It is like using a subroutine library; instead of having to define all the intricate functions into your program, you simply "call" them from the library.

What does this tell us? It tells me that I can go about printing my own near letter quality character sets if I wanted to. The beauty in this is that I can easily support true proportional spaced fonts by doing it myself, even on a printer that does not support proportional spaced printing internally. Does this give you any ideas?

HIGHER DENSITY PRINTING

You can remove a lot of the dotty edges from a character by printing it at a horizontal resolution of 240 DPI instead of the normal 120 DPI for near letter quality printing. Of course this also requires that you send out twice as many codes to keep the character from being crushed. At 120 DPI, a normal near letter quality character is 12 dots wide. If we use a little math we discover that this results in 10 CPI (Characters Per Inch), which is derived by dividing 120 DPI by 12.

If we select 240 DPI, this means that 12 horizontal dots will be printed in the same space as 6 horizontal dots at 120 DPI. Therefore we may wish to print 24 dots to broaden thing out. This compactness (same as printing in the compressed, draft mode), also removes a lot of the bumpy edges from a character.

However, we still have the vertical bumpiness problem. We can solve this by printing our data at a vertical resolution of 216 DPI rather than 144. Bear in mind that explaining this is a =whole= lot easier than doing it (however, you can see it in action in the HRFXPRT/CMD program in my new MODEL 4 HI-RES UTILITIES package available from CN80).

To print at 216 DPI vertically, we must do so in 3 passes. What we do is print the data for 3 vertical bytes (3 x 8 bits = 24 bits) for each line. During the first pass we print bits 1, 4, 7, 10, 13, 16, 19, and 22 of the 24 dots. We then advance the paper 1/216th, compose bits 2, 5, 8, 11, 14, 17, 20, and 23, and print them out. We again advance 1/216th and compose bits 3, 6, 9, 12, 15, 18, 21, and 24, print them, and advance the paper 34/216th for 6 lines per inch, or 23/216th for 8 LPI.

What we have done in each of the 3 passes is printed every third bit of the possible 24 bits. But how does this work out to an even 216 DPI vertically? Easy. The printer's head on a 9-pin printer can only print dots that

are spaced at a =fixed= 1/72 of an inch apart. What we have done is printed 2 dots between each of these dots by advancing the paper only 1/216th of an inch twice. If we divide 216 by 72, we get a result of 3. What this means is that 1/72" is equal to 3/216".

I suppose things could be simplified by using only 1 pin and printing each row 1 dot high, advancing only 1/216th each time, but not only would this take forever to print a page out, but it can also wear the printer head out faster, and possibly over-heat it. What I have done with the method I used is to process 8 bits at a time.

Again, this theory sounds simple until you try doing it. I did discover a nifty algorithm for deriving this data, but not after pulling half my hair out. It can be a fun, though challenging exercise, should you try to figure it out.

What some of you may have figured from all this is that we are actually simulating a 24-pin printer on our 9-pin printers! Even more, I have told you how to print near laser quality text and graphics. For some samples of 240 x 216 graphics, you will find a page of samples reproduced before the ad pages in the back of this magazine. These were all printed on a Seikosha SP-2400 printer (the same one that CN-80 sells). It almost makes me cry to think that I had paid a lot more for my Epson Apex80 printer just a couple of years ago. But now that I have a Seikosha, I will really be pouring it on about taking full advantage of its huge repertoire of fancy features. I understand that Radio Shack's =much= pricier DMP-135 is basically the same printer, except that the shack includes its flimsy DMP mode. If I had one of those 135s, I'd switch it to the IBM mode and leave it there (No, as a matter of fact, I do not like the DMP modes, because they are just too darned restrictive, and in fact prevent a lot of great software from working on printers that do not have IBM or Epson modes).

PRINTER TRIVIA

People talk about the advancements in printers all the time. But actually the technology has not changed that much; just how it is applied. For instance, laser printers, deskjets, inkjets, and other jet printers are all dot-addressable printers, just like dot matrix printers. The only real differences that dot matrix, deskjets, inkjets, and scanjets have with lasers is that the laser is page-based and the others are line-based. Page-based means that you can address and print to any location on the page before actually putting ink to paper.

Since I have spoken so much about vertical dots distances (or sizes) being 1/72th of an inch, you may be interested in knowing that point sizes are measured in 1/72ths of an inch. When you read something that says that a font is an xx-point font, you know that the font is xx/72 inches tall. Thus a 10-point font, like what you are reading right now, is 10/72" tall. Give you any ideas for applications?

Users of 24-pin printers can print data even finer than the 9-pin printers. For example, currently 216 DPI vertical resolution is the highest vertical density the 9-pin printers can go. 24-pin printers can also select 180 DPI and 360 DPI vertical density. Also, 24-pin printers can support 180 and 360 DPI horizontal densities in the 24-pin mode. What this means is that where the 9-pin printers can support a maximum resolution of 240 x 216 DPI, a 24-pin printer can support a density of 360 x 360 DPI -- this is much finer than the 300 x 300 DPI current to PCL level 4 on lasers and other -jet series printers! Of course you won't see me coming out with any software for this high density until I have the funds to purchase a 24-pin printer, and that also depends upon the demand for such software (come on, Lotto!).

Another neat thing about the 24-pin printers is that they can support downloadable fonts. This is accomplished pretty much as I had explained for producing your own near letter quality fonts in my February 1992 column. All you would need to do is dump the printer data to a disk file, byte for byte, just as though you were sending it to the printer to re-define characters 0-127. Of course you may wish to redefine only characters 32 through 126 to be more current with laser font definitions. Then you would simply list the file to the printer any time you needed that font, of course making sure to turn tabs and high-bit translations off (ASCII8 and TABS= parameters for the LIST command).

Of course, as the prices of laser printers are

dropping down to being within reach, and sometimes lower than some of the high-end 24-pin printers, it might be better to just invest in a laser. It is much =quieter= and durable.

DOT MATRIX SOFT FONTS

What's next in line in David's list of printer software? Why not soft fonts for dot matrix printers? I've already figured out how to convert laser soft fonts to print on a dot matrix printer at 240 x 216 DPI (and 360 x 360 on 24-pin printers). But it's just a matter of having the time to fully develop the project. Aside from a full time job, I've got so many irons in the fire as far as new products for CN-80 that right now I'm maxxed out. This will be changing soon. And then you'll see that many of the innovative things I've only hinted at or talked about will be (or in most cases -- have been) reality. Actually, I disseminate a lot of this information in the hopes that others will try to tackle the projects before I do (you'll save me the work -- so I can buy your program and have what I conceptualized without having to type one byte of code!).

But if you only knew what 1992 and 1993 will bring....

CONCLUSION

Well, I don't have enough room for the BOX creation program I mentioned last month, because I'll need extra space for illustrations and technical explanations. This delay also gives me enough time to add even more powerful features to it. However, I will make it the first feature of next month's column. Also, to fill the space out, I've got another exiting type-in program to dish out to you dot matrix and laser users! Have you ever noticed how the US Postal Service places a bar code line near the bottom edge of your domestic mail? Well, next month I'll show you how easy it is to print those bar codes on a dot matrix and laser printer using a simple BASIC program. If you are in business, this can save you big $$$$ on bulk mailings!

Happy computing!
-David Goben

THE NEWCOMERS CORNER

For Novices, Beginners, and First Time TRS-80 Users. Part 8

In our opening article for the Newcomers Corner (Vol. 4 No. 5, pg. 16) we told you that there were eight Command Words that you needed to become familiar with which are used from DOS Ready to get the most out of your computing. They were:
FORMAT(see Vol. 4 No. 6, pg. 17)
DIRectory (see Vol. 4 No. 7, pg. 14)
LIST (see Vol. 4 No. 8, pg. 17)
COPY (see Vol. 4 No. 9, pg. 12)
BACKUP (see Vol. 4 No. 10, pg. 11)
BASIC -LOAD-SAVE (Vol. 4 No. 11, pg.10)
QUESTIONS ON DISK DRIVES (Vol. 4 No. 12, pg. 13)
QUESTIONS ABOUT THE 4P (Vol. 5 No. 1, pg. 12)
MINIMUM SYSTEM DISK AND OTHER QUESTIONS. (Vol. 5 No. 2, pg. 13)

In part one through six we covered the few computer command terms that you need to know to operate your TRS-80 computer with some comfort. In part 7 which was printed over a period of three issues, we took the opportunity to answer many of the questions we have been asked by new owners about floppy disk drives and floppy disks. Now in this issue (part 8) because we have so many users who have just acquired their computers and are asking about the dating we think it is time to cover the subject of dating again.

Back in 1988, we discussed in almost every issue that year why you can't enter a date beyond the year 1987 when the DATE PROMPT asked for it. This is true of any application program disk that came with a TRSDOS 6.2.1 or earlier TRSDOS 6 version. The reason for this is the date calendar installed on the disk just did not go beyond Dec. 31, 1987. At that time there were many home grown patches that allowed you to put in a date beyond 1987, but most of these home grown patches had devastating effect on some other parts of the system and should not be used, even today if you find one.

The one simple solution is to turn the date prompt off by typing at DOS Ready:

SYSTEM (DATE=NO)

when you have a working copy of your DOS system disk in drive zero, without a write protect tab on it. From that point on whenever you boot up the disk you will not be asked for the date. Be sure to replace the write protect tab.

This is a simple approach, but from that point on your directory of a disk will not show the date. There are some programs that utilize the date in keeping data records, such as an accounting program. So the appropriate thing to do would be upgrade your system disks with David Gobens T62DOSXT program or upgrade to LSDOS 6.3.1. In the case of Model 3 you should upgrade to LDOS 5.3.1. All of these DOSs are available from CN80 and we can supply them on 3-1/2" disks if you have changed your drive zero to a 3-1/2" drive.

TRSDOS 1.3 for the Model 3, or Model 4s operating in the 3 mode will accept any date you write, so there is no update to this DOS.

Another great reason for using the latest DOSs available, beyond their ability to accept a date that will carry you well into 2000+, is that these later versions have many features added that make your computing easier. Such as DISKCOPY that comes with LSDOS 6.3.1 (LSDOS = Logical Systems Disk Operating System). DISKCOPY allows you to make a mirror image backup copy of a disk without having to format the disk first. DISKCOPY will not recognize it if you mistakenly put a disk in your destination drive that already has data on it. Which is a good way to wipe out some important data without your knowing about it until it is too late. But these latest versions of the Model 4 and Model 3 DOSs, do have many advantages over their predecessors. FFormat and FBackup does the job much faster and is safer to use.

All the programs written today and available from CN80 are being written for use with one of these three DOSs, and all of David Goben's programs are written to be used with either LSDOS 6.3.1 or LDOS 5.3.1 and only TRSDOS 1.3 if the program can be easily transcribed to operate under that DOS, otherwise TRSDOS 1.3 versions are just not economical to produce any longer. TRSDOS 1.3 does not support double sided drives which is another of its drawbacks.

If you have either the original TRSDOS 6.2 or LDOS manual there is no need to purchase a new manual (unless you want one that is easier to read like the MOD4 and MOD3 by Chris.) because the latest version of these DOSs are based upon the original manuals with the exception of any new features and those are covered by update sheets that come with the new version of the DOS.

One thing we might also mention again, is that the LSDOS 6.3.1 and LDOS 5.3.1 are complete system and basic interpreter disks. If you acquire these, place your old system disks on the shelf and forget them. The opening documentation is a little confusing to the new user in this regard. It starts out with the instructions on how to upgrade your existing system disks, and what it is really talking about is how to upgrade any systems/application disk that you have in your collection. Such as SuperScripit or other program disk where both the application program files and the system files reside on the same disk.

Hints and Tips

PostMaster Tips & Tricks
by David P. Miller

A recent letter from a PostMaster user brought to my attention a fact that I had always taken for granted, but only results from an 'Ah-HAH!' discovery for users of the program. (This is a case of my not being able to see the forest for the trees...)

When creating a Poster, many people may find it difficult to position the text they want precisely where it is needed, especially when trying to center text halfway down the Poster image. This can be easily done by noting the size of the font-style example on the Font Selection screen.

When PostMaster sets up the text lines, it allows vertical space for each line based on the maximum height of the characters in the font (to the bottom of the lower-case 'g', I believe). Therefore, an unused text line spaces down by the height of the font for

the next line. As you know, placing of text on the fourth or fifth line down results in empty space at the top of the poster. To 'fine tune' the spacing, go back to one of the empty lines and use the <SHIFT><F2> combination to select font styles of varying heights. This will adjust the vertical spacing accordingly.

Once you select Print from the final menu and the finished work is displayed on the screen, you can adjust the text again without going through the entire design process. Just hit the <BREAK> key at the Print menu, re-select your Font file, and readjust the text. All Border and Icon selections, along with the text you have already typed in will remain in place. Once you have a Poster that you wish to use repeatedly with minor changes, such as cover sheets for magazine collections, you can save a parameter file. Re-loading this file takes you to the Print menu, where you can follow the procedure outlined above to edit the few characters you wish to change. This method also works for all other PostMaster functions.

While I'm on the subject of PostMaster, here's a final update on the printer situation. The next version of PostMaster (which is still a long way off) will support *MANY* more printers than the original version. Because of this, no further work on printer drivers for the original version will be done, other than to correct any existing errors, if they crop up. The printers supported by original PostMaster are (all are subject to the note on 300/180 dpi):

Radio Shack DMP-130, -130A, -131, -132, -133, -430, -2100P. Also any other DMP with a 3-digit designation and "3" as the second digit.
All Epson and IBM 8- and 9-pin printers.
Okidata Microline 182 and 192.
Panasonic KX-P1091, -1092, and 1124 nonsuffixed.
Star 10X, -15X, -NP, -NX, LC-10.
C-Itoh 1510, 8510, C-310.
Siekosha SP-2000, 2000 Plus, 2400.
All printers that provide 100% compatible Epson and IBM modes. *HOWEVER* it is important to mention that dot-matrix printers providing 300-dpi or 180-dpi may not work with PostMaster and no guarantees can be made concerning them.

Printers that will not work are:

Radio Shack DMP-110, -120, -400, -500, -2100.
Panasonic suffixed printers (1124i, 1124e, etc.).
Okidata 82, 92.

Please note that this list is the ONLY one you should go by for the time being. Although other printers are listed on the PostMaster Printer Selection menu, not all of them are truly compatible with the program and may not give satisfactory results. Also, some newer model printers (specifically, the Star NX-1001) may refuse to work at all with a TRS-80. In the case of this specific printer, a letter to Star Micronics requesting an update ROM will get the ROM free of charge from Star. I have not personally checked to see if this ROM will solve the TRS-80 compatibility problem and suspect it has more to do with the INIT line on the printer cable, which is different on "PC" type computers.
-David P. Miller

WIDE VARIETY USES FOR POSTMASTER
by Jack E. Wilson

A wider variety of letterhead styles may be obtained by utilizing the Large Label rather than the Letterhead Program. To use, select a border of your choice, icon if desired, and type style for the name. Many of the smaller fonts may be used if you wish a four line letterhead. If you do without a telephone number many type styles will fit.

Set your printer to start the label printing about 3/8" from the top of the paper and start printing at the same point as your normal letter indentation (8 to 10 spaces). If you have access to a photo copier, the printout master can be run off on any type and color of paper your desire.

Using the same type style and the Small Label program, design a return label for the envelope. If you are using colored envelopes print on clear address labels. If you have an envelope feeder print directly on the envelope.

To help organize your household redeemable

coupon inventory, print out small labels showing groups of grocery items such as Cereals, baked goods, dairy products, soup, laundry, etc. Apply these to #9 or #10 envelopes. The heavy envelope stock will last for a long time. To dress up the label I use the shipping bag icon from disk M4PMLDO.
-Jack E. Wilson

Editor's Note Great ideas Jack. A prize of two of our new disks from the PostMaster Icon Library is on its way to you.

Anyone else submitting to the Hints and Tips column will receive a similar prize when published and it does not have to be about PostMaster, it can be about anything. -CN80

TIP ON 3-1/2" DISK HOLDER

We found that a 4 x 6 index card box makes a great inexpensive holder for 3-1/2" disks. We cut the top off and placed a little plastic memo holder inside. Turn it sideways to store your most often used disks and set it next to your computer. It takes up much less space than the regular disk storage cabinets with the flip top and costs a lot less. When not in use place the lid back on to keep out any dust. -CN80

HI-RES GRAPHICS PROGRAMMING IN Z80 ASSSEMBLER

by J.F.R. "Frank" Slinkman

Before you attempt to write any actual code for your Radio Shack ("RS") or Micro-Labs ("uL") high resolution graphics board, you need to learn some basics about the boards, and about graphics.

TRS-80 hi-res graphics use what are called "bit mapped" graphics. Each bit of graphics board memory references one dot, known as a "pixel" (which stands for "picture element) on the screen. The TRS-80 hi-res screen is 640 pixels wide by 240 pixels high. Each pixel can only be white ("on" or "set") or black ("off" or "reset"). A bit value of one is "on," zero is "off."

Since there eight bits to a byte, each byte of graphics board RAM is a bitmap of eight horizontal pixels, with the high order bit (bit 7) being the leftmost of the group and the low order bit (bit 0) being the rightmost.

For example, if you execute the BASIC statement OUT 130,5, you will set two pixels and reset six pixels according to the binary representation of the number 5, which is 00000101B. Sending 255 (11111111B) will set all eight pixels white, and 0 (00000000B) will reset all eight black. Sending 85 (01010101B) or 170 (10101010B) will set and reset alternating pixels, according to the number's binary pattern.

Because there are eight bits to a byte, each horizontal or row of graphics data is held in 80 bytes of the graphics board RAM. Thus the whole displayed image is held in 19,200 (80 x 240) bytes of RAM.

This RAM is organized into columns and rows. To access the upper leftmost pixel on the screen, you would have to address bit 7 of the graphics board RAM byte addressed by the x,y coordinates of 0,0. To access the lower rightmost pixel, you would have to address bit 0 of the byte at coordinates 79,239.

Both the RS and uL boards are addressed through four ports, as detailed in Table 1. (*See Listing pages.*) In addition, there are three other "undocumented" ports for the RS board, which I will get into later.

On either board, any value from 0 to 255 can be sent to port 129 to set the Y coordinate. The highest "legal" X coordinate on the uL board is 79, while on the RS board, since it has 32K of RAM vs. the uL board's 20K, the X coordinate can be as large as 127.

To illustrate the use of the ports, look at the code in Listing 1, which sets the upper leftmost pixel:

The first two instructions put the board into the desired mode. Be sure you understand this before you proceed. The next three instructions set the X and Y coordinates to zero. The next instruction reads the specified byte from graphics board RAM, which is then ORed with 80H to set the high order bit, and then written back to graphics board RAM, which lights the desired pixel.

The routine in Listing 2 will set ANY desired pixel.

This code could be easily changed to complement the pixel by changing the OR C instruction to XOR C. It can also easily be changed to reset the pixel by changing the LD C,1 instruction to LD C,0FEH and changing the OR C instruction to AND C.

Address "clocking" is a very valuable and powerful feature, which greatly increases the speed when writing or reading large quantities of data to or from graphics board RAM. For example, the code in Listing 3 "negates" the entire screen; making every white pixel black, and every black pixel white.

The first two instructions put the graphics board in an "auto increment Y on write" mode. This means the Y coordinate will be automatically incremented each time there is a write to port 130. This eliminates the need for our program to keep track of the Y coordinate, or have to write the Y coordinate to port 129 prior to each write to port 130, the graphics data port.

Then D is initialized with the value 79, the number of the rightmost byte column of the hi-res display, and E is loaded with the number of rows on the display. Thus, this routine works from top-to-bottom, right-to-left.

The byte column number is copied from D to A, and then sent to the board as the X coordinate. Then 00H is sent to the board as the Y coordinate. Next, B is loaded with 240, from the E register.

In the NGT020 loop, each of the 240 bytes in the column are read, complemented to reverse the bits, and then written back to graphics board RAM. Each write causes the Y coordinate to be incremented automatically.

When all 240 bytes have been negated, the column number in D is decremented. If it is still positive (i.e., >= 0), the jump is made to NGT010, so the next column can be processed. The job is done if the column number in D goes negative; so return is made to the calling routine.

The code in Listing 3 can easily be modified to create a graphics clear screen module, simply by changing the NGT020 loop to keep sending 00H out port 130.

When negating or clearing the screen, or copying graphics data from normal RAM to graphics board RAM, it's usually best to transfer the data column-by-column rather than row-by-row, as this reduces program overhead and increases speed, especially if you're using INIR or OTIR instructions.

However, when dealing with Model 4 /HR files, you must work in raster order (i.e., left-to-right, top-to-bottom), as that is the way Model 4 /HR files are ordered. (Model III 512 x 192 /HR files are ordered differently -- each line from left to right, but in a staggered order vertically, which we will not go into.)

Thus, to work with /HR files, you must auto clock the X coordinate. The code in Listing 4 assumes the Model 4 /HR file has already been opened with a LRL of 80.

The uL board carries 20K, which means that in addition to the 240 displayable lines, there are 16 more lines below (lines 240 through 255). These "lower" 16 lines can never be displayed, but can be used for data storage. In other words, the full dimensions of the uL board are 640 x 256.

The RS board carries 32K, all of which can be accessed, and all of which can be

displayed, through the use of two "undocumented" ports. The full dimensions of the RS board are 1024 x 256.

These undocumented ports, 140 (8CH) and 141 (8DH) control the X and Y scrolling of the displayable area. In other words, the 640 x 240 display is actually a "window" of a much larger displayable area. The normal contents of both these ports are zero, which means the upper leftmost 640 x 240 area of the available 1024 x 256 is normally displayed.

The largest value you would ever want to sent to the horizontal reference port (140) would be 48. This value allows you to view the 80 byte columns 48 through 127 (X pixels 384 through 1023).

The largest value you would ever want to send to the vertical reference port (141) would be 16. This value allows you to view the 240 horizontal lines 16 through 255.

Think of the values you send to ports 140 and 141 as the "edges" of the 640 x 240 window you want to display. If you want line 7 to be the top line on the screen, send 7 out port 140. If you want byte column 12 to be at the left edge of the display, send 12 out port 141. (Remember that line and byte column numbers are base zero.)

By changing the values at these two ports, you can make images appear to move around the screen, or use the 640 x 240 as a "window" to scroll around a larger image up to 1024 x 256 in size.

The data sent to ports 140 and 141 have no effect on the way ports 128 and 129 address the graphics board. They only affect which part of graphics board RAM is displayed.

On the uL board, video wait states are always enabled, and cannot be turned off. To compensate, the uL board can be written to during both the monitor's horizontal and vertical blanking pulses.

On the RS board, when video waits are enabled, you can only write during the vertical blanking pulse. But you can control video waits yourself by manipulating bit 1 of port 131. Normally, you want video waits enabled, as disabling them causes interference with the signal to the electron gun of the CRT, resulting in undesirable "snow" on the screen.

However, you can achieve very fast clearing or negating of the screen, for example, by first turning the board and the waits off, performing the operation, then turning both the board and waits back on. This method allows screen clears in about 0.3 seconds, for example.

Most of the time, however, you need video waits enabled; so the uL board allows faster transfer of data since it can be written to about 1/4th of the time, while the RS board can only be written to only about 1/16th of the time when video waits are enabled.

Since bit 1 of port 131 of the RS board is used to control video waits, another way has to be used to enable and disable text overlay of graphics.

To enable text overlay on the RS board, you must first turn the graphics display on (write to port 131 with bit 0 set), and then write to undocumented port number 142 (8EH) with bit 0 set. Thereafter, you can turn the graphics on and off, and the text will remain. To go to graphics-only mode, you must write to port 142 with bit 0 reset.

Since port 142 has no effect on the uL board, when writing software designed to run on both boards, it's OK to talk to port 142 as though the program will be running only on the RS board.

However, different values for bit 1 of port 131 must be sent for the two different boards since you will virtually always want it set on RS boards to keep wait states enabled, but will be sending different values for this bit on uL boards to enable and disable text overlay.

The code in Listing 5 tests to see which kind of graphics board is installed, provided you have not disabled interrupts.

The use of TIMSL$ to govern the delay is the easiest and best way to make sure the graphics board has had time to both receive and process the data sent to it. This delay is completely independent of CPU speed and, happily, changes to TIMSL$ are triggered by the start of the vertical blanking pulse (which is also the RTC clock pulse), which

suits the purpose of the delay perfectly. This is equally true for machines running on 50 Hz power, except that references to 1/60th of a second become 1/50th of a second.

If you want your program to be absolutely "legal," the same function could be accomplished in a "documented" way by setting up a self-terminating high priority RTC interrupt task, but that's a lot of trouble just to achieve a simple delay.

One fairly easy way to maintain software compatibility for the two graphics boards is to maintain a one-byte storage area (labeled BORDTYP in Listing 6). If the program detects a RS board, it loads this byte with 02H. Otherwise, it loads it with 00H. Then the code in Listing 6 will make uL control codes perform the desired functions on RS boards as well, with the RS video wait-on bit always set.

With this subroutine in place, you would use bit 1 of the control port code to govern text overlay (a la Micro-Labs), and forget about video waits, as they will always be on. Then, instead of doing direct writes to port 131, you would CALL COMPAT instead.

Note that this routine makes the write to port 131 first, and the write to port 142 second, the order required for proper handling of text overlay on the RS boards.

O.K. You now have the basics of how to manage both the Radio Shack and Micro-Labs high resolution graphics board in Z80 assembly language, and how to transfer data to and from the hi-res board.

WHAT you send to the boards is up to you. If you want to write software to draw lines, arcs, shapes, etc., I suggest you buy a good book on bit-mapped computer graphics. There are many. Perhaps the best is the one named, appropriately enough, "Bit Mapped Graphics."
-Frank Slinkman

OPEN FORUM

LTR: SPELLING CHECKER: I recently received and started to use the new SuperSCRIPSIT Proofreading program, and enthusiastically recommend in to anyone using SuperSCRIPSIT and are not using a spelling checker. I have one 5 1/4" disk drive (drive 0) and one 3 1/4" disk drive (drive 1) in my computer. Both SuperSCRIPSIT and the spelling checker files will fit on the 360 k, 5 1/4" drive and leave some room for the "user" word list.

To use the spelling checker, simply quit your document using <Control> <Q> to go to SuperSCRIPSIT'S main menu. Press the <P> key (Proofread) and answer the prompt, "Name of document to proofread." The program is very fast -- it took less than 1 minute to make a pass through a 1200+ word document I created. The program counts the recognized words in the document (a nice feature for students) and the words it did not recognize and displays these numbers on the screen. The proofreader then takes you back to the first unrecognized word in the document and ask if you want to SKIP the word, CORRECT the word, or ADD the word to the user list. The spelling checker comes with about 74,000 words and a specialized user file to which you can add about 2045 words. I have added less than 70 words (mostly of special interest) so far!

Pressing <S> will cause the word being "pointed" to by the cursor to be skipped over, and the the cursor will go to the next unrecognized word. If you wish to "correct" a word, simply press <C> and a prompt for the correct spelling will appear at the bottom of the screen. The corrected word is automatically inserted in the text. One small problem with the program shows up at this point. The program does not spell check the "new" spelling unless you recheck the entire document. And once you have corrected the spelling of a word, the program will not ask you if you want to add the word to the user list (assuming the word is not already in the dictionary). These are not big problems since going back through the spell check process consumes only a small amount of time. The program also does not recognize every possible prefix and suffix that could be added to a word. So, you may have to manually check a few

words when the lexical (basic) form of that word is actually in the program file.

The program disk comes with a 8 page manual that tells how to install the program on your working disk. I found the manual to be easy to follow, and by following the manual, installation was "foolproof." One thing I wanted to do was to have both my word processor and the spell check program on the same disk. After removing a few user files from my SuperSCRIPSIT disk, there was ample room to BACKUP the spelling checker from drive 1 to drive 0. As I said above, there is a small amount of room (about 21.O k) left on the disk for additional words you may want to add. Once you get your spell checker installed, you probably will be able to file the manual safely away -- the program is so easy to use, I never have to refer to the manual.

BACKUP COMMAND:
Next, I would like to describe my "adventures" in backing up a 360 k, 5 1/4" disk to a 720 k, 3 1/2" disk. This can sometimes be a problem since it is easiest to backup between disks that have the same number of tracks and the same capacity. As of this time, I have only had to backup FROM my 5 1/4" drive to my 3 1/2" drive so I do not have any experience going the other way. I have more to say about this later on.

When making backup's with the (X) parameter, it is sometimes necessary to have system files 2, 3, 1O and 12 in memory. If you are prompted to install those files do the following: Type in "SYSTEM (SYSRES=2)" to install system file 2 in memory. Change the number and repeat this process for the other three files. This is done at TRSDOS Ready (or LS-DOS Ready). It might also be possible to do this from a JCL file and save some keystrokes. Once you have installed those four files in memory, you can then make a backup using the (X) parameter (see BACKUP in you Disk System Manual).

Since I have only one 5 1/4" drive (after replacing both original drives), this is the process I use to copy "old" 5 1/4" data disks to "new" 3 1/2" data disks. (1) Start up the computer with the 5 1/4" System Disk in drive 0 and a formatted 3 1/2" disk in drive 1. (2) BACKUP the system disk from drive 0 to drive 1 using this command -- BACKUP :0 :1 (SYS,INV). (3) Type in: SYSTEM (SYSTEM=1). This temporarily transfers control to drive 1 and makes the computer think drive 1 now is drive 0. (4) Now I can make a single drive backup in my lower drive which the computer now thinks is drive 1. I can also make backups from 5 1/4" data disk to 3 1/2" disks using this command -- BACKUP :1 :0 (X). Remember the preceding paragraph if you have a problem and your computer refuses to cooperate.

If you still are having a problem, go to TRSDOS (or LS-DOS) Ready and set up either a 32 k or 64 k RAM drive and use the COPY command. Again, see the disk operating manual for additional information.

RAM DRIVE & PRINTER SPOOLER:
Use of a RAM drive is a good reason to upgrade from 64 k to 128 k (it is not necessary to upgrade to 128 k to use a printer spooler or RAM drive). Part of this additional 64 k of RAM can also be used as a 32 k printer spooler. The spooler allows you to print a document while still using your keyboard to do other work. To set up the print spooler in bank 2, type this in -- SPOOL *PR (BANK=2,DISK=0), and then press <ENTER>. A message saying that the spooler has been installed will appear. To clear the spooler memory (maybe you made a mistake, or want to make another change), go to the Ready prompt and type this -- SPOOL (CLEAR). To turn the spooler off, type in -- SPOOL *PR (NO).

To set up the RAM drive (memdisk), type in this -- SYSTEM(DRIVE=2, DRIVER="MEMDISK"), then answer the prompts. If you have set up the printer spooler, answer <B> to use Bank 1. Use <A> if you have a 64 k computer. Otherwise, use <D> if you have 128 k. Next, type <D> for Double Density (same as your disks), and <Y> to format the RAM drive. If you exit your word processor before finishing your file in the RAM drive, you can go back to it -- just answer <N> when you are asked if you want to format it. After leaving your word processor, any file in the RAM disk can be COPYed to another disk. REMEMBER! If you don't copy your file, that file will be lost when you turn your computer off!

NEW DRIVES:
Lastly, I want to describe my adventures as I installed two new disk drives in my "early" model Model 4 (purchased it in 1983). I have had my case off a couple times before (once to install a high resolution board), so I knew some of the things to expect as I took the case off. If this is your first time, remember there is only a small amount of clearance between the back of the CRT (picture tube) and the case. THIS IS IMPORTANT: Be sure to move the case to the front as you are taking it off to avoid damage to the tube! DO EVERY THING SLOWLY. You may also want to allow your computer to set for at least 24 hours after unplugging it to allow any static charges in the picture tube to drain off -- they can be dangerous. After removing the necessary screws, and the top, I then carefully removed a small bundle of wires that were connected to a circuit board attached to the top part of the case. I then set the top aside.

The next step is to remove the old drives, which is not difficult. Begin by removing any metal shields around the drives. Make note of how things are installed so you can put them back later. My drives are installed in plastic supports. Later models may have metal ones. Since I was removing two full height drives and installing two half-height drives, I decided to install them both in the bottom opening and leave one of the old drives in the upper opening as a "filler." To do this, I had to have a new drive cable made up -- I purchased this from CN-80. The person I talked with shipped it right out after my "panic" phone call, which was made necessary when I learned my old cable was not going to work (I tried to modify it, but ruined it). A Phillips (cross point) screwdriver is about the only tool I needed up to this point.

With the case apart, and the new drives just "laid" in position, I carefully hooked up all the cables and wires, and then plugged my computer in. I turned it on and booted it up, and it did not work right. Another phone call to CN-80 got me going. My call was made after people normally would have gone home, but someone answered it anyway, for which I am very thankful.

In order to install both drives in the lower bay, it was necessary to remove the drive supports and cut them so there would be room for the cable connections on the back of the drives. The new drives are a little bit longer than the old ones which makes this modification necessary. A saw made quick work cutting the plastic towers. I also had to drill new mounting holes in the supports for one of the drives. The mounting holes for the old full-height drive were used for the new drive 0 which filled the lower half of the bottom bay. Using a 3" x 5" card to make a template for the new holes, I was able to accurately locate the new holes the first time. Do this by making two holes in each card that match the holes in the new drive 0. Attach the card to the drive using the supplied mounting screws. Place the top drive (#1) in the same relative position it will be mounted in, and locate its mounting holes. Carefully observe the mounting holes in the drive case and poke small matching holes in the card. Use the card to locate the holes you will drill in the drive supports and then carefully drill the holes.

The screws that came with my new drives were not long enough, and the old mounting screws could not be used since the new drives required Metric screws. I found a solution at a local hobby store that sold parts for radio controlled cars. I had to buy four screws 10 mm long for mounting my new drives. The new screws required that I also pick up a Metric hex wrench to tighten them.

There is only one thing, looking back, that I would have done differently. If I could have afforded it, I would have put two 5 1/4" drives and two 3 1/2" drives in so it would be easier to make backups. With over 2000 k capacity, it would be like a "poor man's" hard drive! Since I could not do that, I probably would have settled for two 5 1/4" drives. As it is, I have more disk drive capacity than I know what to do with!

OLD PARTS:
If someone wants my old drives (for parts, etc.) you can have them for the cost of shipping and two half height filler plates for my top bay. I also have an original, new Radio Shack Scripsit Dictionary (Model III) complete with manual if someone would like to make me a fair offer. I have opened it but never used it.

TECHNICAL QUESTION:
The new 720 k, 3 1/2" drive I installed is substantially noisier than the new 360 k, 5 1/4" drive. Is that normal???

Sincerely,
Samuel Laswell
74214 Lambert Dr., South Haven, MI 49090

A: To answer your question about 3-1/2" drives being noisier than the 5-1/4" drive, this is normal because of the speed that it flies back and forth across the disk media. Twice as much storage space in half the space. All 3-1/2" drives have this typical noise. One suggestion; when using a 3-1/2" drive as your system drive you can quite it down substantially by placing your /SYS file as close as you can to the directory.

To do this using FBackup, format your new 3-1/2 disk that you are going to use as your working system boot disk. Using your original system operating disk as the source disk type at Dos Ready:

FBACKUP /SYS:sn :dn (S,I,C:37) <ENTER>

"sn" being the source drive number and "dn" being the destination drive number. This will cause FBackup to start placing the /SYS files on cylinder 37, (track 37) close to the location of the directory location. Then type at Dos Ready:

FBACKUP :sn :dn (S,I,New)

which will install all the rest of the files on the disk in the destination drive, and you have a new, quieter 3-1/2" system boot disk.

The reason for this is that you have cut down the travel distance that the read/write head is traveling between the directory file location and the location of the /sys files.

You have probably noticed that when the drive is reading and writing to a data file with out leaving that file location that it is much quieter, until it leaves the file location. One other note that we have discovered when we installed all 3-1/2 drives inside the Model 3 or 4 case is that there is an effect created similar to the sound created by an orchestra hall. There is a lot of empty space surrounding the drives and this space on amplifies the vibrations of the drive. We would not suggest any form of baffling though, this would keep the heat trapped inside the case and it has to breath to expel this heat through natural convection, except on the model 4P which has an internal circulating fan.

All new drives shipped now have both short and long phillips head metric screws.

The SuperScripsit Spelling Checker Program written by David Goben is available from CN80 $37.95 +(Z)S&H. Model III or 4 versions.

LTR: You published my request for help with CP/M and Wordstar/Calcstar in the March 91 issue. I solved the problem and am passing the solution on. The problem was to get both programs to run on the printer without having to reset a DIP switch. The solution was to change the CP/M using CONFIG command so that line feed was sent with carriage return to Calcstar, but not to Wordstar. Each program is on it's own disk and only the data need be transferred from Calc* to Word*. Both now work great and didn't have to buy anything new. The moral is to read the book, then read it again for the first time.
-B. G., Dayton, OH

LTR: I have 3 TRS Model IIIs each with 48K, one with an RS232 port. I would like to make one Model 4 out of my Model IIIs. Is there a book or article that would tell me how? Do you have the upgrade parts?

I don't have a lot invested in my 3's, one was free, so I can't spend a lot on upgrading, but I'm a science librarian. I do a lot of word processing, and I'd like to upgrade to Model 4 features.

Thanks for any information you can pass along.
-C. K. P. Santa Rosa, CA

A: At one time there were upgrade kits available to convert a Model 3 into a Model 4. But the expense would be more than it is worth. It requires a completely different mother board, and several other components depending on the age of the Model III. Better to stick with them for word processing if they are doing the job. Or invest in good used Model 4.

TABLES AND PROGRAM LISTINGS by J. R. "Frank" Slinkman

(Editors Note: These listings are written in assembly language and are not basic programs. They require a complier program such as DEA to compile them into machine language programs.)

Table 1

128	80H	set X coordinate (write only)
129	81H	set Y coordinate (write only)
130	82H	graphics data (read/write)
131	83H	set graphics board mode (write only)

The bits of port 83H are mapped as follows:

7	Y clocking control:	0 = clock after write, 1 = no clocking
6	X clocking control:	0 = clock after write, 1 = no clocking
5	Y clocking control:	0 = clock after read, 1 = no clocking
4	X clocking control:	0 = clock after read, 1 = no clocking
3	Y clock direction:	0 = increment, 1 = decrement
2	X clock direction:	0 = increment, 1 = decrement
1	RS boards: video waits:	0 = disable, 1 = enable
	uL boards: text overlay:	0 = enable, 1 = disable
0	Graphics screen:	0 = off, 1 = on

Listing 1

```
        LD      A,11111111B
        OUT     (131),A         ;graphics board on, no clocking
        XOR     A
        OUT     (128),A         ;set X coordinate to zero
        OUT     (129),A         ; "  Y     "       "   "
        IN      A,(130)         ;read data @ 0,0
        OR      10000000B       ;set bit 7
        OUT     (130),A         ;write data back to board
```

Listing 2

```
;  ENTRY: HL = X pixel coordinate (uL range 0-639, RS range 0-1023)
;                C = Y pixel coordinate (range 0-255)
;  EXIT          HL and BC altered
;
SETPXL  LD      A,11111111B     ;no clocking, gfx display on
        OUT     (131),A
        LD      A,L             ;p/u lsb of X pixel coordinate
        AND     7               ;A = X pixel coord modulo 8
        LD      B,A             ;  store result
        LD      A,C             ;Y coordinate
        OUT     (129),A         ;send Y coord to gfx board
        SRL     H
        RR      L               ;divide X pixel coordinate
        SRL     H               ;   by eight
        RR      L
        SRL     L
        LD      A,L             ;p/u X byte column number
```

cont'd on next page

```
        OUT     (128),A         ;send to gfx board
        LD      C,1             ;create bit mask
        INC     B               ;in case zero
STP010  RRC     C               ;shift mask right...
        DJNZ    STP010          ;...until in proper position
        IN      A,(130)         ;read byte from gfx RAM
        OR      C               ;set desired bit
        OUT     (130),A         ;replace gfx data w/bit set
        RET
```

Listing 3

```
NEGATE  LD      A,01110111B     ;auto inc Y on write
        OUT     (131),A
        LD      DE,79<8!240     ;D counts byte columns, E = # of rows
NGT010  LD      A,D
        OUT     (128),A         ;send column # to gfx board
        XOR     A
        OUT     (129),A         ;set Y coord to zero
        LD      B,E             ;B counts 240 rows
NGT020  IN      A,(130)         ;read gfx data from board
        CPL                     ;reverse the bits
        OUT     (130),A         ;write back to board -- causes Y to clock
        DJNZ    NGT020          ;do next row
        DEC     D               ;next lower column number
        JP      P,NGT010        ;go if col # >= 0
        RET                     ;else finished
;
;  To change to perform clear graphics screen function, change NGT020 loop to
;
NGT020  OUT     130,A           ;A is already 00H due to XOR above
        DJNZ    NGT020
```

Listing 4

```
HRREAD  LD      A,10111011B     ;auto clock X on write
        OUT     (131),A
        LD      DE,FCB          ;DE -> the file control block
        LD      BC,240<8!130    ;B counts lines, C = gfx data port #
HRR010  PUSH    BC
        LD      A,240
        SUB     B               ;calc Y coordinate (range: 0 to 239)
        OUT     (129),A         ;send to gfx board
        XOR     A               ;X coordinate = 0
        OUT     (128),A         ;send to gfx board
        LD      HL,UBUF         ;HL -> 80-byte user buffer
        LD      A,@READ
        RST     28H             ;read an 80-byte record into UBUF
        JR      Z,HRR020        ;go if no error
        POP     BC              ;    else clear stack
        POP     BC              ;    (RET address, too)
        JP      ERROR           ;    and handle error
HRR020  LD      B,80            ;count 80 bytes
        OTIR                    ;send 80 bytes to gfx board
```

cont'd on next page

```
        POP     BC          ;restore line counter in B
        DJNZ    HRR010      ;go if more lines to read & display
        RET                 ;else finished
;
HRSAVE  LD      A,11101011B ;auto clock X on read
        OUT     (131),A
        LD      DE,FCB
        LD      BC,240<8!130
HRS010  PUSH    BC
        LD      A,240
        SUB     B           ;calc Y coordinate
        OUT     (129),A
        XOR     A           ;set X coordinate to 0
        OUT     (128),A
        LD      HL,UBUF
        LD      B,80
        INIR                ;read 80 bytes from gfx board to UBUF
        LD      HL,UBUF
        LD      A,@WRITE
        RST     28H         ;write 80-byte record
        POP     BC          ;row counter in B
        JR      Z,HRS020    ;go if no error
        POP     BC          ;    else clear stack...
        JP      ERROR       ;...and handle error
HRS020  DJNZ    HRS010      ;do next row
        RET
```

Listing 5

```
TIMSL$  EQU     002BH       ;TRSDOS/LS-DOS 6 task processor time slice
                            ;    (changes 60 times per second)
GFXTST  LD      A,11111110B ;turn off all clocking (gfx display off)
        OUT     (131),A
        OUT     (129),A     ;set Y coord to line 254 (off the screen)
        XOR     A
        OUT     (128),A     ;0,254 coordinate exits on both boards
        CALL    TSTBORD
        JR      NZ,NOBORD   ;if <>, no graphics board installed
        LD      A,80
        OUT     (128),A     ;80,254 coordinate exists only on RS boards
        CALL    TSTBORD
        JR      Z,RSBORD    ;is RS board if =, else must be uL board
;
ULBORD  make changes needed to support uL board (such as load BORDTYP w/00H)
        JR      CONTINUE
;
RSBORD  make changes needed to support RS board (such as load BORDTYP w/02H)
        JR      CONTINUE
;
NOBORD  inform user no gfx board installed -- terminate
;
TSTBORD IN      A,(130)     ;read byte from gfx board
        LD      (TBD030),A  ;store for later replacement
        XOR     A           ;create test bit pattern
        LD      C,A         ;store pattern
```

cont'd on next page

```
            OUT     (130),A         ;send to gfx board
            LD      HL,TIMSL$
            LD      B,2             ;wait for > 1/60th second
TBD010      LD      A,(HL)          ;p/u time slice pattern
TBD020      CP      (HL)
            JR      Z,TBD020        ;wait for it to change
            DJNZ    TBD010          ;do second time
            IN      A,(130)         ;read data back from gfx board
            CP      C               ;does it equal what was sent?
            LD      A,$-$           ;A = original gfx board data
TBD030      EQU     $-1
            OUT     (130),A         ;restore gfx board to previous
            RET                     ;return to caller with Z or NZ
;
CONTINUE EQU        $
;   program continues
```

Listing 6

```
;   Initialization:  BORDTYP loaded w/02H if RS board, 00H if uL board
;   Entry:           A reg holds the MICRO-LABS code to be sent to port 131
;
COMPAT      PUSH    HL              ;preserve register
            LD      L,A             ;store port 131 code
            AND     $-$             ;isolate text overlay bit if RS board,
BORDTYP     EQU     $-1             ;    create 00H if uL board
            SRL     A               ;shift result to bit 0
            XOR     1               ;reverse bit 0
            PUSH    AF              ;    and save
            LD      A,L             ;restore port 131 code
            LD      HL,BORDTYP      ;if RS board, these two instructions
            OR      (HL)            ;    make sure the waits-on bit is set
            OUT     (131),A         ;send code to control port
            POP     AF              ;text overlay data in bit 0 of A
            OUT     (142),A         ;send it to RS text overlay port
            POP     HL              ;restore register
            RET
```

FACTORX/BAS A Model 3 Program submitted by Robert R. Keegan

In his letter sent with the program Mr. Keegan says, "There don't seem to be as many simple interesting program listings in CN80; on the theory that what goes around comes around, there is enclosed a Mod 3 program in BASIC which might help. I don't take credit for the basic ingenuity of the program, which is a factoring program based on an incredible HP-25 programmable computer program (The HP-25 was limited to a maximum of 49 operation steps.) The original was authored by a real expert, Jim Davidson, who was lost to the world some ten years ago by an untimely death. Thanks, Jim. I don't choose to write explanations as a part of my hobby, and you will have to deal with the absence of one for this program. Maybe you can print it bare and offer to publish the best explanation submitted on how it works. I debugged it quite well, and also belled and whistled it a bit.

The pokes in the program will prevent you Mod IV users from running it in IV mode, but it will be good for you to get acquainted with TRSDOS 1.3 again."

FACTORX/BAS PROGRAM

```
600 CLEAR 500:CLS
700 PRINT"                    PRIME FACTORS          This program accepts input of 10 numbers
differing by D, i.e. N thru N+9*D. It calculates and displays the prime factors of each of the ten
numbers.  Copr. RRKeegan 1985
790 PRINT
795 DEFDBL N,Q,X,Y:DEFINT D,R,M,I,J:X=131041:Y=31
800 INPUT "ENTER your first number to factor"; X
803 INPUT "ENTER the difference between successive numbers";Y
805 CLS
810 FOR I=0 TO 9
820 N=X+Y*I
825 POKE 16259,170
830 GOSUB 900
840 GOSUB 2000
850 NEXT I
870 END
900 DI=2
910 PRINT N;"=";
920 Q=INT(N/DI):R =N-Q*DI
930 IF R=0 THEN GOSUB 1100
1000 DI=3
1020 Q=INT(N/DI):R=N-Q*DI:NQ=SQR(N)
1030 IF R=0 THEN GOSUB 1100:NQ=SQR(N)
1033 IF N = 1 THEN PRINT "":RETURN
1040 IF DI>NQ THEN PRINT N: RETURN
1045 POKE 16260+DI/NQ*50,187
1050 DI=DI+2: GOTO 1020
1100 M=1: N=Q
1110 Q=INT(N/DI): R=N-Q*DI
1120 IF R=0 THEN M=M+1: N=Q: GOTO 1110
1122 PRINT DI;
1125 IF M=1 THEN 1135
1130 PRINT CHR$(8) CHR$(94) MID$(STR$(M),2);" ";
1135 IF N><1 THEN PRINT"*";
1137 RETURN
2000 FOR J=0 TO 52
2010 POKE 16259+J,32
2020 NEXT
2100 RETURN
```

(Editors Note:) We would publish more short type-in programs if the readers would send them in. We certainly appreciate Mr. Keegan's support by sending us this program. There doesn't seem to be much new in the Model 3 program area and we do not want to run the risk of publishing programs that are pretty much old hat to everyone. But we are sure that you Model III users do have new things that you have developed which have not seen the light of day. Programs for publication need to be short, not only for our space considerations, but also very long programs can be very tedious to type in. Short programs are more fun when you can type them in and gain the satisfaction of seeing your efforts rewarded by having the program run without a lot of time spent correcting typing errors.

And yes, we will publish the best explanation to the above program by any reader who cares to sent one in. Type away and have fun.)

LOTTO/BAS Program Listing Number Three by Mike Anderson

We are enclosing a program we wrote called LOTTO/BAS which we somtimes use to pick numbers in our Canadian lottery. No luck so far, but one of the days! It is in ASCII and also a hardcopy. I think it will be of interest to the readers.
-Mike Anderson

```
5 CLEAR
10 CLS:RANDOM
20 PRINT"****************************************"
30 PRINT"* LUCKY LOTTO NUMBER PICKING PROGRAM  *"
35 PRINT"*                                      *"
40 PRINT"* GOOD LUCK WITH THE NUMBERS YOU PICK *"
50 PRINT"****************************************"
60 PRINT
70 INPUT" * TYPE IN LOTTO 636 OR 649 - * ",N
80 IF N=636 THEN N=36
90 IF N=649 THEN N=49
100 IF N<>36 AND N<>49 THEN 70
110 DIM LOT(N):X=RND(-TI)
120 FOR I=0 TO N:LOT(I)=0:NEXT I
130 LOT(0)=-1
140 FOR J=1 TO 6
150 X=RND(N)
160 IF LOT(X)<>0 THEN 150
170 LOT(X)=1:NEXT J
180 PRINT:PRINT
190 PRINT"THE SIX NUMBERS ARE";
200 FOR I=0 TO N
210 IF LOT(I)=1 THEN PRINT I;
220 NEXT I
230 PRINT
240 PRINT:PRINT"IF YOU WOULD LIKE A DIFFERENT SET OF NUMBERS TYPE Y "
250 PRINT:PRINT"TO END THE PROGRAM TYPE N."
260 PRINT:PRINT
270 K$=INKEY$:IF K$="" THEN 270
280 IF K$="Y" GOTO 5
290 IF K$="N" THEN GOTO 300
300 END
```

All of these programs and the programs printed in Vol. 5 No. 1 and No. 2 will be available on the CN80 Disk Series Number 16.

PLEASE NOTE

When submitting programs in assembly language source code format, many of the listings are too long to publish. Plus the fact that many of our readers are not familiar with how to use the listings or do they have the compiler programs required. But we would certainly like to make them available to our readers. If you will submit the actual machine language program ready to run, as well as the source code (in ASCII), and your documentation and comments about the program (also on a disk in ASCII) we can then publish your text and make the program available on our disk series for the benefit of your fellow readers.
-CN80

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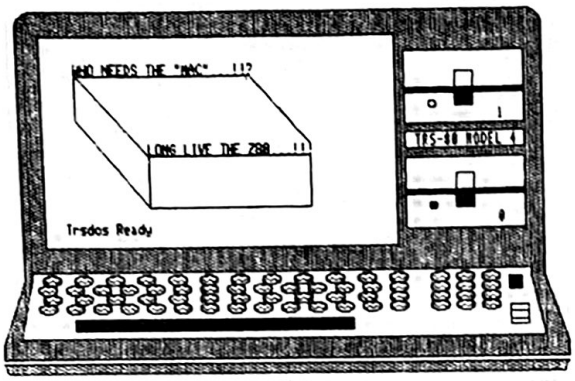

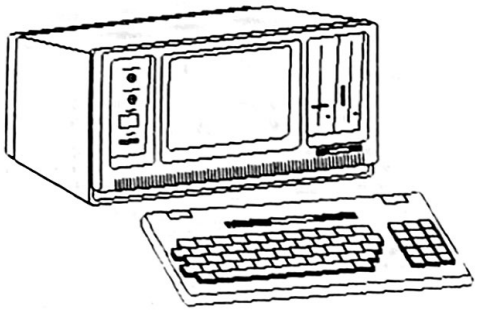

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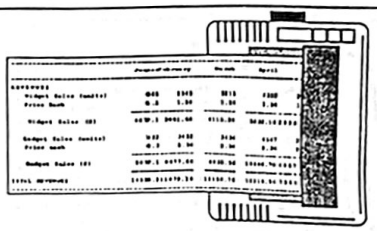

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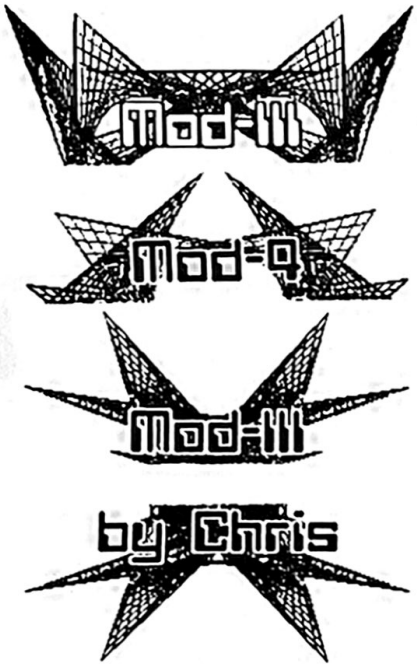

Books by Christopher Fara

MOD-4 by CHRIS for TRS/LS-DOS 6.3, 232 pages — each $24.95
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Written in plain English, the manuals are better organized, with more and better examples for the use of DOS, JCL and BASIC; include chapters with examples on interfacing of DOS and BASIC with assembly language; describe in detail popular ROM, RAM and DOS subroutines; and provide lots of useful extra information never before published in the Model III and Model 4 manuals.

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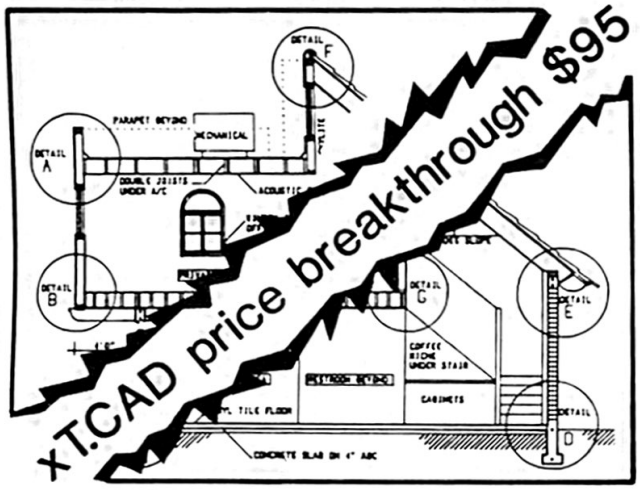

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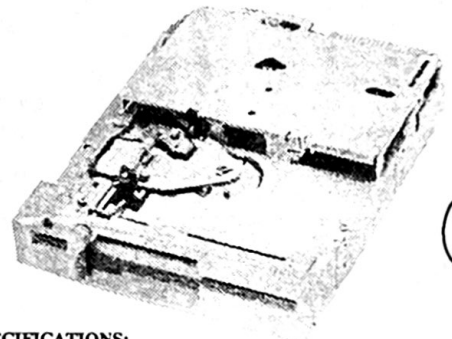

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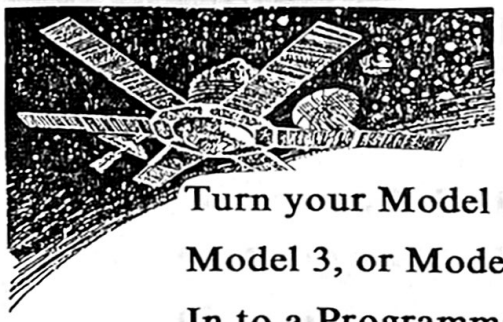

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Create and maintain mailing lists of up to 32,767 names and addresses. Up to five-line entries, including title, first and last names, optional second line, address, city, state, zip code, optional fifth line and telephone number. Sort or search for names by any field. Prints labels in 1, 2, 3, or 4 adjustable columns or on envelopes. Print form letters with any substitutions.

HOME BUDGET and CHECKBOOK ANALYST $ 49.95

A complete checkbook program combined with budget comparisons, income and expense analysis, and projections. Computes current checking balance. Also handles non-check expenses, bank debits, and income. Monthly and year-to-date summaries, yearly projections based on data up to a known month.

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TWO NEW PROGRAM PACKAGES by David Goben

Hi-Res Utilities Package $15.00 plus $3.00 Shipping and Handling.

MODEL 4 HI-RES UTILITIES provides you with 9 utilities to perform general Hi-Res graphics maintenance from DOS Ready. Model 4 equipped with a High Resolution board from Radio Shack or MicroLabs, required.

* HRFXPRT allows your Epson or IBM compatible graphics printer to print your Hi-Res screen data at a resolutions NEVER BEFORE AVAILABLE by ANYONE, TRS-80 or IBM! Print your graphics in picture-perfect super sharp 240 x 216 dots per inch. This is the ONLY program which support this super printing density. Obtain near-laser quality on your 9-pin printer without paying hundreds of dollars for a better printer. You can also select from 7 other densities.

* HRLSRPRT allows you to print your graphics out on a laser, deskjet, and any other printer which support LaserJet+ raster graphics.

* HRLOAD allows you to load standard Hi-Res files (/HR), Crunched Hi-Res files (/CHR), Supercrunched Hi-Res Files (/SHR), and even IBM screen dump files (640 x 200).

* HRSAVE allows you to save the graphics on your Hi-Res screen in /HR, CHR, and /SHR file formats.

* HRHALF1 and HRHALF2 allow you to reduce your graphics screen image to a smaller size.

Other programs include HRFLIP to reverse your Hi-Res screen, HRCLS to clear it, and HRVIEW to view it.

PostMaster Support Utilities Package $39.00 plus $3.00 Shipping and handling.

A great new utility package for owners of David P. Miller's amazing PostMaster package:

POSTMASTER SUPPORT UTILITIES provides you with 10 programs which allows you to capture and create your own icon libraries, decode and encode your own PostMaster font files, and decode and encode your own PostMaster border files.

* MAKEICN allows you to move a capture window using a mouse or the keyboard to frame a Hi-Res image and create a PostMaster icon graphic from it.

* ADDICN allows you to combine individual icon files into a ready library for use by PostMaster. Other icon-related files are DSPICN to display individual icons, and DSPLIB to display entire icon library files.

* Create and edit your own PostMaster fonts using ENCDFON, DECDFON, and ADDFONT. Using these programs allow you to convert simple to create ASCII text file and convert them into font files which can be called up from within PostMaster!

* Create and edit your own PostMaster borders using ENCDBOR, DECDBOR, and ADDBOR, with the same ease of use as you will get from the font utilities.

If you own PostMaster and have ever wanted to create your own library of original icons, fonts, and borders, then this package is definitely for you. The new formats for the yet to be released new version of PostMaster are also supported!

Order both packages for $47.95 plus $4 Shipping and handling -- And Save!

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Ours!

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80 Column Printer
300 Characters Per Second
9 Pin Dot Matrix
Both IBM & Epson Compatible
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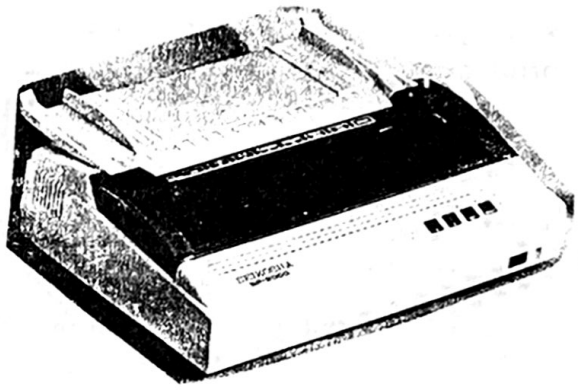

PostMaster

Is distributed now by

Computer News 80

PostMaster by David P. Miller is a program that lets you create Posters, Letterheads and Mailing Labels with icons, borders, and many different character fonts using your dot matrix printer. The program runs on TRS-80 Model 4/4P/4D, with 64K or 128K of memory that has a MicroLabs or Radio Shack high resolution board installed.

This program has received the highest praise from reviewers of any program ever written for the Model 4. It allows you to use thousands of icons, borders, and fonts that are available from the File Cabinet Icon Library, it also allows you to add your own icons, borders and fonts.

Printers supported: Radio Shack DMP-130, -130A, -131, -132, -133, -430, -2100P, also any Radio Shack DMP printer with a 3-digit number with "3" as the second digit. All Epson and IBM printers. All other dot matrix printers that are Epson and IBM emulation printers. Seikosha SP-2000, -2000Plus, -2400. Okidata Microline 182 and 192. Panasonic KX-P1091, -1092, -1124, nonsuffixed. Star 10X, -15X, -NP, -NX, LC-10. C-ITOH 1510, 8510, C-130. (Note - Dot Matrix printers providing 300-dpi or 180-dpi may not work with PostMaster and no guarantees can be made concerning them.

Printers that are not supported are: Radio Shack DMP-110, -120, -400, -500, -2100. Panasonic suffixed printers 1124i, 1124e, etc. Okidata 82, 92, and Daisy wheel printers.

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Free Draw Program Included

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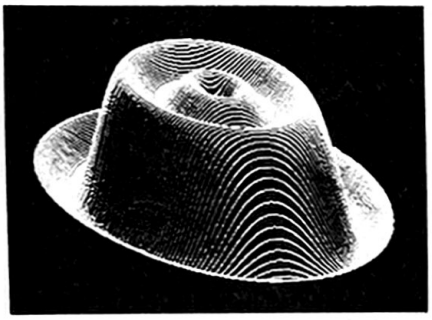

Superior Hardware. The Grafyx Solution provides 153,600 pixel elements which are arranged in a 640 × 240 or on the Model III a 512 × 192 matrix. Hundreds of new business, personal, engineering, and educational applications are now possible. The hi-res display can be shown on top of the standard display containing text, special characters, and block graphics. This simplifies program debugging, text labeling, and upgrading current programs to use graphics. The Grafyx Solution fits completely within any tape or disk based Model 4, 4D, 4P, or III. Installation is easy with the plug-in, clip-on Grafyx Solution board.

Superior Basic. Over 20 commands are added to the Basic language. These commands will set, clear or complement points, lines, boxes, circles, ellipses, or arcs. The hi-res screen can be printed on any of 30 popular printers or saved or loaded to disk without leaving Basic. Areas may be filled in with any of 256 patterns. Sections of the screen may be saved and then put back using any of five logical functions. Labels can be printed in any direction. The viewing area can be changed. The entire screen can be complemented or cleared. Graphics Basic provides dot densities of 640 × 240, 320 × 240, 160 × 240, and 160 × 120, all of which can be used in the same display.

Superior Software. The board comes with over 40 programs and files which make it easier to use, serve as practical applications, demonstrate its capabilities, and serve as programming examples. The software works with TRSDOS 1.3, 6.1.2, 6.2, 6.3; Dosplus 3.4, 3.5, 4; LDOS; and Newdos80. The Grafyx Solution is also supported by 30 optional applications programs: Draw, Bizgraph, xT.CAD, 3D-Plot, Slideshow, Mathplot, Surface Plot, Chess, etc.

Purchase a Grafyx Solution Hi-Res Graphics Board for $ 99.00 and receive a free copy of DRAW a powerful graphics program which allows drawing or designs to be easily created on a Model III/4/4P/4D.

$ 99.00 Add (Z) S&H

Specify Model 3, Model 4p, Model 4 Gate Array, or Model 4 Non Gate Array when ordering. The boards are different for each. Please include phone number.

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Hi-Res Utilities Program
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Five HiRes File Cabinet Volumes

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DWP-310 - Working Needs Minor Adjustment	$ 175
DW-2B - Working	$ 199
DW-2 - Not Working	$ 29
DW-2 - Sheet Feeder (NEW)	$ 29
DW-2 - Tractor (Working)	$ 69
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Percom External Floppy for M3/M4/CoCo - NEW	$ 45
Mod 2 - Exp. Unit 1 Drive	$ 25
Co Co Floppy Drive Cable	$ 2
10 MegPercom-New Untested	$ 45
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Sixteen Model 4 Programs!

Mark Reed's Model 4 Utility Disk now contains 16 useful utilities for every Model 4 owner:

- **CLOSE**, to close all open files on a disk;
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- **CMDINST**, to install CMDEDIT on the system disk in drive zero;
- **CMDSTORE**, to install CMDEDIT's special high memory storage area;
- **DSP**, to display control codes and graphics characters;
- **MAPMEM**, to list all low and high memory modules;
- **MOVE**, to transfer files from one drive to another;
- **PRINT**, to format and print text files;
- **PRT**, to print control codes and graphics characters;
- **RECLAIM**, to remove unused high memory modules;
- **SETMOD**, to set or reset files' MOD flags;
- **SETVIS**, to make files visible or invisible;
- **SWAP**, to exchange disk drive numbers;
- **UNFILTER**, to remove a filter from a device without resetting the device;
- **VLOAD**, to display specially formatted disk files; and
- **VSAVE**, to save the display to a specially formatted disk file.

The Utility Disk comes with a help file, a 23-page manual, and full support from the author. Order your copy today for only $14.95 (plus shipping and handling) from *Computer News 80*, P.O. Box 680, Casper, WY 82602-0680.

Introducing
ED-IT for the Model 4
by Mark Allen Reed

For TRSDOS 6.2 or LS-DOS 6.3. ED-IT is a brand new full-screen text editor that combines power, versatility, and ease of use. Its features include fast operation, a large text buffer (nearly 47K with no high memory modules installed), an easy-to-use menu system (activated by the <BREAK> key), three special programming modes (for assembly language, BASIC, and C), word-wrap capability, block operations (including delete, copy, move, save, and load), search operations (including find, change, change to the end of the file, repeat last find or change, and jump to specific line number), and the ability to enter any ASCII character into the document. ED-IT also allows you to execute nearly any DOS command without leaving the editor or affecting the text buffer. You can view a disk directory, purge unwanted files, even FORMAT and BACKUP from within ED-IT!

ED-IT is powerful enough for a programmer, yet simple enough for the casual user. It is excellent for editing README files, patch listings, and job control language (JCL) files. ED-IT comes with a complete instruction manual and full support from the author. Order your copy today for only $17.95 (plus shipping and handling) from *Computer News 80*, P.O. Box 680, Casper, WY 82602-0680.

DIRECT from CHRIS

Self-booting single-key menu system for Model 4
by Christopher Fara, Microdex Corporation

Runs on any Mod-4/4P/4D under TRS/LSDOS 6.2, 6.3, 6.3.1.

- ♥ Replace dumb 'DOS Ready' with custom-tailored menus
- ♥ Design your own menus with built-in full-screen editor
- ♥ Write comments, help messages anywhere on any menu
- ♥ Up to 36 different menus instantly 'call' each other
- ♥ Run any program by pressing a single key, 58 choices
- ♥ Change and re-arrange 'hot key' assignments on the fly
- ♥ Create flexible 'template' commands with open options
- ♥ Common chores (format, directory, etc) preprogrammed
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- ♥ Screen-saver blanks idle display, optionally shows clock
- ♥ Does not reduce memory for other programs

*USERS WRITE: ...I have found it to be truly the 'salvation' of my hard disk... (H.E.F.) ...I had a copy of 'Direct from Chris' and it has made the process almost painless... (**Patrick E. Hamel, CN80 November 1991**)*

*REVIEWED in CN80 (March/April 1991) ...installation is child's play... screens can be designed easily and can be reached like a flash... (**Dale Hill**) ...the good news here is that DIRECT is very simple to use, takes little disk space, and you, the user, have complete control over the menus and the hot key assignments... the whole thing is very flexible... I am greatly impressed... (**Dick Houston**)*

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LP VI/VIII,DMP 400/420	26-1418	CN1004	FABRIC CART.	5.60	5.10
LP VII, DMP 100	26-1424	CN1038	FABRIC CART.	6.00	4.50
DMP 110	26-1283	CN1005	FABRIC CART.	6.58	6.08
DMP130/130A/132/133/107	26-1236	CN1006	FABRIC CART.	6.40	5.90
DMP130/130A/132/133/107	26-1238	CN1007	FABRIC REFILL	5.00	4.50
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DMP 120, 200	26-1483	CN1009	FABRIC CART.	7.00	6.50
DMP 120, 200	26-1489	CN1010	FABRIC REFILL	4.85	4.35
DMP 105, 106	26-1288	CN1011	FABRIC CART.	9.64	9.15
DMP 105, 106	26-1288	CN1012	FABRIC REFILL	5.84	5.34
DMP 430	26-1296	CN1013	FABRIC CART.	12.25	11.75
DMP 440	26-2809	CN1014	FABRIC CART.	19.30	18.80
DMP 2100, 2100P, 2110	26-1442	CN1015	FABRIC CART.	6.10	5.60
DMP 2100, 2100P, 2110	26-1442	CN1016	FABRIC REFILL	4.85	4.35
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DMP 2120	26-2836	CN1018	FABRIC REFILL	7.90	7.40
LMP 2150	26-1287	CN1019	FABRIC CART.	8.00	7.50
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ALL RIBBONS ARE BLACK, CART.= Plastic Cartridge, REFILL= Refills Only/No Cartridge.

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1 to five items add (Y) .... 6 or more items add (Z)
Please refer to the CN80 Product Guide Shipping and Handling Schedule.

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Computer News 80 Product Guide

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MOD III by CHRIS $ 24.95 (Z)
TRSDOS 1.3 VERSION by Chris Fara (Microdex). The Model III manuals in plain English. 8-1/2 x 11.

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MOD 4 by CHRIS $ 24.95 (Z)
by Chris Fara (Microdex, Corp.) For Mod 4/4P/4D TRS-DOS 6 & LSDOS 6.3 in plain English. 8-1/2 x 11.

JCL by CHRIS $ 7.95 (Y)
by Chris Fara (Microdex, Corp.) How to write Job Control Language Programs 30 pg booklet, explains JCL, Model III & 4/4D/4P.

Z-80 TUTOR I by Chris Fara $ 9.95 (Y)
The 1989 Introduction series of essays published in CN80 revised in book form. Z-80 instructions and subroutines for Mod-III and Mod-4.

Z-80 TUTOR II by Chris Fara $ 9.95 (Y)
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Z-80 TUTOR III by Chris Fara $ 9.95 (Y)
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"Z-80 TUTOR X" stand-alone reference manual for assembly programming on any Z-80 Computer. 62 pages; thorough, yet compact and easy-to-use.

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For TRSDOS 6.2 or LS-DOS 6.3. New full-screen text editor. Powerful enough for a programmer yet simple enough for the causal user.

PATCH UTILITY PROGRAM FOR TRSDOS 1.3 $ 10.00 (V)
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PACK for Model 1/3/4 $ 17.95 (Y)
BASIC Program Packer by David Goben.

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T62DOSXT Upgrade TRS 6 Dating $ 18.00 (X)
by David Goben. Extends TRSDOS 6.x date entry beyond Dec. 31, 1987, patches & utility programs.

BUSY-CALC Spreadsheet Program $ 79.95 (Z)
by David Goben. Small business & family spreedsheet program. Model 4/4P/4D; TRSDOS 6.x, LSDOS 6.3.x.

BUSY-CALC DEMO DISK ONLY $ 10.00 (V)
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BCX Spreadsheet Program $109.00 (Z)
by David Goben. For Model 4's with Extended Memory (minimum of 128k required).

BCX DEMO DISK ONLY $ 15.00 (V)
Redeemable against purchase price of BCX.

DAVID'S MODEL 3 FILE UTILITIES $ 9.00 (Y)
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Specify Version when ordering:
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Model I or III NEWDOS/80 v 2
Model 4/4P/4D TRSDOS/LSDOS 6.X
Model 4/4P/4D DOSPLUS

SCRIPT SPELLING VERIFIER $ 37.95 (Y)
by David Goben.

SUPERSCRIPSIT SPELLING CHECKER $ 37.95 (Y)
by David Goben.
Specify version when ordering Spellers
Model I, III, 48k, 2 disk drives minimum required.
Model 4 64k, 2 disk drives minimum required.

MODEL 3 FBACKUP by David Goben $ 15.00 (Y)
LDOS 5.x. Very fast and versatile backup utility.

MODEL 4 FBACKUP by David Goben $ 15.00 (Y)
Very fast and versatile backup utility for Model 4.

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LDOS 5.x systems. Very fast hard drive backup prg.

MODEL 4 FASTBACK by David Goben $ 29.95 (Y)
TRS/LSDOS 6.x systems. Very fast hard drive prg.

MODEL 3 FFORMAT by David Goben $ 15.00 (Y)
Fast FORMAT for Model 3 using LDOS 5.3.x.

MODEL 4 FFORMAT by David Goben $ 15.00 (Y)
Fast FORMAT for Model 4 using LSDOS 6.3.x.

REMBRANDT Graphics Toolkit $ 39.95 (Z)
by Spectre Technologies. Graphic software for Mod 4/4D/4P, TRSDOS/LSDOS, hi-res board is not required.
Order both Rembrandt and Long & Loud for $ 67.50 (Z)

LONG & LOUD Sideways & Banner $ 34.95 (Z)
by Spectre Technologies. Mod 4/4D/4P TRSDOS/LSDOS,
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ASTROCAL by Vernon B. Hester $ 29.95 (Z)
Turn your Model 1, 3, 4/4P/4D in to a programmable calculator. Manual and diskette w/built-in operating system, ready to run. Specify computer Model 1,3,4.

TRSCAN by J.F.R. Slinkman $ 45.95 (Z)
Scanner program for Chinon DeskScan 2000 with Model 4 using LSDOS 6.3.0 or 6.3.1.

ROMCLOCK3 UTILITY PACKAGE $ 5.00 (Y)
by David Goben. Clock operating system for SmartWatch or No Slot Clock LDOS 5.3.1 version.

ROMCLOCK4 UTILITY PACKAGE $ 5.00 (Y)
by David Goben. Clock operating system for SmartWatch or No Slot Clock TRS/LS 6.3.1 version.

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Posters with a variety of Fonts and picture Icons.

The CN80 MOUSE HOUSE

MOUSE+ DRIVER by David Goben $ 10.00 (Y)
Complete Mouse Driver Program and manual for 2 or 3 button mice for Model 4. Write your own mouse programs in BASIC or prcgram language.

M T K by David Goben $ 18.00 (Y)
Mouse to Keyboard Interface program w/manual for 2 or 3 button mice for Model 4. MOUSE DRIVER Required.

THREE BUTTON MOUSE $ 26.95 (Z)
Three button mouse and adapter for RS-232 connection.
NOTE: Model 4s w/RS-232 connector pointing down require an Extender Cable $8.00 + $2.00 S&H.

CN80 COMBINATION MOUSE PACKAGE
M4s w/RS-232 connector out the back $ 52.95 (Z)
M4s w/RS-232 connector on the bottom $ 59.95 (Z)
Includes: 3 button mouse w/adapter, and extender cable if needed (see pricing above), Mouse+ Driver program and M T K Interface program.

MOUSE HOUSE HOLSTER $ 1.75 (X)
Holds mouse on side of computer out of the way.

MOUSE PAD $ 2.45 (Y)
Better Mouse control, foam pad nonslip surface.

BOOKS

DISK INTERFACING GUIDE/MOD I $ 1.85 (V)
by William Braden Jr. Out of print book.

101 COMPUTER BUSINESS IDEAS $ 7.95 (A)
by Wally Wang. "If you'd like your computer to work for you-and help you earn money-this is the book to read."

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by Jim Kimble. "...covering everthing the beginning modemer needs to know-from purchase and installation".

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by Wally Wang and Scott Millard. "...understandable, inexpensive and easy maintenance solutions.

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LASER and DOT MATRIX PRINTER DRIVERS

ALLWRITE HP LASER SUPPORT $ 20.00 (Y)
PACKAGE, Model 4/4P/4D

ALLWRITE DESKJET SUPPORT $ 20.00 (Y)
PACKAGE, Model 4/4P/4D

SUPERSCRIPSIT HP LASER DRIVER $ 20.00 (Y)
Model I,III,4/4P/4D

SCRIPSIT PRO HP LASER DRIVER $ 20.00 (Y)
Model 4/4P/4D

SUPERSCRIPSIT FX80 DRIVER $ 17.95 (Y)
Model I,III,4/4P/4D

SCRIPSIT PRO FX80 DRIVER $ 17.95 (Y)
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SuperSCRIPSIT for the Model III
SuperSCRIPSIT for the Model 4
Scripsit PRO for the Model 4

Font style	Point Size (Height of Letter)
Century	10 point
Amertype	10 point
Legal	10 point
Helvetica	10 point
Optimas	10 point
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Times Roman	10 point
Palitine	12 point
Centrum	12 point
Optimis	12 point
Helvetica	12 point
Palitine	8 point

Each Font Package supports normal, bold and italics printing of letters. Thirty-six soft font packages in all, Twelve soft fonts for each word processor supported.

Prices are $10 for each soft font package, plus (Y)
Discounts for multiple font orders are:
5 Font Packages for $ 45.00 (Z)
10 Font Packages for $ 90.00 (Z)
12 Font Packages for $ 96.00 (Z)

FILE CABINET CATALOGS

MODEL 4 TRS-80 PUBLIC DOMAIN	$ 2.00 (V)
MODEL 4 HIGH RESOLUTION	$ 2.00 (V)
TRS-80 MODEL 1/3 PUBLIC DOMAIN	$ 2.00 (V)
SYMPHONY 90 MUSIC LIBRARY CATALOG	$ 3.00 (V)

SYMPHONY 90 MUSIC SYSTEMS FOR THE MODEL 4

SYMPHONY 90 COMPOSER SYSTEM $ 39.95 (Z)
Specify Model 4 or Model 3 Version

SYMPHONY 90 PLAYER SYSTEM $ 17.95 (Z)
Specify Model 4 or Model 3 Version

SYMPHONY 90 MUSIC INTERFACE UNIT.
Sold only with Composer or Player program.
Interface and Composer $ 89.00 (Z)
Specify Model 3 or Model 4 Versions.
Interface and Player $ 67.00 (Z)
Specify Model 3 or Model 4 Versions.

Y CABLE $18.00 (Y)
50 pin edge-card connectors. Enables hard drive and Symphony 90 (or ORC 90) to be used at the same time.

TRSLINK LIBRARY DISKS
TRSLINK issue 1 to 43 only $ 1.50 (W)
Complete set 1 to 43 $ 32.50 (Z)
(5-1/4" or 3-1/2" LSDOS 6.3) or (5-1/4" TRSDOS 1.3)

SPECIALTY PROGRAMS

SPECTECH Disk#1 $ 5.00 (V)
A collection of electronic and other formula programs.

DISK OPERATING SYSTEMS (DOS)

TRSDOS 1.3 R/S Cat # 26-0312 $ 7.00 (X)
Model 3, Disk Operating System and BASIC

LDOS 5.3.1 $ 39.95 (Y)
Model 3 Disk Operating System and Basic Interpreter.

LS-DOS 6.3.1 R/S Cat # 700-2297 $ 39.95 (Y)
Model 4 Disk Operating System and Basic Interpreter

DISK OPERATING SYSTEMS WITH MANUALS

TRSDOS 1.3 R/S Cat # 26-0312 $ 31.95 (Z)
Model 3, Disk Operating System and BASIC with Manual.

LDOS 5.3.1 $ 60.00 (Z)
Model 3 Disk Operating System and Basic with Manual.

LS-DOS 6.3.1 R/S Cat # 700-2297 $ 60.00 (Z)
Model 4 Disk Operating System and Basic with Manual.

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5-1/4 Double/Single Sided Disks DD. 100% Error Free Lifetime Guarantee with Paper Sleeves, Labels & Read/Write Tabs.

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Holds one or two 5-1/4 floppy disks.

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With three female 36 conductor centronics connectors.
A-B SWITCH, SERIAL, RS232 $ 18.75 (Z)
With three DB25 Female connectors.
THREE POSITION SERIAL SWITCH $ 20.95 (Z)
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FOUR POSITION SERIAL SWITCH $ 22.95 (Z)
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Printer to Selector Switch 10'	$ 15.95 (E)
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RS232 SERIAL CABLES

RS232 Serial Cable 6 ft $ 14.95 (E)
Equal to Radio Shack #26-240, Male - Female

RS232 Serial Cable 6 ft $ 14.95 (E)
Equal to Radio Shack #26-249, Male - Male

MOUSE CABLE ADAPTERS $ 2.95 (W)
Male 9 pin to Male 25 pin

RS-232 EXTENDER CABLE $ 8.00 (Y)
For computers w/RS-232 connector pointing down on the bottom of the computer.

HARD DRIVE CABLE 4 ft $ 16.00 (Y)
w/2 50 pin Edge Card connectors.

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Flat Ribbon 12', Mod III/4/4D&P $ 15.00 (E)
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MISCELLANEOUS ITEMS

5-1/4" DISK DRIVE CLEANING KIT	$ 4.90 (Y)
3-1/2" DISK DRIVE CLEANING KIT	$ 5.25 (Y)
UNIVERSAL PRINTER DUST COVERS	$ 9.75 (Y)

For printers up to 16" wide, anti-static vinyl, soft tear-resistant, elastic bottom.

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FOR PANASONIC 4450/4450i/4455	
Toner Kit	$ 32.95 (T)
Developer Cartridge	96.80 (T)
Drum Cartridge	139.00 (T)
Fuser	138.00 (T)
Corona	28.80 (T)
Ozone Filter	28.80 (T)
FOR ALPS LPX 600	
Toner Kit	$ 45.95 (T)
Developer	90.75 (T)
Photo Drum Cartridge	178.00 (T)

INTERNAL HALF HEIGHT DOUBLE SIDED DISK DRIVES

Internal Half Height 5-1/4 360K	$ 67.00 (Z)
Internal Half Height 3-1/2 720K	$ 67.00 (Z)
Half Height Filler Plate	$ 4.00 (V)

EXTERNAL HALF HEIGHT DOUBLE SIDED DISK DRIVES COMPLETE WITH CASE AND POWER SUPPLY

One Disk Drive Unit $143.00 (S)
One 5-1/4 360K or One 3-1/2 720K Unit.

Two Disk Drive Unit 193.00 (S)
Two 5-1/4 360K drives, or two 3-1/2 720K drives.
One 5-1/4 360K and one 3-1/2 720K drive.

64K TO 128K UPGRADE KITS for MODEL 4

64K UPGRADE KIT $ 12.95 (Z)
Includes 8 150ns 128 refresh cycle dynamic ram chips, plus instructions and Memory Test Disk.

64K 120ns CHIPS $2.75ea (Z)
120ns 128 refresh cycle chips. 16 chips are required for use w/Anitek Speed Up Kits. Includes installation instructions and Memory Test Disk.

PAL CHIP $8.00ea (V)
Required to upgrade Non-Gate Array Model 4s.

MICRO-LABS HIGH RESOLUTION BOARDS

Grafyx Solution For Model 3/4/4P/4D $99.00 (Z)
Free Draw Program included. Specify Model when ordering because the boards are different for each Model. Model 3, Model 4P or Model 4 NonGate array or Model 4 Gate Array.

ROMCLOCK4 $ 28.65 (Y)
Clock chip with ROMCLOCK4 or ROMCLOCK3 Utility program package and installation instructions. Keep time and date current. 10 year lithium battery.

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for Model 4/4P/4D.

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(E) - Add $4 for one or more cables.
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The excellent graphics and animation of these exciting casino games will turn most IBM PC users green with envy! These games are FUN!

SLOTMOD4 is a 100% accurate simulation of a 1930's Mills nickel slot machine. The handle pulls down realistically, and the three reels spin so realistically you'd swear you were looking at the real thing! The sounds were tape recorded from the prototype and digitized. If you want to see what you hi-res board is capable of, or just want a GREAT game for parties, you need...
SLOTMOD4 $14.95

VIDPOKR4 is a 100% accurate simulation of a video poker machine. The included optimum video poker strategy can be used on VIDPOKR4 or on the "real thing" in Atlantic City or Nevada. The EXCELLENT GRAPHICS "make" this program. Requires 128K.
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Hi-res graphics board req'd. Add $2 S&H to total games order. Outside U.S. add add'l $2. VA add 4 1/2%. Order from JFR Slinkman, 1511 Old Compton Road, Richmond VA 23233

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Reap the reward of knowing that someone else will be able to enjoy what you no longer want.
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FOR SALE: GENUINE RADIO SHACK HARD DRIVES for Models 3 & 4. 5 Meg $175. 10 Meg $225. 15 Meg $275. 20 Meg $325. 35 Meg $455. Formatted under LS-DOS 6.X. New MISOSYS RSHARD5/6 driver included. Do it yourself special, (No Bubble) $125. Includes controller, P/S, fan, cables, driver. Install your own ST-506 bubble, half or full height. Instructions included. All cables included. Add S&H to all prices. All hardware used, tested, warranteed 90 days. Call: Roy T. Beck 213-664-5059 after 6pm California Time, or Write: 2153 Cedarhurst Dr, Los Angeles, CA 90027

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CompuServe's GIF has become THE way to exchange hi-res graphics between different types of computers. Before GIF4MOD4, Mod 4 users had no way to view GIF Graphics, or to send their own hi-res graphics creations to other types of computers.
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GIF4MOD4 $39.95

Add $2 S&H. Outside U.S. add add'l $2 for airmail. VA add 4 1/2% sales tax. Order from JFR Slinkman, 1511 Old Compton Road, Richmond VA 23233

WANTED: I am in need of a reference manual for Scripsit Pro. If you can help, contact:
James M. Long
P.O. Box 44493
Columbus, Ohio 43204

MODEL 3+4 public domain programs, free disk catalog, JaRick Software, 4201 71st Ave N., Brooklyn Center, MN 55429. Over 2000 to choose from Drop us a line.

HELP: I need the Owners' Manual for Tandy BPS 400, R/S #26-1189 (a 400 watts UPS). DISK only for MULTIPLAN on Models II/12, R/S #26-4580. Contact R.Yves Breton, P.O. Box 83, Stn Place d'Armes, Montreal, Que, Canada H2Y 3E9

FOR SALE: Model 3, 2 drives, graphics board. M3 Software: Home Accountant, Trashman, Project Mgr., Portfolio Mgmt, many others. Also Model 4, 2 drives, graphics board & clock. M4 Software: Postmaster, Bizgraph, LeScript & many others. A wealth of software, books & manuals. Send SAE for list. Would prefer to sell as a lot. Make me an offer!
G. Robertson, 114 Gwathmey Rd, Ashland VA 23005; 804-798-1959 Evenings.

FOR SALE: Model 4P dual drive; DMP-110 printer. Used little. Deskmate, Scripsit, T-Maker, more. All CN80 back issues. $300 + shipping. Tim Kent, 14319 SE 16th Circle, Vancouver, WA 98684 206-254-4905

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Take all for $ 65.00 COD

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VOL. #	ISSUE	ADVERTISING DEADLINE	MAILING DATE
Vol. 5 #2	February - 1992	Jan. 13	Jan. 28
Vol. 5 #3	March	Feb. 10	Feb. 25
Vol. 5 #4	April	Mar. 16	Mar. 31
Vol. 5 #5	May	Apr. 13	Apr. 28
Vol. 5 #6	June	May 11	May 26
Vol. 5 #7	July	June 15	June 30
Vol. 5 #8	August	July 13	July 28
Vol. 5 #9	September	Aug. 10	Aug. 25
Vol. 5 #10	October	Sep. 14	Sep. 29
Vol. 5 #11	November	Oct. 12	Oct. 27
Vol. 5 #12	December	Nov. 16	Nov. 30
Vol. 6 #1	January - 1993	Dec. 14	Dec. 29

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