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VOLUME 3, NUMBER 3, JUNE/JULY 1986

For CP/M Users!

Morrow Owners' Review

THE INTERNATIONAL MAGAZINE FOR USERS OF MORROW & CP/M COMPUTERS

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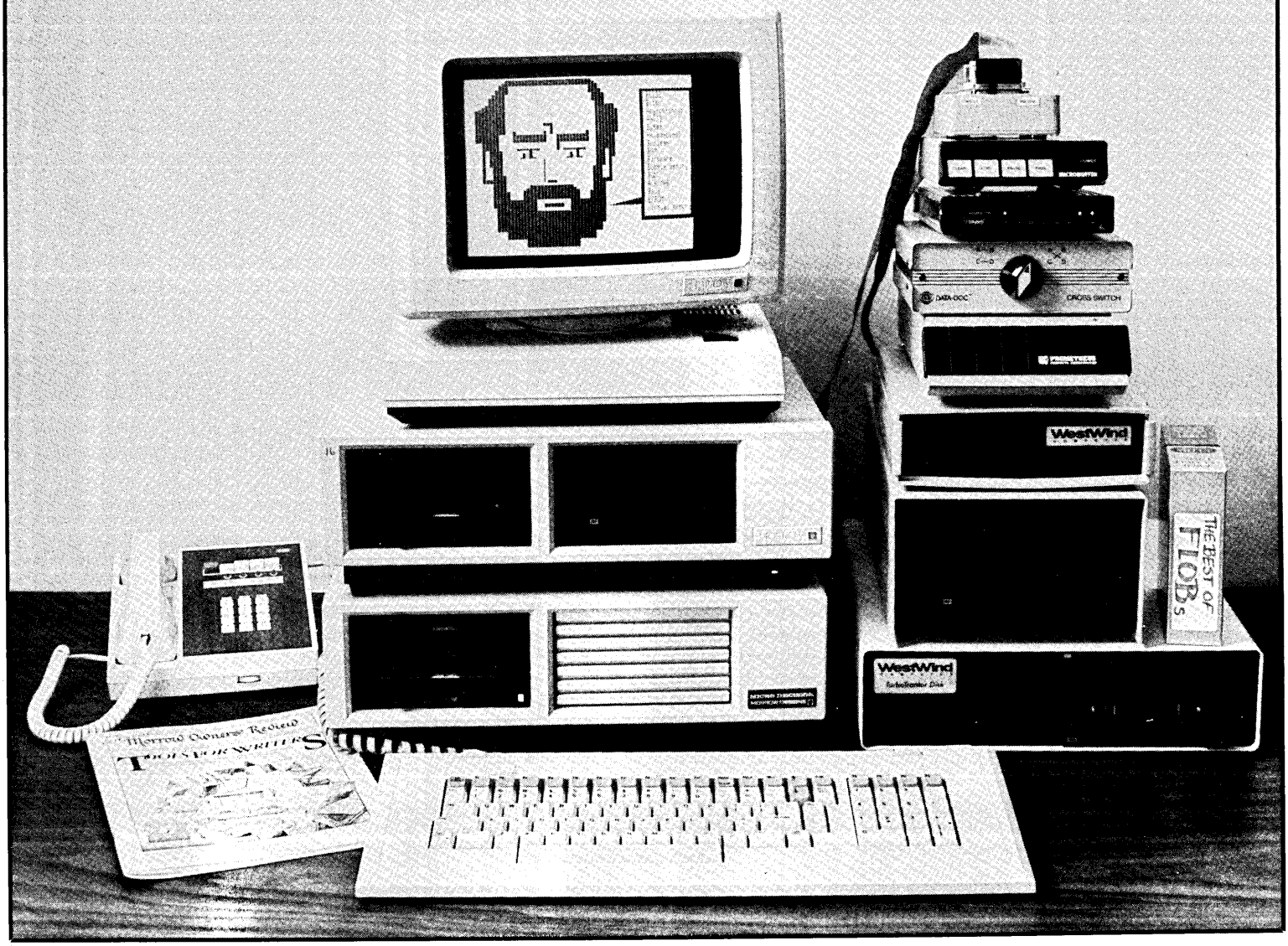
- *Double Your Terminal Speed*
- *Connect an MD3 to a Portable*
- *Alist Database Review*
- *Drive C2 RAMdisk Review*



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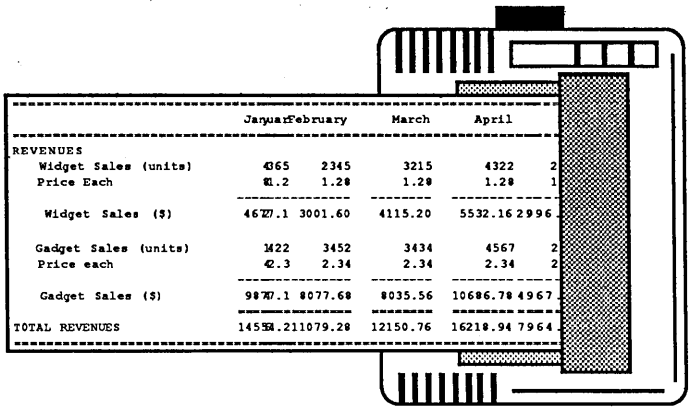

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Price each	2.3	2.34	2.34	2.34	2
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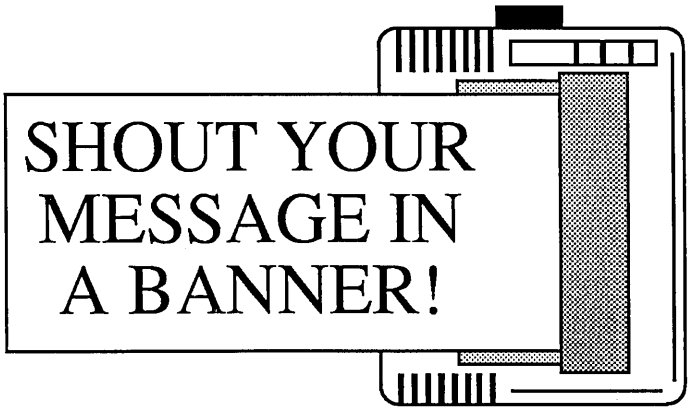

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EDITORIAL

Are Morrow Enhancements worth it?

From the phone calls, letters and article submissions that flooded MOR for this issue, we learned that improving basic MD hardware has become quite a popular activity. This seems especially true when the improvements are ones MD owners can perform themselves. Turning an MD2 with single-sided drives into an MD3 with double-sided drives appears to be a favorite challenge. We received four submissions on this topic alone. One of these we selected for our lead article. Other materials submitted were so specialized we believed they would only interest a small segment of readers. We loaded these contributions onto one of the FLOBs for this issue. (see page 54).

You may find in this issue ways to make some, if not all, of your computer wishes come true. Many MD3 owners would like to have a four-drive MD3. B.H. Marshall tells you how you can get it (page 11). Others might like a really big RAMdisk. Eric Preminger explains how you can get this in the form of DriveC2 from Westwind (page 47).

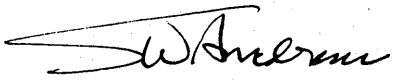
We've learned that many of you who are writers would like to add a portable to your MD. For you, we've printed a review (for old times' sake) of the PIVOT II look-alike called Z-171 (page 45), along with a review of the Bondwell 2, which runs CP/M 2.2 (page 41). To top it off, we have included yet another article (page 36) on how to connect certain portables to your Morrow machine for file transfer.

Do you want to double the baud rate on your MD3 terminal? In the past you couldn't (due to an infamous Morrow engineering slip-up), but after reading Dave Grothe's article on page 17 you'll know how to make this change yourself for less than $15.00 and a few afternoons of your time. Do you want to upgrade the ROM (and BIOS) of your MD3? Your wish is granted. Read Maxwell Syndstrom's article on page 26 and order the MD3 ROM/BIOS Update kit from MOR. And there is more....

But remember, just because there is more does not mean more is better. For all the tinkerers among us forever improving our machines, there are many who remain quite content with their basic, no-frills MD model. These easily satisfied types are not sluggards or dummies. They may be sane, productive folk who ask only that their computers process words and file data with the least amount of fuss.

The fuss factor is what each of you must consider for yourselves. Is it worth it to install any or all of these enhancements? That is a value judgment only you can make. To the tinkerers, these add-ons sparkle and shine like the powers in a wizard's magic wand. But even magic does not come free. If it doesn't cost in coin--and some of these enhancements are dirt cheap--it may cost in time and require a good slice of your energy. Ask yourself, before adding one more add-on, do I really need this? Will I have fun installing it? Will the power or pleasure it gives me be worth the effort?

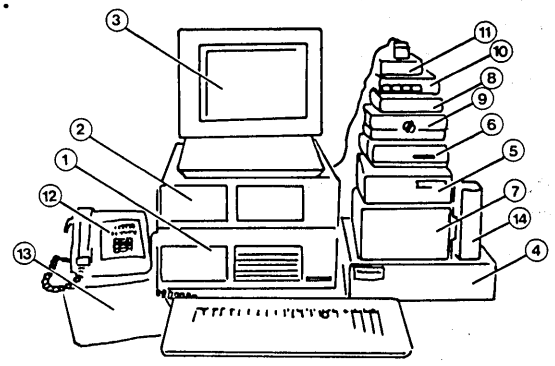
All we are really doing in this issue is letting you know some of what is available to you. It is for you to decide what these enhancements are worth.



COVER STORY

You may have been wondering about those stacks of equipment on the front cover. Our cover photo shows two richly enhanced Micro Decisions, an MD3 (1) and an MD16 (2). They share the MT70 terminal (3), sitting on top, and two printers not in the photo. The MD3 uses a TurboTape (4), which is a 21 MB hard disk and controller with a backup (streamer) tape built in. No need for floppy backups anymore. You could have up to 3 MB of RAMdisk added in with the disk, but here the DriveC2 RAMdisk is located in Ram-in-a-Box (5). The latter two devices are made by Westwind, which bundles it with a special version of SuperCalc, enabling you to use enormous spreadsheets. (See review on page 47.) The Prometheus 1200 modem (6) is also used by the MD3.

The MD16 uses a home-brew 16 MB add-on disk, which consists of a CMI 5619 hard disk drive built into a power supply-equipped enclosure made by Integrand Research (7). Total cost for this home-made disk, including cables and connectors, is about $450, in addition to a lot of your own time fiddling with the hardware and changing the BIOS. The Auxillary MD16 port is connected to the Hayes 1200 smartmodem (8).



Shared equipment consists of the Data-Doc Cross-switch (9), enabling both computers to share two printers, of which the MP200 (not in the picture) uses a 64 KB Microbuffer (10). The little box on top is the E-Systems GangBox (11), which switches the MT70 between the MD3 and the MD16. Indispensable items are the latest copy of MOR (13) and the best of FLOBs (14). Last but not least is a telephone (12) to call your local computer guru or your repair shop in case things go wrong, but that will be dealt with in our next MOR issue.

LETTERS TO THE EDITOR

A PUFF PIECE?

Dear Editor:

I have some concerns about the usefulness and purpose of MOR at all. Its new cover proposes to make MOR into a forum for CP/M users in general. But I fail to see how deeply it can cover CP/M if it does not get just a little technical. I have observed as the months have gone by that MOR has become, in fact, less and less technical, and more and more aimed at the novice user. I cannot help but feel that by abandoning your more knowledgeable readers you will also lose your most dedicated supporters.

I only hope that you will not let MOR become just another little puff piece whose only purpose is to show readers how computers can be "fun" and "easy to use." I greatly fear, however, that this is in fact what is happening, and that MOR will lose its usefulness to me and many others.

Ralph W. Mathisen, Columbia, SC

[The fact that MOR is a magazine nearly entirely written by its readers, added to our editorial intention to strike a balance between more and less technical articles, will save us from ever becoming a puff piece. The MOR readership still has people in the novice stage, and they should not be forgotten in favor of all the knowledgeable readers. Still, we are printing quite a few technical articles in this and in the next issue. For some very detailed or long articles that we feel are of interest to only a small section of our subscribers--but that certainly merit publication--we have made room on one of the FLOBs. We wish we could print all the good articles sent to MOR, but we can't. --Ed.]

CHAPTER 11 REASSURANCE

Dear Editor:

Regarding your April/May editorial: Well done. I'm sure there are a lot of folks out there in MOR Land that need the reassurances you provided. I for one wasn't shocked to see Morrow file for bankruptcy under Chapter 11--it was extremely unfortunate; however, it was not surprising, nor alarming.

MOR took off months ago in the right direction to support a solid base of interested readers in the true spirit of the original CP/M hackers--providing mutual support because of a "need to know" and love for the activity of "computering," not for the computers themselves. MOR is helping many of us to learn to use those tools well, regardless of the brand of hardware we purchased or purchase. Carry on.

James E. Bottom, Salem, OR

PP'S ANNOYING EMPTY SPACES

Dear Editor:

We find this publication to be the only source for information on or about the MORROW line; therefore, please keep up the good work.

The letter to the editor from Peter Campbell in MOR April/May 1986 regarding the empty spaces produced by Personal Pearl when printing labels was of great interest to us. We tried his method of producing a report for NewWord from which the labels could be made without all the extra spaces. There is one problem to consider if using an old mailing list; check the comma location before running.

Nyal O. Garmon, Scottsdale, AZ

LCDUMP FRUSTRATION/SOLUTION

Dear Editor:

I had the frustrating experience that many LogiCalc users must have had when I attempted to use the LCDUMP program to print out specifications of a spread sheet I had designed, and then watched in astonishment as half of the output went to the printer and the other half to the monitor. No reply was forthcoming from Software Products International when I wrote them for help.

I thought I had heard the last word on the topic when I received the question and answer booklet from Morrow under David Block's signature. It stated flatly, on p. 25, that the problem could't be fixed.

Recently I was following the useful advice to browse back through earlier editions of MOR, and guess what I found in Volume 1, #2, June 1984, p. 36. Instructions to fix the problem which work.

You type LCDUMP^P<R> to the "A>" prompt, and when asked for the output file name, type CONSOLE:. A complete output file then goes to both the printer and the monitor. Problem solved. Moral: Read and reread your old MOR's.

Jim Hedstrom, Diamond Bar, CA

IMPORTANT ANNOUNCEMENTS

MOR's new Managing Editor.

The long search is over and MOR has a new managing editor. Marilyn Werden brings with her an impressive set of skills and years of experience to go with it, enough to move MOR to increased levels of quality. Glad to have you join us, Marilyn.

Sales Tax for Californians.

When you sell subscriptions for a magazine that comes out at least four times a year, you don't have to charge sales tax. But if you sell MOR Manuals and FLOBs, then it's a whole other matter. That's what MOR found out when slapped on the wrist for not charging sales tax on those items. The State of California has made it clear that it will hold up its rules and hold out its hand to collect the tax we mistakingly thought we were exempt from. So, from now on, if you live in California, add 6.5% sales tax to your orders for FLOBs, MOR Manuals, Morrow User's Guides, Upgrade Kits and all that good stuff.

Hard-to-get Morrow Software Manuals.

MOR receives requests for copies of manuals belonging to the bundled software that came with your machine. Some people loose them, some people buy used machines without manuals, some people even assemble new Micro Decisions from scrounged parts. That's why MOR has decided to make those manuals available to you. You'll find a list of the 12 Morrow software manuals--not to be confused with the more technical MOR Manuals--on page 53. Unfortunately, MOR only has a limited supply.

ROM Update kit and ROM/BIOS source listings.

You can now acquire a ROM Rev. 3.1 upgrade kit for your MD3. Why and how you should do this is explained in Maxwell Syndstrom's piece on page 26. Included in the kit is a ROM chip, printed instructions on how to replace it, a DS/DD floppy with several files to help you make the BIOS modification and another floppy with the latest versions of the MD3 CP/M Distribution Master--most of which you already have, at least in an older version. Turn to page 53 for the order form.

MD-HD System program listings, docs on diskettes.

MOR is releasing a new set of 11 DS/DD diskettes with system program source listings and other information about the BIOS, Firmware and Utilities for MD5, MD11, MD16 and MD34 computers. A new MOR Manual "MD-HD Systems' Notes" of about 120 pages is also available. Call MOR for details.

The Final, Absolute Word on Installing Double-Sided Drives in Your MD2

by Greg Smith

Although my single-sided MD2 had been performing valiantly for the two years I had owned it, I found myself wishing I had the extra power of an MD3. I seemed to be filling up those single-sided disks faster and faster. I kept wishing I could put Correct-It on the same disk as WordStar or NewWord, but, alas, 186K just wasn't as big as I had originally thought it was. To my rescue came Victor Chan, who wrote a "how to" article on upgrading to double-sided drives (published in the BAMDUA Newsletter, Vol. 3, #10). Despite my limited experience in patching, I braved the hexadecimal world and started altering my CP/M. It didn't work. I tried everything conceivable to get those half-height disk drives to work, but no luck...until this spring when I stumbled across an article submitted to MOR by Jim Holder that provided the missing "patch." From this article, Victor Chan's article, and some input from Beatty's article in MOR Vol. 2, #1, February 1985, p. 20, I have assembled an article that will guide you into the world of 768K of on-line storage.

Some Things You Should Know About the Changes

1. Even with the new double-sided drives in place, you can run your old single-sided disks just as you always have; you simply won't be utilizing the double-sided feature of your new drives. This will allow you to make a gradual transition from all single-sided to all double-sided diskettes.

2. Most MD2s have a Rev. 1 motherboard (no parallel port), while most MD3s have a Rev. 2 motherboard (no expansion drive port). There is no need to change motherboards to upgrade to double-sided drives, if you're happy without a parallel port.

3. While you must modify the BIOS (in CP/M), you need not upgrade to the latest BIOS and ROM revision to successfully increase your disk capacity.

4. The power supply should not need changing, because most of the half-height, double-sided drives available consume less power than your old single-sided drives.

What Does Need Changing?

Just your disk drives and the BIOS portion of CP/M. The CP/M we'll deal with later. For now...

Greg Smith is an undergraduate student in international business at Cal State Hayward. He spent countless hours upgrading his MD2 to an MD3 last fall, and has now deigned to share this knowledge with the rest of us mortals.

The Hardware Changes

What you need are two half-height, double-sided drives and a mounting plate. I recommend that you buy name-brand disk drives (e.g., CDC, Shugart, Panasonic, Teac, etc.; I have heard from some people that Qume drives tend be problematic, although I've seen no concrete evidence). Basically, the biggest consideration is price. Look for good drives, somewhere between $75 and $95 each. You might try mail order or computer swaps.

The mounting bracket simply consists of a square piece of metal with four holes drilled into it to allow you to mount one half-height drive on top of the other. Ask about mounting brackets wherever you purchase the drives.

Outside of the two drives and mounting bracket, the only other things you'll need are a screwdriver, a couple of undisturbed hours and some patience (a pair of long-nose pliers might come in handy, too). Especially for those of you who are timid about taking a screwdriver to your Morrow, I recommend you order a copy of Section #1 of MOR's Technical Manual (see MOR, Vol. 2, #6, December 1985/January 1986, p. 51). Section #1 outlines the specifics of removing the drives from your particular chassis revision.

Step 1--Removing the Old Drives: Unplug everything connected to the back of your Morrow. Around the base of the beige lid on your machine are four screws. Remove them (but do not remove any of the screws exposed on the gray, underside of the case until you remove the power supply). Standing in front of your Morrow, slide the beige cover towards you, until the cover is completely removed.

To facilitate the removal of your drives, you should temporarily remove the power supply. (See Figure 1, p. 6.) To do this, tip the Morrow on its side (whichever side is easiest for you). You will see four screws on the bottom of the Morrow that outline the power supply. Remove them. Unplug all of the plugs that emanate from the power supply, and set the power supply out of the way. (Be sure to note what you unplugged to ensure you can plug everything back in when you are finished.)

In the back of each drive, three cables can be found: one connected to the red LED on the front of the Morrow, one connected to the motherboard near the power supply (which powers the drive), and the ribbon cable, also connected to the motherboard, which transmits data. Unplug them from the drives. Now you

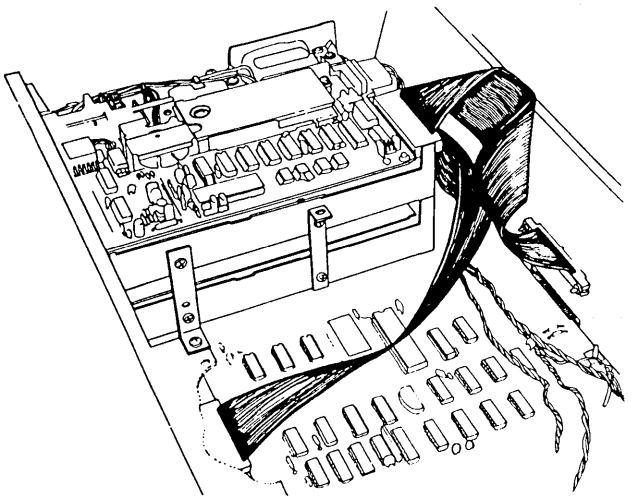


Figure 1.
(reproduced from MOR Technical Manual, section 1, p. 5-19)

can probably identify the screws found on the sides and/or bottom of the disk drives, all of which need to be removed to allow you to remove the old drives. Take note of how drive A was mounted so you can mimic the mounting when installing your new drives. Finally, knock out the black faceplates that contain the red LED on the front of your Morrow; you won't be needing them any longer.

Step 2--Preparing the New Drives: One setting needs to be checked before installing the new drives. Each drive will have a Drive Select jumper, usually labeled "DS." (See Figure 2.) Sometimes the four possible positions for this jumper are labeled 1-4; sometimes the four possible positions are labeled 0-3. No matter which way they are numbered, make sure the jumper is set on the lowest setting on both drives.

Now, mount the two drives on top of each other using the mounting bracket. Then, place the two piggyback drives inside the Morrow where drive A formerly resided. Mount the piggyback drives securely, copying the way drive A was previously mounted, and then connect the power cables and the ribbon cables to your new drives. It should be readily apparent where they go. To make sure the data cable is connected correctly, manufacturers customarily number some of the pins on the drive where the data cable will be attached (numbered 1-34). On the data cable itself, one edge is painted red. That edge is pin #1; thus, the other edge on the cable is pin #34. Connect the ribbon cable formerly connected to drive A to the bottom drive so that pin #1 on the cable matches the pin #1 on your new drive. Likewise, connect the ribbon cable formerly connected to drive B to the upper drive. The power cable is shaped so it will only fit on the drive correctly, so you needn't worry about which wire is which in the power cable; simply connect a power cable to each drive.

Now for aesthetics: You have opened a gaping hole in the front of your Morrow where drive B used to be. You might just put a screen on it to allow extra air to circulate, you might try to find a insert panel for it (just like the MD3s from Morrow have), or you might want to get creative with the new window in your Morrow. No matter what you choose, I recommend that you somehow cover the opening to keep dirt, dust, cat hair and everything else out of your machine.

Replace the power supply and plug in all of its little cables (you did keep track of where each cable went?). Slide the cover on again and plug everything into the back of your Morrow that you disconnected at the beginning.

You now have an MD2 with double-sided drives that will work with all your old single-sided diskettes just like before. To make sure:

Turn the machine on and insert your old single-sided system disk into drive A (the bottom drive). Did you get an A>? Yes? Then replace the screws securing the lid and skip to "Patching CP/M." No? Then open up your computer again. Is everything plugged in? You might want to try reversing the data cables (i.e., so pin #1 on the cable is connected to what appears to be pin #34 on the drive). Just fiddle around in there; and if all else fails, go back to the beginning and try again. It will be easier the second time anyway.

Patching CP/M

You will need three disks: your CP/M "system"

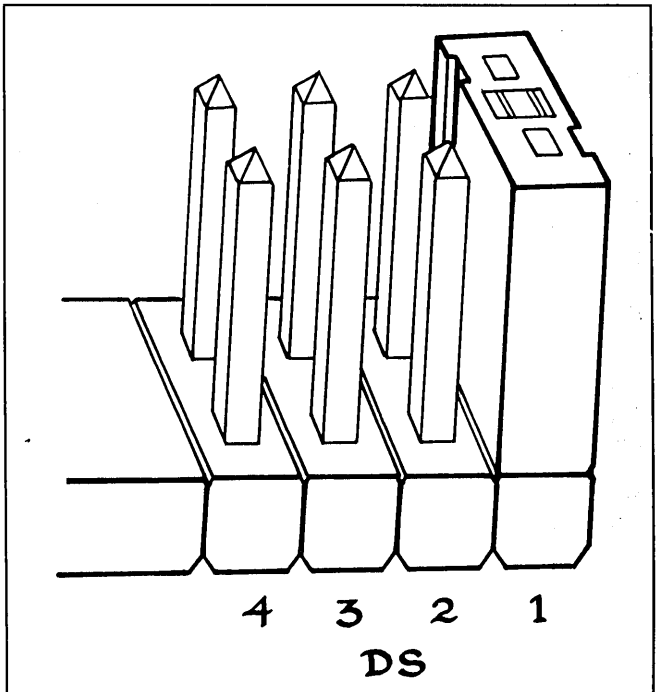


Figure 2.

disk, a "scratch" formatted disk and a "patching" disk that has been SYSGENed and contains PIP.COM, SYSGEN.COM, FORMAT.COM and DDT.COM (DDT.COM is found on the "Programmer's Utility Disk" that came with your Morrow). For those of you who have NSWEEP, DISK or some other file maintenance program, you may substitute it for PIP.COM. For those of you who don't have one of these programs yet, get one--but in the meantime use PIP.

Throughout the remainder of the article, you will see examples of what will appear on your screen when following the instructions. Anything that is not underlined will be generated by your computer; everything that is underlined, you must enter. Among the information that you must enter, you will find "<cr>". "<cr>" means hit the Return key; don't enter the characters "< c r >." Armed with this knowledge, you are ready to modify CP/M.

Step 3--Capturing a Copy of CP/M: Place your patching disk in drive A and your scratch disk in drive B. In order to change CP/M, you must first capture a copy of the CP/M system that hides on the first two tracks of all of your "system disks." You used SYSGEN to put CP/M on the first two tracks, so you will use SYSGEN to get a copy from there:

```
A>SYSGEN<cr>
SYSGEN VER d.d MDd.d
SOURCE DRIVE NAME (OR RETURN TO SKIP) A<cr>
SOURCE ON A, THEN TYPE RETURN <cr>
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) <cr>
A>SAVE 48 CPM64S.COM<cr>
```

You now have a copy of your single-sided CP/M system with a copy of the SYSGEN program in a file named CPM64S.COM.

You must find and alter three sets of bytes within CP/M to allow CP/M to utilize the double-sided features of your new drives. The three tables are the Boot TABle (BTAB), which the computer looks at when it boots, the Disk Parameter Block (DPB), which outlines how much space is on a disk, and the Motor TABle (MTAB), which regulates the motors in your disk drives.

To change these three tables, you will use DDT. Don't be afraid of DDT just because you've never used it. Just follow along. Each byte in the program has an address that, as you might guess, tells you where in the program the byte is located. The address comes in the form XXXX, where X can have a value of 0 through 9 or of A through F. Don't let the letters scare you, just know that any letter between A-F is OK.

The first table, BTAB, is easy to find because it is universally located at 0980.

Step 4--Finding the DPB Table: To find the DPB table, you must enter a few codes as shown below:

```
A>DDT<cr>
DDT VERS. 2.2                [The "-" is DDT's prompt, just
-A100<cr>                    like "A>" is CP/M's prompt.
0100 MVI C,1F<cr>            It signifies that DDT is
0102 CALL 5<cr>              waiting for your next
0105 RST 7<cr>               command.]
0106 <cr>
-G100<cr>
*0105
-X<cr>
```

You will see a line containing a number of values, one of which will be H=jjkk, where jj and kk are bytes that will be generated by your computer. Write down the values for jj and for kk, and substitute the value for jj in the following procedure:

```
-Hjj,CF<cr>                  [Disregard the values for
dddd 00mm                    dddd, but write down the value
-^C                          for mm. Then, write down the
A>                           combination mmkk and label it
                             "Address of DPB."]
```

Step 5--Finding MTAB: To find MTAB, you must now look inside the copy of CP/M you captured in the file CPM64S.COM.

```
A>DDT CPM64S.COM<cr>
-S2344<cr>
2344 ww <cr>                 [Write down the two bytes ww
2345 yy .<cr>                and yy, substituting yy in the
-Hyy,CF<cr>                  following procedure. Write
dddd 00xx                    down the combination xxww and
-                            label it "Address of MTAB."
                             Once again, disregard the
                             values for dddd.]
```

Step 6--Altering SYSGEN.COM: Here you must alter SYSGEN.COM to allow it to write on a single-sided disk regardless of how CP/M is configured.

```
-S389<cr>
0389 C2 0<cr>
038A B8 0<cr>
038B 03 0<cr>
038C dd .<cr>                [Disregard the value for dd.]
-
```

Now that you have found the three tables, you need to modify them, starting with...

Step 7--Modifying BTAB: You must modify BTAB for the new drive A.

```
-S980<cr>
09800121<cr>                 [A quick note about how DDT's
0981 D8 DC<cr>               "S" command works. The first
0982 58 7D<cr>               four characters are the
0983 05 04<cr>               location or address of the
0984 6F AF<cr>               byte. The next two numbers
0985 03 <cr>                 displayed are the byte itself.
0986 05 <cr>                 You may now either enter a
0987 1C <cr>                 <CR> to leave the byte
```

(continued)

```
0988 FF <cr>
0989 28 <cr>
098A 00 <cr>
098B 04 <cr>
098C 0F <cr>
098D 01 <cr>
098E 5E C2<cr>
098F 00 <cr>
0990 7F BF<cr>
0991 00 <cr>
0992 C0 E0<cr>
0993 00 <cr>
0994 20 30<cr>
0995 00 <cr>
0996 02 <cr>
0997 00 <cr>
0998 EF 43<cr>
0999dd .<cr>
```

unchanged or enter a new value, followed by a <CR>. Later, you will be given just the values to be substituted, and by following this format, you will be successful.]

[Disregard the value for dd.]

Step 8--Modifying DPB: Next, patch the DPB portion of CPM64S.COM, using the "S" command again. Start by substituting the value for mmkk that you found in Step 4 for mmkk in the first line below. After altering the first six bytes as shown in the first six lines, continue entering the values in that column, continuing through the remaining three columns, reading from top to bottom. As always, disregard whatever value appears for dddd.

```
-Smmkk<cr>
mmkk 28 <cr>      28   28   28   28
dddd 00 <cr>      00   00   00   00
dddd 04 <cr>      04   04   04   04
dddd 0F <cr>      0F   0F   0F   0F
dddd 01 <cr>      01   01   01   01
dddd 5E C2<cr>    C2   C2   C2   C2
       00         00   00   00   00
       BF         BF   BF   BF   BF
       00         00   00   00   00
       E0         E0   E0   E0   E0
       00         00   00   00   00
       30         30   30   30   30
       00         00   00   00   00
       02         02   02   02   02
       00         00   00   00   00
```

[After entering the last value, you should enter a period (".") to return you to the command line.]

```
dddd dd .<cr>
-
```

Step 9--Modifying MTAB: Next, change the MTAB table, starting at the address found in Step 5, substituting it for xxww in the following:

```
-Sxxww<cr>
xxww 01 21<cr>    22   21   21   21
dddd D8 DC<cr>    5D   DC   DC   DC
       7D         7D   7D   7D   7D
       04         04   04   04   04
       DF         DF   DF   DF   DF
       03         03   03   03   03
       05         05   05   05   05
       1C         1C   1C   1C   1C
       FF         FF   FF   FF   FF
```

[After entering the last value, enter a period to return to the command line.]

```
dddd dd .<cr>
-
```

Step 10--Changing the Log-On Message (optional): The last patch that needs to be made is to change the message that appears after each cold boot from "Single Sided System" to "Double-Sided MD2 System." This text can sometimes be difficult to find. If the values at 2DA1 don't match the ones listed here, skip to Step 11. Don't worry if you don't patch this message; it won't have any effect on how your system runs.

```
-S2DA1<cr>
2DA1 2A 20<cr>
2DA2 2A 44<cr>
2DA3 20 6F<cr>
2DA4 53 75<cr>
2DA5 69 62<cr>
2DA6 6E 6C<cr>
2DA7 67 65<cr>
2DA8 6C 2D<cr>
2DA9 65 53<cr>
2DAA 20 69<cr>
2DAB 53 64<cr>
2DAC 69 65<cr>
2DAD 64 64<cr>
2DAE 65 20<cr>
2DAF 64 4D<cr>
2DB0 20 44<cr>
2DB1 53 30<cr>
2DB2 79 20<cr>
2DB3 73 53<cr>
2DB4 74 79<cr>
2DB5 65 73<cr>
2DB6 6D 74<cr>
2DB7 20 65<cr>
2DB8 2A 6D<cr>
2DB9 2A 20<cr>
2DBA dd ^C
A>
```

Step 11 - Saving the New CP/M: You must save the changes you have made by entering:

```
A>SAVE 48 CPM64D.COM<cr>
```

[Note that the "D" in CPM64D.COM stands for double, as opposed to the "S" used earlier, which stood for "single."]

Step 12--Making a Temporary System Disk: Next, with the blank "scratch" diskette in drive B (top drive), put the double-sided system on it by doing the following:

```
A>CPM64D<cr>
SYSGEN VER x.x MDx.x
SOURCE DRIVE NAME (OR RETURN TO SKIP) <cr>
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) B<cr>
DESTINATION ON B, THEN TYPE RETURN <cr>
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) <cr>
A>
```

Place this scratch disk (presently in drive B) into drive A and press the Reset button on the front of your MD2. If you were able to complete Step 10, you will see "Double-Sided MD2 System" after the copyright notice.

If you ask for a directory of drive A (with DIR), you will probably get a mess displayed on the screen. Don't be concerned, this happens because you have put a double-sided system on a single-sided disk.

Reinsert the "working" diskette in drive A (top) and enter Control-C.

Step 13--Copying Files to the Temporary System Disk: Copy FORMAT.COM, SYSGEN.COM and PIP.COM onto the "scratch" disk. For those of you who have NSWEEP or one of its clones, you may substitute it for PIP.COM and use NSWEEP to copy the three files to the "scratch" disk. For those of you who don't have NSWEEP, use PIP as follows:

```
A>PIP<cr>
*A:=B:FORMAT.COM[VO]<cr>
*A:=B:SYSGEN.COM[VO]<cr>
*A:=B:PIP.COM[VO]<cr>
*<cr>
A>
```

Step 14--Formatting Your First Double-Sided Disk: You may format over your old single-sided disks now and make them double-sided, since single-sided and double-sided disks are physically the same. Single-sided diskettes, however, pass lower quality standards. Consequently, beware of bad sectors if you plan to recycle your single-sided diskettes into double-sided diskettes.

Put your "patching" disk in drive B (top drive), and enter:

```
A>FORMAT<cr>
Disk drive to be used (A-E) B
Single or double-sided format (S or D) D
Insert diskette to be formatted in drive B,
   then press [RETURN] <cr>
```

You will see 79 tracks formatted, instead of the usual 39. When the formatting is finished, copy the CP/M tracks from drive A to drive B using SYSGEN.

```
A>SYSGEN<cr>
SYSGEN VER x.x MDx.x
SOURCE DRIVE NAME (OR RETURN TO SKIP) A<cr>
SOURCE ON A, THEN TYPE RETURN <cr>
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) B<cr>
DESTINATION ON B, THEN TYPE RETURN <cr>
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) <cr>
A>
```

Step 15--Copying Files to Your New System Disk: The only remaining step is to copy the files from your old single-sided CP/M system disk onto your new double-sided system disk. To do this, take the disk in drive B, place it in drive A and press the Reset button on your MD2/3.

Place your old single-sided CP/M system disk in drive B and enter a Control-C. For those of you who have NSWEEP or a clone, use it to copy from your old CP/M system disk. If you don't possess such a program, use PIP as follows:

```
A>PIP A:=B:*.*[VO]<cr>
```

Label the disk in drive A as your double-sided CP/M system Disk.

Congratulations, you are now the proud owner of an MD2/3.

Most of your system disks will have to be transferred to double-sided floppies and then SYSGENed with the new system. Of particular interest to WordStar users is the fact that you can now fit Correct-It on the same disk as WordStar. And by using the "R" command, you can run Correct-It from within WordStar.

If you find that heat is a problem with your new hardware, you might want to consider installing a fan or somehow making it easier for your disk drives and/or power supply to breathe. But most of you will not experience any heat problems.

Good Luck!

SPECIAL CREDITS

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Your 4-Drive Morrow:
Adding 2 More Drives to Your MD3

by B. H. Marshall

Micro Decisions can be made to operate with four disk drives. In this article, I will explain how I added two more drives to my MD3 (Kohjinsha model), Rev. 2.0, ROM 2.3A.

The Hardware

You will need to buy two DS/DD drives of the type used on IBM machines, which you can usually find for less than $100 each. I discovered that the Shugart SA 455 drive is identical to my original half-height Panasonic JA-551 2N DS/DD drives (made by Mitsushita), but I'm sure that there are others that will work as well. You will also need to buy two 34-pin displacement-type connectors (I recommend the Scotchflex p/n 3463-0001, Amp p/n 583717 or Radio Shack p/n 276-1564), about 18 inches of 34-pin conductor ribbon cable and some strapping material to duplicate the mounting of the two original drives. (Four-pin 5V and 12V connectors (Amp p/n 1-480424-0), which you'll also need, will come with the new drives.)

Before I actually added my two new drives, I first checked my power supply under the calculated working conditions of having four disk drives. The supply didn't appear to be strong enough, so I also bought a small switching-regulated power supply to install (from BCD Electro, P.O. Box 830119, Richardson, Tex. 75083-0119; $24.50, includes shipping and schematic).

As I said, I seriously doubt that the original power supply would carry the +5V load. But whether you decide to use the original supply or get a new one, the power supply still must be moved out of the computer/drive chassis to make room for the new drives and prevent excessive heat buildup. This heat buildup problem is very important and, if you take care of it properly, life will be much happier for your computer and its four drives.

To move the power supply out of your computer--and, not incidentally, to add your two new drives--you must first take the cover off of your CPU. Remove the screws on the CPU's beige lid and slide the case off. You will see the two internal disk drive ports on the front edge of the printed circuit board (PC board).

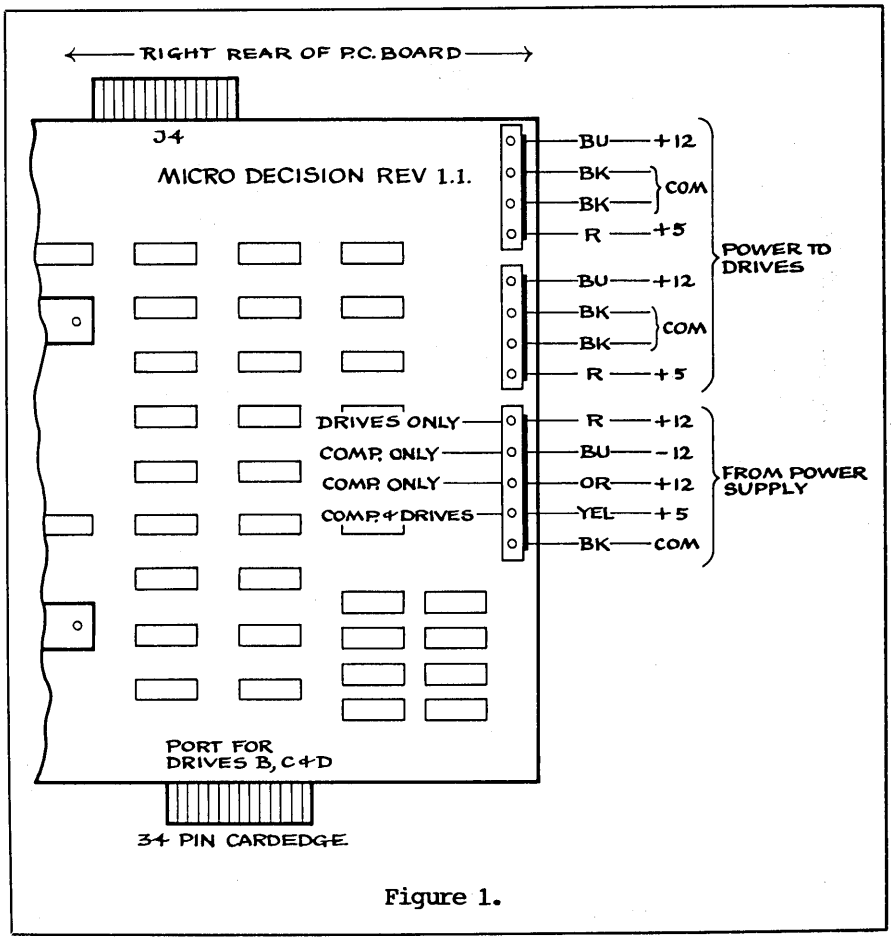


Figure 1.

You can also see the power supply with its connections to these drives. (See Figure 1.)

To install the new power supply, first mount it in an aluminum chassis (mine was 8 x 12 x 3 inches) and run a 16-gauge cable from it to the computer. Then disconnect the power connections linking the original supply with the disk drives, remove the old supply and copy the connections to the new supply.

(continued)

B.H. Marshall has been with Southwestern Electric Power Co. over 36 years as a communication engineer and, most recently, as a project engineer in the Relay Dept. He purchased his MD3 in November 1983.

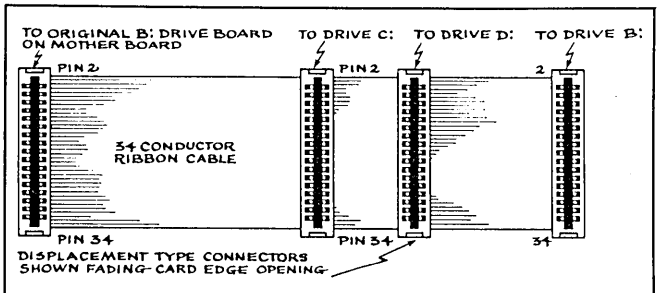


Figure 2.

This new power supply, like the original, has two +12Vs, one +5V and one -12V output. The maximum currents I measured with four drives were as follows:

4.0 amps @ +5V--drives and computer
1.0 amp +12V--drives only
<100 milliamps +12V--computer only
<100 milliamps -12V--computer only

(There may be other versions of this board, and I suggest using a voltmeter to check voltages at the power connectors.)

Now, on to the drives: First, remove the B drive connector and cable from the motherboard. Then, remove the two connectors from the old ribbon cable and replace them in exactly the same way on the new, longer ribbon cable. (Note: At no time during this procedure should you disturb the A drive port on the left side of the board; both of the new drives' connections will be made to the B drive.)

Next, connect the two new displacement-type connectors at appropriate points along the ribbon cable, keeping in mind that this cable will run from the B drive port on the PC board to the lower C drive, to the upper D drive, and back over to the upper B drive. (See Figure 2.) Considerable pressure is needed to install the displacement-type connectors on the ribbon cable, and a bench vice will come in handy here.

Before the new drives are physically installed, you must first set the drive select jumpers and install the termination packs. The drive select jumper blocks and 14-pin termination packs are located near the left rear of the disk drive's printed circuit board. (See Figure 3.)

If you look on your drive select jumper, you will find that the existing B drive is set to #1. You should set your new lower drive C to #2 and your new upper drive D to #3.

Each drive has a 150-ohm, 14-pin terminating pack attached to it. But since you want the signal currents to only terminate on drive B (remember, the current is going from the B drive port on the PC board to C, to D, and back to B again, where it will terminate), remove the terminating packs on drives C and D. If this seems a little confusing, think of it as being sort of like a sprinkler system: If you have three sprinkler hoses hooked together (like your drives B, C and D are now), you have to make sure the end is capped on the final hose or all the water will run out the end rather than shooting through the sprinkler holes the way you'd like.

Now, with all power connectors unplugged, set the power supply to +5V and +12V (+ or - 10 percent) and check at the connectors for proper voltage. You can either do this yourself with a voltmeter or you can take your power supply to an electronics shop and have them do it for you. But however you do it, make sure it's done correctly. Remember, if you make certain all connector voltages are correct, you won't damage anything even if something else in the system doesn't work right.

At this point, I'd doublecheck the 34-pin cable and connectors. If all looks well, replace the cover and turn on the power.

Now let's see if everything really is all right. Place a system disk in drive A and log onto drive B. Drive B should respond. Now select drive C. Your virtual drive statement should appear, which tells you that at least your original system is still intact.

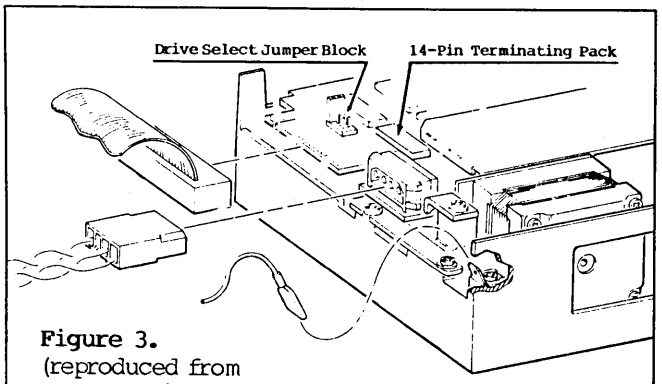
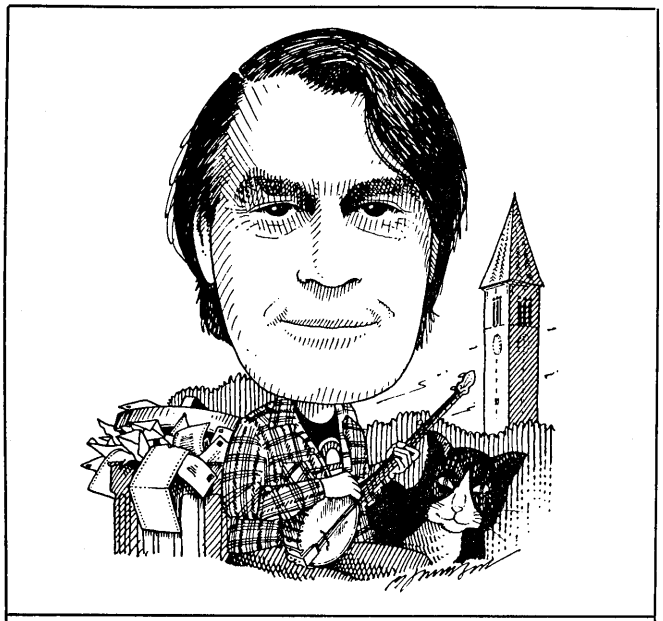


Figure 3.
(reproduced from
MOR Technical Manual, section 5, p. 3-1)

Now place your original CP/M distribution disk in drive A and formatted blank disks in drives B, C and D. Boot the system and follow the prompts; what you're going to do is reinstall your CP/M system for four drives instead of two. Next, SYSGEN the disks in drives B, C and D. After you're finished doing this and you get back to the main menu, type **<ESC>**. Then remove your CP/M distribution disk from the A drive and put it in a safe place. You can now boot with one of your new system disks and have fun.

If you have trouble along the way, check the 34-pin data cable; this is the system's weak point. And if you have any questions, I'll be happy to answer them by phone (318/631-0564, through 11 p.m. CST) or by mail (B.H.Marshall, 5910 Burke Circle, Shreveport, LA 71108).

Good luck!



FROM THE MAILBOX

by Bill Steele

I'd like to launch a small self-reliance project: Silvia Ator of W. Willington, CT, writes, "Could you refer me to a book (or books) where I can learn 'all' about microcomputers?" That's sort of like wanting books that tell "all" about love: not only is the subject vast, but each person will want to know about a different aspect. There are a few books that stand out in my mind--ones that explain things clearly but in depth, without assuming either that you already know a lot or that you're too dense to understand anything. I'd like to compile a list with perhaps one or two titles on each of several subjects. I have a few nominations, but I'd like to hear yours.

Stanley C. Mortel of Owosso, MI, asks if anyone has tried adding 80-track drives to an MD2, as described in Derek Lee Beatty's article in the February 1985 MOR, and if it worked as described. I'll add the request that anyone who has tried any project described in these pages write in and tell us how it went. We need to know about problems, and positive reports may give others confidence to try.

For "Richard," whose last name I can't make out: According to Dave Block, the MD power supply will support two floppy drives of any kind, and the operating system will handle any disk capacity up to around 8 megabytes. As I've noted before, the patches to CP/M and FORMAT.COM will be different for each drive capacity. We still need someone to explain how to do these patches for any setup.

We're more on our own than ever, so if you know a solution to a problem, don't assume someone else will write in; there are not so many of us that you can count on that. Whether you have questions or answers, keep them coming: Bill Steele, P.O. Box 782, Ithaca, NY 14851, 607/273-2132, MCI: WSTEELE, 254-5833.

Chandos Brown of Hartford, CT, offers some comments on Brian L. Swinney's inquiry about converting his MD2 with the CPU boards advertised in Byte. First, Mr. Brown says that he doubts that the Southern Pacific HD64180 is still in production, and "as to its compatibility with Kaypro, surely this means only that it utilizes the Kaypro disk format." The Kaypro motherboard, he explains, includes video driver circuitry (Morrow doesn't--that's all handled by the terminal), and the Kaypro uses a non-standard keyboard. To make the conversion on an MD, he says, you'd have to add a video board and replace the keyboard. However, Mr. Brown has used the SB-180 board to build himself a whole new computer, using the disk drives from his MD3. It works with his Liberty terminal and "with the exception of SmartKey and Uniform, all my CP/M software runs beautifully (and perceptibly quicker)." He warns that to install this board in a Morrow, you would need technical data on the power supply and might have to rewire the supply.

He also asks if there's an upgrade ROM for the Freedom 100 (MDT50) terminal that would implement automatic terminal blanking. Not according to Liberty Electronics (see last issue's column). Does anyone know of a way to do this? You could write a program that would send the terminal the codes to blank the screen, but to be useful it would have to be a routine that could be used from inside another program.

Alfred Butler in Allston, MA, installed the CP-88 co-processor and is happily using it with SuperCalc-2 and some public domain utilities, but has had trouble finding out what other MS-DOS programs he could run. "In most cases, after I described my system the salesperson would ask me if my computer was IBM compatible. This teed me off because why did I describe my system in the first place?" Reports are that WordStar, dBase II, PC-File III, Multiplan, SuperCalc 2 and Open Systems Accounting packages will run with the board; Lotus, Sidekick, dBase III, Basic A, GW Basic and Symphony definitely won't. Any others?

Someone called from Florida and gave my answering machine a suggestion about Julian Ashe's problem of letters running together on WS printouts: He may be deleting "real" spaces and leaving the spaces WS inserts to do justification. Sorry, I couldn't make out your name on the recording, but thanks.

Ron Sarner at the State University of New York at Utica is trying to use his MD3 to talk to various minicomputers running Unix, but at 9600 baud finds MDM730 and MDM795 too slow--characters get dropped. He'd settle for a good fast dumb terminal program.

From Lois Brown, Spencer, WV: "Is anyone out there filing Medicare forms or #1500 medical insurance forms with an MD3? Where can I obtain the necessary software?" You can use MailMerge or Pearl to fill out

forms. It will take some cut-and-try to get everything in the right places on the page, but if they change the forms on you, you won't have to buy new software.

An addendum to myself: In my article "How Not to Lose Your Files" (MOR Vol. 2, #4, Aug./Sept. 1985, p. 23), I explained how to escape the dreaded "Not enough space to store data on disk" message by copying to the virtual drive. George Bellak of New York City tried it, but NewWord refused to cooperate. Seems his NewWord was installed so that only A and B were "legal" drives. To find out what drives your NewWord recognizes, go to the No-File Menu and type "L" to change logged drive, but don't type the drive letter right away; the prompt screen that comes up will include the line "Legal drives are..." If only A and B are listed, run NWINSTAL, select "Computer Related Items" and then "Install Legal Drives," and add Drive C. Do it now, not after you lose a big file! After doing this, George found out that copying to the virtual drive still won't work if you're logged onto A and working on a file that's on B.

Michael G. Kellogg of Concord, CA, writes that "The problem A.H. Donn encountered trying to program the function keys on the MT 70 is not with his terminal, but the documentation. I found several errors in my manual (most corrected in later printings) including that code sequences for FA through FD are reversed for unshifted and control. The sequences for F10 are completely wrong in my manual; they are listed as unshifted 50H, shifted 52H, control 53H. Actually they are 49H, 69H and 1CH. Codes for the arrow through home/clear keys are listed as single codes, but in fact they are double codes like the rest of the function keys. Finally, in the legend to Table 3-2 it is indicated that the terminal is in Morrow mode with configuration paddle 8 set to ON. Morrow mode is attained by setting paddle 8 to OFF. You can check what function keys are sending by typing them at the A> and looking up the hex code for the ASCII characters that are displayed. However, Rev. 3.1 of Morrow CP/M strips the beginning 1CH so that it is not displayed, even when in Morrow mode."

Bill Boyle in Syracuse, NY, tells me that Supersoft in Champaign, IL, has a complete ANSI 66 Fortran for CP/M, at around $300.

Chuck Kelso, Jr., of Shelton, WA, gets R/W error messages on the MD11 hard disk--reformatting has done no good--and wonders if there is a hard disk equivalent of the public domain program FINDBAD, which locks out bad sectors of a disk. Sorry, Chuck, I'm told that Morrow's hard disk FORMAT program already does that, although it doesn't create a file that's visible in the directory. I'm afraid you have a hardware problem. Along with the tech manuals, MOR has acquired a disk of diagnostic programs for the hard disk drive (and another for floppies) that was originally available only to service agencies. See page 54 to order.

Escaping to Terminal and Printer Control

A couple of recent letters to the Mailbox shared a common theme. Julian L. Ashe of Fresno, CA, says his MP100 printer "printed in a different spot for each program. On Smart Checkbook it printed so far to the left that the tractor feed could not be adjusted far enough for the printing to begin even on the sprocket holes. A technician installed a plastic tube on the microswitch that limits the left travel of the carriage, but the feed still has to be as far left as it will go for Smart Checkbook, to the right 3/8ths inch for WS and 9/16ths for Pearl. A hell of a nuisance." Well, I don't know why it does that, but you can deal with it by sending an escape sequence that resets the left printer margin. Meanwhile, M. Jon Koerner of St. Paul, MN, wants a way to send escape sequences to his terminal from a SUBMIT file to toggle on the numeric keypad function key mode for his terminal. The catch is that the SUBMIT utility with CP/M 2.2 won't accept the ESC character and some other control codes, although the one with CP/M 3.0 will. Thinking about both these problems led me to find a neat trick for sending commands to the printer or terminal.

You can type in terminal commands from the A>. To send keystrokes to the printer, type:

PIP LST:=CON:

and stop the process with Control-Z. Or you can send commands to the printer or terminal with a BASIC program, and to the terminal alone with a Pilot program (see John Vanderwood's article, "Deciphering Your Terminal Manual," MOR Vol. 1, #5, Dec. 1984, p. 27). But MBASIC.COM takes up 24K of disk space, and PILOT.COM is 32K.

Here's a simpler way: Using the non-document mode of your word processor, make a file containing the control sequence(s) you want to send to the terminal or printer. You can enter ESC and other non-printable codes in these files by typing Control-P followed by the character (ESC will appear on the screen as "^["). Then, at the A> or in a SUBMIT file, the line "PIP CON:=<filename>" will send a file to the terminal, and "PIP LST:=<filename>" will send it to the printer. The advantage of this approach is that you can change the contents of these files easily. You can also send a file to the printer from inside WS or NW by calling PIP from the R option of the menu.

WS also has "initialization" and "uninitialization" strings for the printer and terminal, into which you can patch your own codes. In the WS patcher use the labels TRMINI, TRMUNI, PSINIT and PSFINI. NW has TRMINI and TRMUNI, but no printer strings. In Vers. 2.xx (i.e., any version beginning with "2."), you have to use DDT to patch them, at addresses 035F and 0364. In Vers. 3.xx (i.e., any version beginning with "3."), they're on the "Special Patches" menu.

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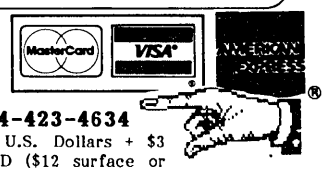

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Doubling the Speed of Your Terminal Port

by Dave Grothe

While preparing my tax returns last year, I became mildly peeved at the slow screen update of the LogiCalc program during scroll and tab operations. When I purchased my MD3 in 1984, I spent uncounted hours at the keyboard in unbridled enthusiasm for this spunky little machine. But later, when I learned that earlier models in the Micro Decision line (those with Rev. 1 motherboards) had the capability to communicate with a terminal at a speed of 19,200 baud--twice the speed of my system--I began to chafe at little things like LogiCalc's lethargic screen output.

Other programs, I noticed, could also benefit from a faster terminal port. NewWord, for example, processes text with speed and grace. Yet scrolling up or down by a screenful at a time creates a short delay as the screen is rewritten--a delay that could be slashed in half by doubling the terminal port speed from 9,600 baud to 19,200 baud.

And since the MDT-60 terminal that came with my Micro Decision already had the capability to communicate at 19,200 baud, the engineer in me couldn't resist the challenge. I started searching for a way to increase the terminal port speed of my MD3. With the publication of the MOR manuals in January, I finally had access to the technical information necessary to design a terminal port upgrade.

For those readers who are interested in upgrading the terminal port on their Micro Decisions, this article will describe both the construction of an add-on circuit and the necessary modifications to the Micro Decision motherboard to enable the terminal serial port (J1) to operate at a speed of 19,200 baud. Those readers who have experience in building electronic circuits should have no difficulty with this project, while the less technically inclined may be able to coax the hardware guru of their local users group into lending a hand.

Caveat

Although I have used the upgrade described in this article for almost a month and have encountered no problems, I have been informed that at least one program--Perfect Filer--does not function correctly when the terminal is operated at 19,200 baud. I have tested NewWord, Microsoft BASIC, Correct-It, LogiCalc, Personal Pearl, Turbo Pascal and a number of public domain programs, such as SMODEM. All of them operated correctly, indicating that Perfect Filer is the exception rather than the rule. If you have a program that you aren't sure will run at a higher terminal speed, contact the publisher's user support service to find out.

Dave Grothe is an electrical engineer for Motorola in Scottsdale, Arizona, who uses an MD3 for writing and recreational programming.

Rev. 2 Motherboard Versions

Two versions of the Rev. 2 motherboard were manufactured: one by a Japanese company named Kohjinsha and one by a company in Korea. Although functionally identical, these two versions of the motherboard have different component layouts. The upgrade described in this article is designed for installation on the Kohjinsha version, in which the terminal port UART (Universal Asynchronous Receiver/Transmitter) integrated circuit is placed in an accessible location. For owners of Micro Decisions with the Korean version of the Rev. 2 motherboard, the upgrade circuit will function correctly; however, a different method of mounting and interfacing the circuit may need to be devised.

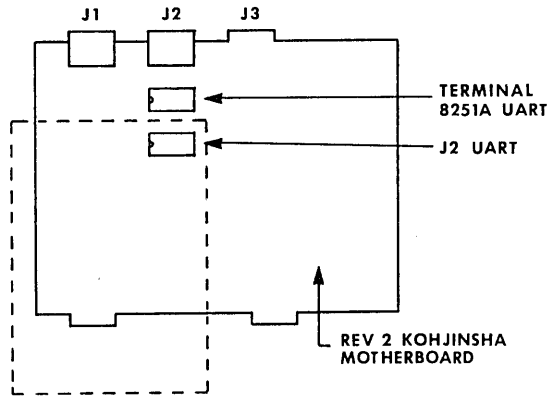

Figure 1: Top View of Rev. 2 Kohjinsha Motherboard. Here you can see the location of the 8251A UART devices for serial ports J1 (the terminal) and J2 (the printer/modem). J3 is the parallel printer port. (All figures by Dave Grothe)

How can you tell which Rev. 2 board is installed in your Micro Decision? The easiest method is to remove the top cover from the computer and compare what you see to Figure 1. This drawing shows the placement of the UART integrated circuits for the terminal port (J1) and the printer/modem port (J2) on the Kohjinsha version of the Rev. 2 motherboard. The terminal port UART chip is located directly opposite J2, the printer/modem serial port connector. Look for

a rectangular, 28-pin Dual In-line Package (DIP) labeled with the part number "8251A" (possibly embedded within other characters, like this: "M5L8251AP"). The UART chip for the J2 port is located directly adjacent to the terminal port UART, but it is obscured from view by the floppy disk drives.

In contrast to this, the Korean version of the Rev. 2 motherboard has the terminal port UART chip located opposite J3 (the parallel printer port connector) and somewhat closer to the front edge of the motherboard. If you have a Micro Decision with the Korean motherboard, your view of the terminal UART chip may be obscured by the rear chassis support bar for the disk drives, or by the right hand disk drive itself if you have an MD2. The UART chip for the J2 port is located between the terminal port UART and connector J3.

Hardware Description

A schematic diagram of the upgrade circuit is shown in Figure 2. The upgrade consists of three integrated circuits, two diodes, a capacitor and a crystal. Integrated circuit U1, crystal X1 and capacitor C1 generate a 2.4576 MHz clock signal. Integrated circuit U2 divides this clock signal down to a frequency that allows integrated circuit U3 (an 8251A UART chip) to operate at the desired 19,200 baud. Diodes D1 and D2 supply a reduced voltage to integrated circuit U1, which it needs for reliable operation.

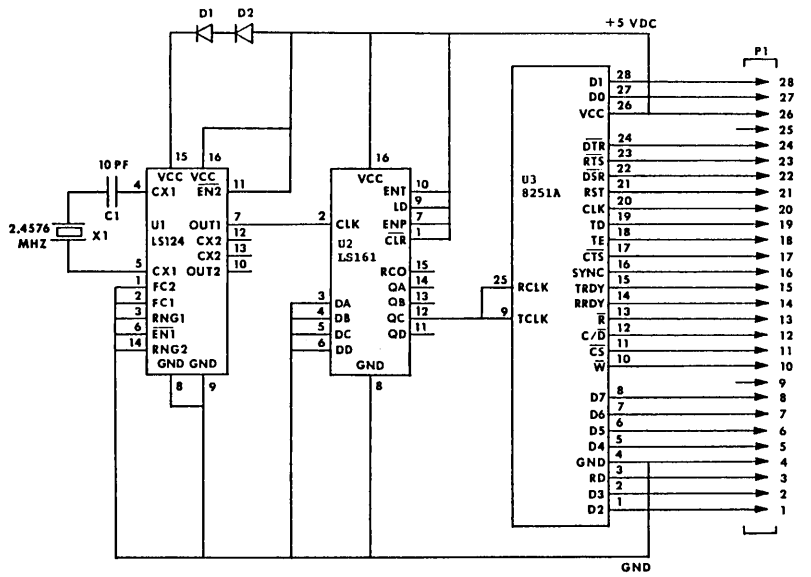

Figure 2: Schematic Diagram of the Upgrade Daughterboard. Three integrated circuits replace the terminal port 8251A UART device on the motherboard. Connector P1 plugs into a socket on the motherboard.

These components are assembled on a small (2.0 by 2.8 inches) perforated phenolic board. The integrated circuits are mounted in wire-wrap sockets. Connector P1 is formed by soldering a 28-pin component header to the leads of the socket for U3. Since this entire assembly replaces the terminal port 8251A UART chip on the motherboard, it is necessary to remove the UART chip from the motherboard and install a 28-pin DIP socket in its place. Connector P1 of the upgrade assembly then plugs into the DIP socket on the motherboard. For this reason, the upgrade assembly is referred to as a daughterboard.

Table 1 (p. 20) is a parts list, with recommended sources of supply. Including shipping charges, the complete project should cost about $15.

Installing the Upgrade

Installation of the terminal port upgrade consists of four main steps: modifying the motherboard, assembling the upgrade circuit on a daughterboard, installing the daughterboard in the system and testing the system. These steps are discussed in the paragraphs below; however, detailed, step-by-step instructions can be found in the file TRM19200 on FLOB/JUN86, Disk #7, for those MOR readers who decide to install the upgrade on their computers.

Motherboard Modification

To accommodate the daughterboard, the motherboard must be modified by replacing the 8251A terminal port UART with a 28-pin DIP socket. To do this, remove the motherboard from the computer, keeping in mind that it contains devices that are easily damaged by static electricity. Handle the motherboard only by its edges, and touch your hand to the bare metal chassis of the computer periodically as you work.

With the motherboard removed from the chassis, locate the terminal port UART, using Figure 1 as a guide. Remove the UART by clipping each of its 28 metal leads with a small pair of diagonal, side-cutting pliers. Then remove each lead from the board by grasping it with a pair of needle-nose pliers, melting its solder joint using a low-wattage soldering iron and pulling the lead out of its hole. To avoid damage to the motherboard, use the minimum amount of heat necessary to do the job. After all 28 leads have been extracted, remove any excess solder from the holes on the motherboard using a desoldering suction tool or a length of copper desoldering braid. [Warning! If you suspect that you

might damage your motherboard while desoldering, have an electronics technician do it for you with the correct tools. --Ed.]

Mount a 28-pin DIP socket on the motherboard in place of the UART chip. Carefully solder each lead of the socket to the motherboard using resin-core solder. Clean any excess resin flux from the solder joints using a cotton swab dipped in isopropyl alcohol.

Insert a new 8251A UART chip into the DIP socket, making sure the index notch is lined up as shown in Figure 1. Avoid handling the UART chip by its metal leads. Re-install the motherboard and check to make sure that all cables are reconnected properly.

To verify that the modification was properly installed, turn on the computer and run some software. Since the only difference at this point is that the 8251A UART chip is installed in a socket instead of being soldered directly to the motherboard, the computer and terminal should function normally.

(If they aren't functioning correctly, refer to the troubleshooting procedure in Step 15 of the file TRM19200 on FLOB/JUN86, Disk #7.)

Assembling the Daughterboard

Cut a piece of perforated phenolic board 2.0 inches wide by 2.8 inches long. Mount the DIP wire-wrap sockets for integrated circuits U1, U2 and U3 as shown in Figure 3, and use a small amount of quick-setting epoxy to stake the sockets to the perf board. Be sure pins 1 through 14 of the socket for U3 are located in the row of holes closest to the edge of the perf board or there will be insufficient clearance between the disk drive and the daughterboard, once installed inside the computer.

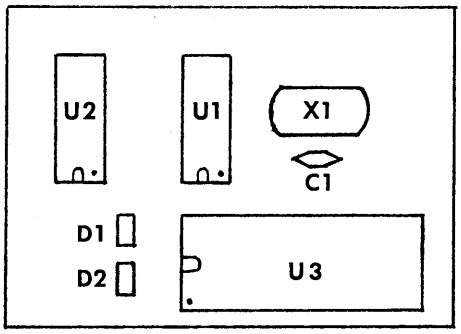

Figure 3: Parts Placement Diagram for the Upgrade Daughterboard. The upgrade circuit is built on a 2.0- by 2.8-inch perforated phenolic board.

Mount X1, C1, D1 and D2 in the positions shown in Figure 3. Use insulated hookup wire to connect them into the circuit as shown in Figure 2, and solder the connections. Wire up the rest of the circuit (except for connector P1) using wire-wrap techniques. Check off each connection on the schematic diagram as you wire it. Do not wrap more than one wire on each of pins 9 and 25 of the socket for U3.

Using a small pair of side-cutting pliers, clip 1/4- to 3/8-inch off of the ends of pins 9 and 25 of the wire wrap socket for U3. Position a 28-pin component header as shown in Figure 4. Each pin (except for 9 and 25) of the wire wrap socket should mesh between a pair of tines on the component header. Solder each connection.

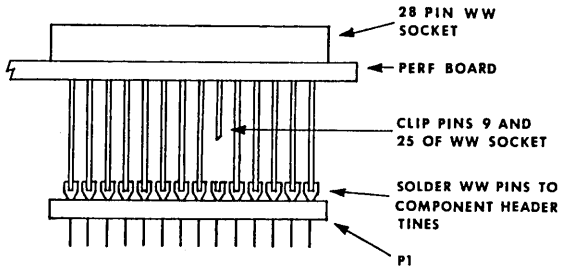

Figure 4: Detail View of Connector P1. Since wire wrap pins will not fit into the UART socket on the motherboard, a 28-pin component header serves as a convenient interface.

To provide clearance beneath the daughterboard for components on the motherboard, clip 1/4- to 3/8-inch off of the ends of each pin of the wire-wrap sockets for U1 and U2. Then plug a 74LS124 integrated circuit into the socket for U1, and plug a 74LS161 integrated circuit into the socket for U2. Refer to Figure 3 for the correct orientation of pin 1 on each of these devices.

Installing the Daughterboard in the Computer

To install the daughterboard, turn off the computer and slide the cover forward to expose the rear half of the chassis. Remove the 8251A UART chip from its socket on the motherboard, taking care not to handle it by its metal pins. Plug the UART chip into the socket for U3 on the daughterboard, referring to Figure 3 for the correct orientation of pin 1. Then plug the daughterboard into the socket on the motherboard and slide the cover back onto the computer.

Testing the System

Configure your terminal for operation at 19,200 baud. Since the baud rate of some terminals is software controlled, while the baud rate of others is controlled by dip switches, you will need to refer to the user's manual that came with your terminal for instructions on how to do this. Turn on the system and run some software. The computer and terminal should function normally, with the exception of a noticeable increase in console display speed.

(continued)

(If your system doesn't function correctly, Step 29 of the file TRM19200 on FLOB/JUN86, Disk #7, contains a troubleshooting procedure to assist you in identifying the problem.)

Conclusion

If you have a Micro Decision with a Rev. 2 motherboard, the upgrade described in this article will put some pep in your screen display by doubling the maximum speed at which characters can be displayed on your terminal screen. The increase in speed is most noticeable in processes that are I/O bound; for example, the TYPE command in CP/M is limited by the speed at which the computer can send characters to the terminal for display. As a test, I constructed a 70-KB text file (about 20 full pages) with NewWord. The TYPE command took 1 minute and 27 seconds to display this file at the default terminal port speed of 9,600 baud. After modifying my MD3 for 19,200 baud operation, the TYPE command took only 45 seconds--a 50 percent reduction. ■

Table 1 -- Parts List

Description	Qty	Source	Each	Total
Perf board	1	RS	1.49	1.49
28 pin ST socket	1	JDR	.22	.22
28 pin WW socket	1	JDR	1.69	1.69
28 pin component header	1	JDR	1.09	1.09
16 pin WW socket	2	JDR	.69	1.38
8251A UART	1	JDR	1.89	1.89
74LS124 Dual VCO	1	JDR	2.75	2.75
74LS161 Binary counter	1	JDR	.39	.39
2.4576 Mhz crystal	1	JDR	1.95	1.95
10 pf capacitor	1	JDR	.05	.05
1N4004 diode	2	JDR	.10	.20
			Total:	$13.10

NOTES: 1. RS = Radio Shack
2. JDR = JDR Microdevices
1224 S. Bascom Ave.
San Jose, CA 95128
800/538-5000 (800/995-5430 in CA)

How I Quieted My Disk Drives and Lived Happily Ever After

by Rick Charnes

My feeling has always been that if this computer revolution is truly to be an advance over the machine age, then one thing it has to be is quiet.

Apropos of that, may I announce the resolution of a problem that had been been bothering me for far too long: I am now blessed with quiet disk drives. After agonizing for a year and a half of enough squeaking and grinding, moaning and groaning to drive the strongest man to drink, my disk drives now bring nothing but music to my ears.

I set out on my journey towards quietude six months ago when I asked my dealer to upgrade my MD2 to double-sided. My machine started out its life with horrendous single-sided NEC/TSA drives. If I had put these next to a Mac truck, I seriously wonder which would have been drowned out. When I began to notice that my roommates were no longer coming into the living room where my computer sits because they couldn't talk above the din, I figured I'd give them and myself a double treat and get more disk capacity and less noise.

I went to my dealer and explicitly told him I wanted the quietest possible drives. He had me listen to Mitsubishi drives on a Leading Edge computer. I literally couldn't hear a thing. It was like heaven. I said, "Do it."

Well, all did not come up smelling like roses. My computer came back from the shop making a "clicking" noise that I definitely didn't like. Mitsubishi drives have a feature called a "solenoid head" in which, unlike most drives, the head is off the disk in its resting position. This saves wear and tear on both the disk and drive itself. When the head comes either down to access the disk or up when it's done, it clicks. Normally it's a sign of a superior drive, but after a year with those NEC/TSAs, the words "superior" and "quiet" were identical to me.

"But," I told my dealer, "when you had me listen to them on the Leading Edge, they were soundless. What happened?"

"Well, the Leading Edge has a very heavy casing, with padding. The Morrow is nothing but very thin metal."

That sounded fishy to me, but I was too furious and I didn't know enough one way or another--so instead I stayed up nights dreaming up 1,001 different ways to poison computer repair technicians.

Lots of friends made suggestions about changing the motor step rate in CP/M and doing all those other nice things that previous articles in MOR have detailed to quiet down disk drives, but I had a gut feeling it was hardware-related.

After months of feeling helpless and resentful and plotting sweet revenge, my dealer suddenly commented to me one day (why I was still talking to him, I'm not sure) that he had heard from a fellow down in San Jose how to eliminate the clicking. All that's required, he said, is to switch the jumper on the drives from their position at HS to HM.

I had never heard of this, and I wasn't even sure what a jumper was. But he explained it and I tried it--and it didn't work.

A few weeks passed. I fumed some more and got the phone number for myself.

Not expecting much, although recognizing that hope springs eternal, I made the phone call. A most helpful technician down in Silicon Valley explained that the jumper is moved to HC, not HM.

Already late for work, I could only spend a few breathless minutes with my machine; but someone in that great computer shop in the sky must have been with me. The clicks were gone.

I don't remember ever walking in to work as joyously as I did that day. I felt like a new man. What a happy ending.

Almost.

Upon returning home from work, I immediately went to explore life with quiet, clickless drives. One thing I was especially eager to try was BACKUP.COM, which, for some reason, hadn't worked since I got the double-sided drives. It would inexplicably freeze up after reading exactly nine tracks.

I loaded BACKUP, put in a disk, and there it went, reading, writing, verifying--track 9, track 29, track 49, track sixty-ni....whoops. Oh, no--that awful, gut-wrenching noise the drives make when they're trying to read a disk but can't. I was hit by the dreaded "Data Error" of the "A,R,I" type.

(continued)

Rick Charnes is a librarian temporarily turned word processor. He originally bought his Morrow to help him write political articles but has since become enamored of computer telecommunications.

This was a job for FINDBAD, which I then ran on the disks I was backing up. Oddly, it began finding bad blocks on disks that had never before given me trouble. A huge number of bad blocks, 10K worth in the [UNUSED].BAD file. The mystery deepened.

Is it an ironclad rule of life that you always solve one problem only to find you've created another in its place?

Was this new problem related to having gotten rid of the clicks? It had to be. But how? And why?

I called up Rob, my friend and computer mentor without whom my computer-life would have never begun. All beginners should have a friend like Rob. He said, "I'll bet it has something to do with timing."

I had taken a quick look at Victor Chan's article in the November 1985 BAMDUA Newsletter about installing double-sided drives, which had some helpful information. I'm not a technical type (although I'm learning), but I casually mentioned to Rob that I had seen something in there about "motor wait time" and "head settling time." He said, "I'll be right over."

He was convinced that it wasn't the step rate, probably wasn't the motor wait time, and probably was the head settling time. He was right.

Rob said, "Rick, you've just got to slow your drives down a little bit. The blocks aren't really bad; it's just that the drives go past them too fast to really see what's there. The heads don't have enough time to 'settle' on the disk to read properly."

We followed Victor's procedure, which referred us to another article that showed us how to find the address of the "Disk Drive Motor Table" and the "Head Settling" byte, which is what we wanted. At this point my own head could have used some settling.

Using Victor Chan's procedure for making a SYSGEN "image" of CP/M, DDT to increase this byte to 08H at the appropriate address for both drives and SAVE to retain it, we then reset the computer.

Not only is the clicking now completely eliminated, FINDBAD doesn't find a single bad block on the same disks on which 12 hours before it found five, and BACKUP.COM now works for the first time in five months. I still don't quite understand it, but somehow eliminating the solenoid head feature did something to the head settling time, and as soon as we changed CP/M to compensate for it, the drives were happy. Life can be so sweet. All because of changing two bytes and a couple of jumpers. Computers are so incredible, aren't they?

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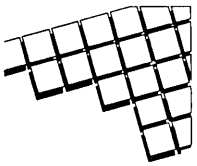

Then develop your ideas using a familiar outline format. Change the structure as easily as you change your mind. Move an idea and all attached text moves with it.

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CP/M ALIVE!

by Ken Grymala

CP/M Does Windows, and IBMs, and....

This month I am devoting my column to special tools for CP/M computers. Even though everything I am discussing is in fairly wide use, I'm always surprised at the number of experienced users who are unaware of what is commonly available to help make life easier.

If you feel strongly about other tools that will help make our computer work and play even better, drop a line about them to MOR, or to me, so that we can all take advantage of them. These tools can be programs, hardware or even special CP/M newsletters.

Compatibility Tools

From calls and correspondence that I've received, I believe that many people do not realize that their CP/M computers are quite compatible with mainframe computers, super-minis, IBM PCs, dedicated word processors, Commodores and more.

The compatibility I'm talking about is file compatibility. This means that you can swap your word processing files, database files and uncompiled computer programs with these other computers.

In many cases, uncompiled programs written for a PC-compatible computer in BASIC (".BAS" files), PASCAL (".PAS" files), dBase II, and C (".C" files) will run on your CP/M computer with little or no modification. The opposite is also true. BASIC, Pascal, dBase II and C programs that you write will run on PC compatibles and other machines. The exception to this is when these programs use graphics or special "machine specific" codes. All you need to run these programs is the specific language interpreter (like MBASIC for BASIC) or the compiler (Turbo Pascal for Pascal).

You may already own the tools that will give you compatibility. But, even if you don't, they won't cost you much money. Some are even in the public domain.

Disk Compatibility. Something that seems to be foremost in many people's minds is having "IBM compatibility." There are two easy methods to obtain this compatibility.

The quickest and easiest method for obtaining limited IBM compatibility is to have a program like Multi-Form or Uniform (see MOR Vol. 2, #4, Aug./Sept. 1985, p. 52, and MOR Vol. 2, #2, April 1985, p. 23). These programs, or programs similar to them, are available for nearly all major brands of CP/M computers. They allow you to read, write and format MS-DOS and PC-DOS disk formats on your CP/M computer. They also allow you to read, write and format nearly every other 5-1/4 inch CP/M format ever conceived. I regularly use this method to transfer WordStar and NewWord text files, dBase II files, and BASIC and Turbo Pascal program files back and forth between my Morrows and "compatibles." I also use this method to trade information with other CP/M machines such as Televideos and Kaypros.

Data Compatibility. The second method that many people overlook in transferring data to and from other computers is the use of a communications program, with or without a modem. Programs such as MDM7, MEX, KERMIT, etc. (FLOB/FEB86, Disk #3) are great for transferring between your computer and other computers. Of course, the other computer also needs a communications program.

If you are located close to the other computer (within about a hundred feet), all you need is an RS-232 cable, without a modem. Sometimes it's a little tricky to get computers to talk to one another, so it's helpful if you can find a friend with a "breakout box" who understands the RS-232. But once you figure out how to do it, it will be a simple matter from then on.

Communications programs generally work in one of two ways. They either send "pure ASCII files," or they use a "data transfer protocol."

Almost all computers and dedicated word processors can send and receive pure ASCII files. Transfer protocols are usually only standard between computers of the same type.

ASCII File Transfers. The pure ASCII files consist only of letters, numbers and certain special functions such as line feeds and carriage returns. These are files that could be printed on a simple teletype printer or displayed on almost any terminal. The Control-T function of MDM7 allows you to send ASCII files. Opening a buffer file and using the MDM7

Send your questions and comments to Ken Grymala at P.O. Box 2540, Manassas, VA 22110.

function Control-Y allows you to capture an ASCII file. Nearly every modem program available for mainframe computers, mini computers, personal computers of all types and dedicated word processors permits the transfer of ASCII files.

Documents (as opposed to "nondocuments") prepared with NewWord or WordStar are not true ASCII files. They have "soft" carriage returns at the end of lines, they may contain control codes and they perform a special technical modification by "setting the high order bit."

Converting WordStar files to ASCII can be done using PIP and its modifiers, but it's easier if you use one of the public domain programs such as HARDSOFT.COM (FLOB/AUG85, Disk #1). ASCII text files may also be turned back into WordStar files by using the same HARDSOFT filter program's "S" option. These programs will run under CP/M 2.2, CP/M 3.0 (CP/M Plus), MP/M and TurboDOS without any problems.

I've used this method to transfer text, database files and programs to PC compatibles, VAXs, dedicated word processors, Commodores and several types of lap portables, none of which run CP/M.

XMODEM and Other Protocol Transfers. If you are transferring to another CP/M machine or to an MS-DOS/PC-DOS machine, you can usually use the data transfer protocol method.

When a data transfer protocol is used, more sophisticated data may be sent, such as compiled programs or WordStar files that have control codes. Using a transfer protocol also ensures that the data received are exactly as sent; otherwise the program will send them again and again until it gets it right--or until it figures there is no use in trying anymore.

MDM7 and many other public domain and commercial programs use XMODEM, a.k.a. "Christensen" protocol (named for Ward Christensen, the originator of XMODEM). This protocol is invoked in MDM7 when you use the "S" (Send) and "R" (Receive) commands.

Many other proprietary protocols are used by commercial communications programs. Some claim to be better than XMODEM protocol, but it is necessary that both computers are using exactly the same protocol, otherwise they are useless. And this is where the problems can begin. Christensen (XMODEM) protocol is widely used in CP/M and MS-DOS communications programs, but almost nowhere else. So, if you're transferring to a Commodore 64 or a VAX, beware! You will probably have to send a pure ASCII file instead.

Multi-Tasking BASIC

Another real bargain for BASIC programmers is MTBASIC, or Multi-Tasking BASIC, from SoftAid, Inc., P.O. Box 2412, Columbia, MD 21045.

If you would like to write BASIC programs that can be turned into ".COM" files, and that can be traded or sold without copyright infringement, MTBASIC is for you.

MTBASIC is a true "diamond in the rough." It may be a little rough around the edges, but its final program product is unbeatable compared with any other BASIC or BASIC compiler I'm familiar with. It doesn't have quite as many commands as some other BASICs, but I haven't found that to be a problem. And now and then it can be unforgiving during the compile cycle if you make a mistake. But being prepared by making backups before it locks up your machine is very easy (and wise).

MTBASIC allows you to set up as many as 10 different windows, anywhere on your screen, each running a different task. It also lets you set up timers so that the different tasks may run at different speeds. And since it "compiles" your BASIC program into machine language, it runs very, very fast compared to the MBASIC that came with your Morrow.

It is a little different from MBASIC, but converting programs from MBASIC to MTBASIC is not difficult. About 80-90 percent of an average MBASIC program is usable without change.

One particularly nice feature is that MTBASIC will either correct your mistakes, if it knows what they are, or it will alert you to a mistake when you have finished typing a line with an error.

MTBASIC compiles very fast, and it is extremely simple to use the compiler. All you do is type **compile**, and it compiles, unless it finds an error that was not found before, in which case it puts you back into the program where it found the error. If it doesn't find any errors it runs the program. A 100-line program takes about a second to compile. Anybody who has used the Microsoft BASCOM compiler with MBASIC will really appreciate MTBASIC.

The only real complaint I have about MTBASIC is the editor. The MTBASIC editor is usable for writing short programs or for making minor corrections during compiling, but it is really primitive. However, when MTBASIC is used in conjunction with an external editor, the combination is very powerful.

When I got MTBASIC in December 1985, it was not available in Morrow format, so I ordered the Kaypro format. MTBASIC comes with a 105-page manual that is well written, but the manual does not have an index (my second small gripe). Hopefully, they will add an index in future editions.

MTBASIC is available directly from SoftAid for $49.95, plus shipping. I ordered by phone one afternoon, and the UPS man delivered my copy the next afternoon. MTBASIC is also available from MOR advertisers, such as Central Computer Products, for only $47.00. ■

Updating Your MD with the Latest ROM
—How and Why

by Maxwell Syndstrom

MOR is now selling an Update Kit, which includes a ROM chip, instructions and a floppy with the necessary programs.

Why update your BIOS and ROM? First, recent versions of some supplied software, like Key and NewWord, make use of features contained only in the latest ROM and BIOS revisions; if you want updates to such software, you may run into problems unless you update your machine's ROM and BIOS as well. Second, there may be some minor bugs in your current configuration, which you've learned to live with, that the update fixes. Finally, the ROM and BIOS updates supplied here are the last revisions the MD3 is likely to see, so any future software or software revisions will inevitably make use of these BIOS and ROM revisions.

Here's a brief explanation of how you would update your BIOS and ROM from our kit: But before you do anything, be sure everything you're working with is a copy of the original working disks/update kit disk you have; that way, if anything goes wrong, you can always go back to where you started. Do not try any of this on your original system/utilities disk or on the update kit disk you've received; back them up.

To update your MD3 to the latest (and final) BIOS and ROM revisions, you must first find your ROM and BIOS revision numbers. Turn on your computer and terminal. The first thing you will see on the screen will be the following:

```
Micro-Decision -- ROM Rev. 2.3
Copyright 1982,1983 Morrow Designs, Inc.
```

This message gives you the ROM revision number, in this case 2.3. Next, insert a bootable disk in drive A and hit return. You will see this message:

```
Micro-Decision -- 64K CP/M Vers. 2.2 -- Rev. 2.2
Copyright '76,'77,'78,'79,'80 Digital Research, Inc.
Copyright 1982,1983 Morrow Designs, Inc.
```

This message gives you the CP/M revision number, 2.2 in our example.

To Change the Software (Your System's BIOS)

To change the software, you should run PILOT, which will automatically perform the changes for you.

First, copy everything from the update disk we have sent you onto a blank disk. Then copy your current SYSGEN.COM, DDT.COM, SUBMIT.COM, PILOT.COM and XSUB.COM onto that disk, as well. Then be sure to run SYSGEN on that disk, to make it a "working" disk, i.e., a disk with the CP/M system tracks on it. Next, put a formatted disk in drive B. Put a copy of PIP.COM or NSWEEP on the disk in B, and then type the following at the A>: **PILOT UPDATE<CR>.**

That's all there is to it; PILOT will automatically create CPM64.COM, insert the CBIOS.HEX we've supplied you with and then run CPM64.COM so that the system tracks on the disk in drive B will be changed. Your disk in B now has the latest BIOS revision, 3.1., on it. Using PIP or NSWEEP, copy ASM.COM, DDT.COM, ED.COM, LOAD.COM, DUMP.COM, DUMP.ASM, SUBMIT.COM, XSUB.COM and SYSGEN.COM from your old system/utilities disk, as well as the files we've supplied you with, onto this new system disk. This will be the replacement for your current system/utilities disk, with the new, compatible FORMAT, BACKUP, etc. programs on it. If you try to Reset and boot up with that disk in drive A, though, it won't work. It shouldn't, because you're trying to run the BIOS 3.1 revision on an incompatible ROM chip. That's the next step.

To Replace the ROM Chip

First of all, be sure that you've turned the computer off. Then unscrew the four screws holding the beige cover on your MD3, and carefully lift off the cover. And make sure you've discharged any static by touching a ground (e.g., the metal box of the computer or a metal pipe) so you don't transmit a static charge to the ROM chip when you handle it.

Inside your computer you'll see a chip with a little label on it, ROM 2.3 or 2.5 or some such number. This chip, which is plugged into its own little socket, has a little dent in it. Write down the orientation of this dent. Now carefully unplug the chip, pulling up gently on it, perhaps using a small screwdriver to pry it out. (Your local electronics store may carry a "chip puller" made especially for this purpose.) If you're very nervous about this, ask a technical friend to help you.

After you have successfully removed the old ROM chip, insert the new ROM chip you received from us in its place, making sure its little dent is oriented just like the old one and that it's seated firmly and properly. That's it; you should now be able to boot up with your new BIOS disk and ROM chip.

Of course, don't forget that you now need to SYSGEN all your old disks so they'll be compatible with the update; they won't run until you do so. ■

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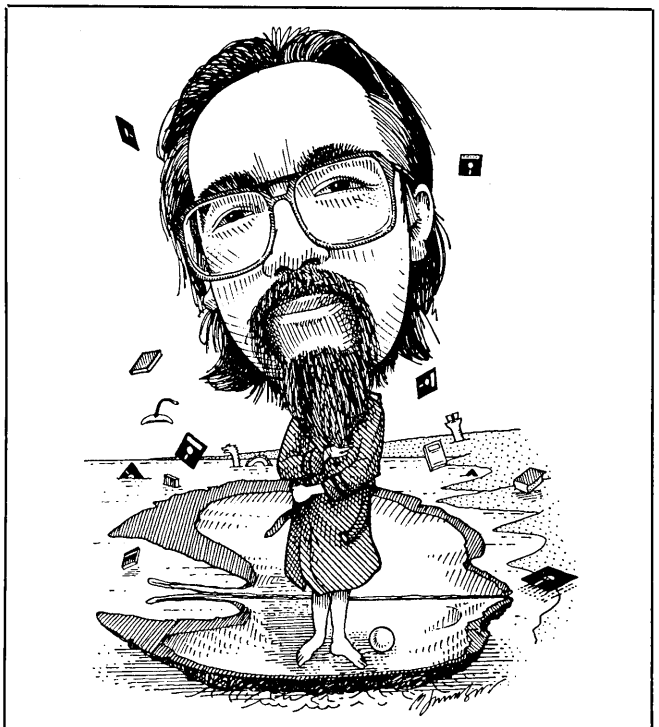

GETTING PERSONAL WITH PEARL

by Bruce Gowens

One of the great features of Personal Pearl is that up to five different files can be accessed simultaneously. This permits prompt masks (as in JOUMASK, below) and lookup tables (as in ACCOUNT and MERCH, below), as well as database arrangements that save file space.

Suppose you have a number of different databases, each of which has need of name and address fields. One might be customers, another members of a club, another friends, and so forth. Let's also say that you have to break up your phone bill between your roommate and yourself, and break up your own calls between those for business, those for your club, etc.

Obviously you could have a different database for each purpose. But by making a single database consisting of the name, address, company name and telephone number that is accessed by each of the other bases, however, you need to store this information in only one place. Let's call this input form NAMES.

Then another database can keep track of your club members' dues statuses. We'll call this CLUB. When you enter the last name, CLUB calls up the first name, address and phone number from NAMES. It does not save them into CLUB; it simply displays them so that you can check that you have the right person. Reports from CLUB will also go to NAMES to get that information.

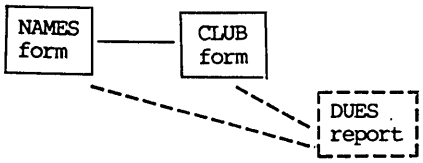

Figure 1. CLUB shows the address, etc. it finds in NAMES. DUES gets information from both CLUB and NAMES.

Another database, which we'll call ADJOURN (ADvertising JOURNal), can keep the financial transactions for your magazine publishing business. ADJOURN is keyed to NAMES by the company name field rather than by the last name field. The first and last name fields can be the contact person (prefixed "Attn:" in invoice, statement or label reports from ADJOURN). ADJOURN also is busy accessing some other input forms, which we'll call JOUMASK, ACCOUNT and MERCH. This means that we are accessing five files, since we must count ADJOURN as well.

JOUMASK is keyed to a single character field in ADJOURN that we'll call TTYPE for "Transaction TYPE." Almost all the fields in JOUMASK are prompts for fields in ADJOURN. So if the transaction type is "P" (for accounts Payable), a prompt might read "Pay by (date):"; whereas if it were "R" (for accounts Receivable), the prompt might read "Overdue on (date):."

Sometimes a field in ADJOURN is not needed for one TTYPE, in which case the prompt might be a simple "N/A:" or, in the case of a required numerical field, an instruction such as "Enter zero here:."

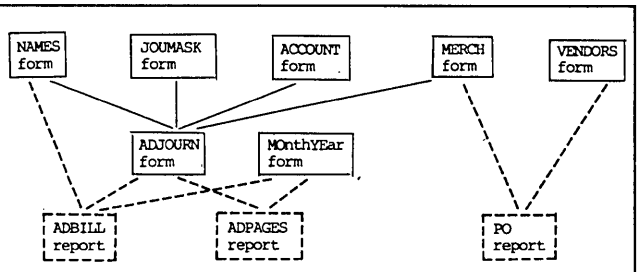

Figure 2. ADJOURN shows information from NAMES, shows prompts from JOUMASK, and keeps information from ACCOUNT and MERCH. ADBILL uses information from ADJOURN and NAMES, and looks up the issue month and year in MOnthYEar.

An important field in JOUMASK is used to set amounts positive or negative. We'll call it SIGN. SIGN is number type and is two spaces long. In JOUMASK it will have the value -1 or 1. SIGN is the only field in JOUMASK that is saved into each record

Bruce would like to see interesting Pearl applications, hear of problems and know what you would like discussed in this column. Send mail c/o MOR, with SASE and phone number if a reply is desired.

of ADJOURN. When a report is made from ADJOURN, the report amount field AMOUNT is calculated by the formula (AMT * SIGN), where AMT is the field in the input form. When data is being entered into ADJOURN, one never needs to enter a negative number because SIGN will take care of it.

ACCOUNT is used as a lookup table, to identify the purpose of each bookkeeping account. So when, for example, "123" is entered in the field ACCT in ADJOURN, the next area (display only) shows "Office Supplies." If you really wanted account 124, Capitol Equipment, you would spot the error and correct your entry.

MERCH is also used by ADJOURN as a lookup table, but it does other work as well, such as preparing purchase orders for re-stocking. When an item is sold, the ITEM NUMber field in ADJOURN keys MERCH into displaying a description so that you can be sure the right item number has been entered.

Let's go back to NAMES and add two more fields to it. OWNER will be the one (you or your roommate) who telephones this person. FOR will be the organization that calls to this person are made for (say your club reimburses you for calls or that you wish to separate out the calls made for business).

And here comes the phone bill. Sorting out whose calls are whose and who owes how much, which are reimbursable by your club and which are for the business, can be a royal mess. Pearl to the rescue. Each number from your bill gets entered in PHONE. The number is keyed to the phone number in NAMES, so you immediately see who had been called, who normally calls that person and if it was for the club or business.

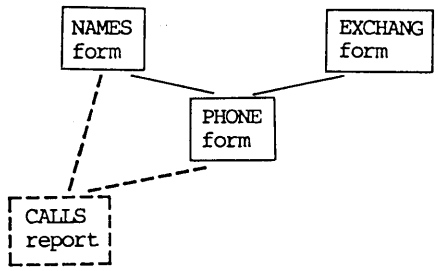

Figure 3. PHONE goes to NAMES to find who was called and to EXCHANG to find the rate. CALLS fills in the name of the person called by referencing NAMES.

Just for fun, let's make the situation even messier. You have "Circle Calling," which means you get a 30 percent discount on calls outside your zones 1, 2 and 3 but within a 50-mile radius of your home. The phone company doesn't show the discounted amount for such calls on each line, just the full price with a discount calculation elsewhere on the bill. And you are, say, in Berkeley, CA, where your 50-mile radius covers parts (but not all) of the 415, 408 and 707 area codes. So we have PHONE use the area code and exchange to take a look at EXCHANG and get the MULtiplication FACTor for that exchange. This is a little awkward, since you have to enter a special number consisting of the area code and exchange (for MOR at 415/644-2638, this would be 415644), which we'll call ACEXC. Zones 1 through 3 and beyond 50 miles have a MULFACT of 1; the discount area has a MULFACT of 0.7. When you enter the amount from your phone bill, the MULFACT feeds in the discount so you don't cheat your roommate, your club or the government.

How much more you wish to enter depends on how much of a data freak you are. The telephone number (the area code is not needed since it is highly unlikely that you might have the same phone number for two different people in two different area codes), ACEXC, date of call (used for sorting and selecting) and amount are the minimum. If you really need it, you could add the time of day and call length. PHONE will pull the person called, his/her company (if any) and the city called from NAME as display only. PHONE will also pull OWNER and FOR from NAME, but it will retain the data so that it can be changed (in the PHONE record) if need be (for example, usually your roommate calls that person, but this time you did; or although that person is a club member, this was a personal call; or that person was coded as being a call that either you or your roommate might have called--and so you need to edit the record).

Of course, there will always be the new number that wasn't in NAME or that call to an unknown number that no one can remember calling. When that happens, you can add a record to NAME where the First NAME field is "Found on" and the Last NAME field is "6/86 bill" and then if it shows up on subsequent bills chase it down.

Reports from PHONE pull data from NAMES for the person called, etc., but use the retained OWNER and FOR fields to sort by. Thus, a report can list calls by OWNER, with a subtotal for the amount for each caller, or by FOR, with a subtotal for each activity or business.

Now you needn't stop here. You can base as many input forms on NAMES as you wish. The limit of five is only on the number that are open (i.e., in use) at any one time. So you can go on to design a form that keeps track of those books, phonograph records and tools that you've lent out; a calendar that prints out the name and phone number of anyone having a birthday or anniversary that day; the Christmas card list; your "drop dead" list (hopefully it's not long enough to put in a database); or anything needing name and address data.

Next issue I'll discuss some of the easy entry tricks that apply to multiple input forms. ■

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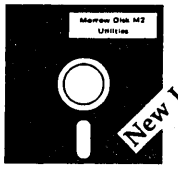

Morrow Users Disks

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The following are full disks of software assembled specifically for Morrow CP/M 2.2 systems (some will not run under CP/M 3.0). Each program has a .DOC (documentation) file and many include source.

Morrow Disk M1
Modem software

This disk is absolutely priceless if you will be using a modem to communicate with bulletin boards, other micros or mainframes.

MMODEM: Morrow version of MODEM 795. You can change your baud rate inside the program. Includes source and library so you can customize it if you wish.

SMODEM: This is MODEM 7 setup for SMARTMODEM compatible modems. Handles autodial and autoanswer.

SQ/USQ: Programs to squeeze and unsqueeze files for faster transfer.

Morrow Disk M2
Utilities

Really oodles of spiffy little (and big) programs to help you get full use of your Morrow.

ZZSOURCE.COM: A true Zilog format disassembler for 8080 and Z80 object (.COM) files. Now you can turn .COM files into .MAC files.

UNERA.COM: Simply enter "UNERA" followed by the name of the file you just erased and presto, the erased file is back! A lifesaver.

FINDBD54.COM: Checks an entire disk, reports bad sectors, and then creates a special file containing those sectors. You save a bundle on disks.

CAT2: This is a group of programs which create and maintain a single directory of all the programs you have on all your disks. Even keeps track of which programs are backed up and which aren't.

DUMPX, DU-77, COMPARE, FORMFEED,DIR-DUMP, ... and all have documentation on disk.

Morrow Disk M3
Games

PACMAN.COM: Despite the Morrow's lack of graphics, this one looks and plays amazingly like the real thing! Keep it hidden.

ZCHESS.COM: Chess with a 1-6 level look ahead.

OTHELLO.COM: You learn it in minutes, master it in years.

BIO.COM: Generates custom graphic biorhythm.

MM.COM: Master Mind.

WUMPUS.COM: This is the famous 550 point super version of Adventure. There isn't room on one disk for this program and all the data files (the cave is huge) so the data files are on Disk M4.

Morrow Disk M4
Adventure Data & Aliens

ADVT.DAT: This disk contains the data files for the 550 point Adventure (the latest, greatest, most cussed version ever devised by half-mortals). You must have both M3 and M4 to play Adventure.

ALIENS: This is the game that made arcades famous. Keep this one hidden from the younger set or you won't get to play Adventure.

Morrow Disk M5
MX-80 Graphics

A complete Epson MX-80 graphics printer package including example files. Same as M6 except for MX-80 (or compatible) printers.

Morrow Disk M6
Prowriter Graphics

This is a complete Prowriter printer graphics package written by the same Micro C subscriber who wrote the MX-80 graphics package. Plot points, lines, circles, boxes, and more. Examples, documentation, and more.

Morrow Disk M7
Small C Version 2 Compiler

This is a greatly extended version of Ron Cain's Small C compiler. Version 2 has more expressions and larger library, true subset of Unix C. Disk contains compiler, documentation, and library — everything you need.

Morrow Disk M8
Small C Version 2 Source

This disk contains the source (written in Small C) of the Small C version 2 compiler. Get M8 if you want to try extending the compiler. (You must have M7.)

Morrow Disk M9
ZCPR

ZCPR: The big news on this disk is the self-installing version ZCPR available only from Micro C. Once you have ZCPR in your CP/M, you'll never go back to straight CP/M! For instance, ZCPR searches drive A for any program not found on drive B, so, even an empty disk in drive B appears to contain every program on A. It's great for text editors, compilers, etc. Plus many more new features to make CP/M easier to live with. In fact, Digital Research incorporated many features of ZCPR into CP/M 3.0

EX14: a super replacement for SUBMIT.

Morrow Disk M10
Assemblers

We've received a lot of requests for a Z80 assembler. So Dana put in some long hours getting the Crowe Z80 assembler to run on the Morrow (and every other Z80 machine).

CROWECPM: This is a first class Z80 assembler. We use this assembler daily (and we included its source). Takes standard Zilog mnemonies.

LASM: This is a more powerful version of the ASM assembler you received with the Morrow. This will link multiple programs together at assembly time.

PRINTPRN: This program makes it easy to print the listing files generated by the Crowe assembler.

Morrow Disk M11
Library & Checkbook Programs

CHECKS: This has been a very popular group of programs. Categorizes checks so you can keep track which are tax deductible and which get charged to which projects. Includes source and excellent example check files. Very powerful.

LIBR: This is a complete set of library routines which let you group files into a single file called a library. Then CP/M sees them as a single program, but with the library routines, you can list them out separately, run them separately, or divide them up again. Almost like a unix environment.

Morrow Disk M12
Pascal Compiler

This is a real Pascal compiler. It supports only a subset of the language (no records, pointers, Booleans, reals or complex) but it generates a real .COM file. Everything is on this disk: the compiler, its source, example programs and documentations.

Morrow Disk M13
Z80 Tools

This is for those of you who are into Z80 assembly language.

XLATE.COM: A very good 8080 to Z80 translation routine.

DASM.COM: An easier to use version of ZZSOURCE (the Z80 disassembler). This full disk includes source and documentation for both routines.

Morrow Disk M14
Z80 Macro Assembler

This is a real Z80 macro assembler! Syntax, closely follows RMACK and MAC. Also includes pseudo-ops to support conditional assembly, etc. No phase or relocatable code.

Morrow Disk M15
Turbo Pascal Games I

We've combined eleven games on this disk using Turbo Pascal's "chain" procedure. Play BACCARAT, BLACKJACK, HORSERACE, KENO, and more without losing a penny. Source is included for all games.

Morrow Disk M16
Turbo Pascal Games II

A variation of Yahtzee, a planetary lander game, a Wumpus hunt, a version of Life, and much more to keep you glued to your keyboard. Like M15, this disk uses the "chain" procedure of Turbo Pascal to combine the twelve games. All programs include source.

Morrow Disk M17
Turbo Pascal Games III

If you like Turbo as much as we do and want to see more involved program examples, this is the disk for you.

CRIBBAGE: the time honored card game.

DBLICK-V: a great version of Breakout, even without graphics.

ELIZA: converse with your computer. Everything you need to create it's own perverse personality.

GERMS: two types of germs battle it out in this version of Life.

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Exploring the ROM in Your Morrow

by Ron Jacobs

Have you ever wondered how your Micro Decision could be smart enough to tell you to standby while it tested its memory? Would you like to know what the "ROM" (Read-Only Memory) in your Micro Decision is there for? In this article I'll shed light on these and other facets of how the Micro Decision works.

The information in this article is, to the best of my knowledge, applicable to any MD1, MD2 or MD3. To research this article I explored the operation of an MD2 with a Rev. 1.3 ROM and an MD3 with a Rev. 2.5 ROM. (The hard disk Micro Decisions work differently in some respects from the floppy-only Micro Decisions discussed in this article.)

So you'll know which revision you have: The Rev. 1.3 ROM was used in Micro Decisions with Rev. 1 printed circuit boards (PCB); Rev. 1 printed circuit boards have a drive expansion connector on the back. The Rev. 2.5 ROM was used in Micro Decisions with Rev. 2 printed circuit boards; Rev. 2 printed circuit boards have a Centronics-type printer connector on the back.

Important Notice: In this article Micro Decisions are sometimes divided into two groups, referred to as Rev. 1 PCB and Rev. 2 PCB Micro Decisions. Reference is made to PCB revisions only when there is a difference between them. Information correct only for Rev. 1 PCBs will be followed by information in [square brackets] that is correct for Rev. 2 PCBs.

Note: This article gets somewhat technical. If you get tired of wading through it, you should skip directly to the part in which I tell you to boot your Micro Decision. That's where the fun begins.

First let's discuss the "brains" of the Micro Decision, that is, its Central Processing Unit (CPU). The Micro Decision uses a Zilog Z80 (or equivalent) CPU integrated circuit (chip). The CPU (and the rest of the computer) is useless unless it is instructed precisely what to do in a way that it understands; it has a fixed set of instructions that it will respond to.

Ron Jacobs, who became really enthusiastic about computers when he discovered he could own one, likes to know how things work. He operates Jacobs Computer Services, which specializes in servicing and supporting Morrow products (P.O. Box 415, Pinole, CA 94564, 415/724-2446).

Where does the CPU get these instructions from? When you turn on the power to a Micro Decision, electronic hardware in the machine resets the CPU and several other components in the computer. Resetting the CPU makes it look to memory location 0000 for an instruction, where the ROM (Read-Only Memory) is located. But (I imagine you thinking), when I turn off my computer it loses everything in its memory. Well, that's true of the computer's RAM (Random Access Memory), but not of its ROM. Technically speaking, the RAM is volatile memory, and the ROM is non-volatile; i.e., the ROM retains its memory even with the power off. In fact, the instructions in the Micro Decision ROM can only be changed by exposing the ROM to sufficient ultraviolet light to erase it and then reprogramming it with special hardware. That is why it is called "Read-Only Memory." Software in the ROM is called "firmware," since it stays firmly in place, even after you turn the power off. Each Micro Decision was shipped from the factory with an already-programmed ROM chip installed.

Both the ROM and the RAM contain bytes (groups of 8 bits of information). Each byte has its own address. The contents of a byte can represent anything from characters to numbers. While the bytes in the ROM are "burned on" and cannot be changed by the casual user, the bytes in the RAM are easily changed while the computer is operating. The Z80 CPU can read the contents of any byte of RAM, or it can write a new value to any byte of RAM. When power to the computer is shut off, however, the contents of its RAM are lost. Further, when power is first turned on to the computer, the contents of its RAM are unpredictable.

When you turn on the computer or press Reset, the CPU gets its first instructions from the ROM. The ROM contains instructions to accomplish many "housekeeping" chores. Among these are:

1. Programming other parts of the computer to set up communications with your terminal.

2. Testing the memory in the computer.

3. Transmitting information and instructions to the user via the terminal.

4. Reading into the RAM some of the bootable floppy disk you have inserted into drive A, so that control of the computer can later be transferred to the program read from that disk. Some later ROM revisions automatically boot the floppy disk if it is in the drive.

(continued)

The CBIOS (Customized Basic Input-Output System) is part of the Morrow-supplied operating system called CP/M, vers. 2.2. Unlike the other parts of CP/M, CBIOS was customized by Morrow for the Micro Decision hardware and firmware. CBIOS uses the ROM firmware's instructions to perform some of its tasks, such as disk accessing.

The Z80 CPU in the Micro Decision is capable of addressing 64K bytes of memory. ("K," also referred to as "kilo," is a multiplier of 1,024, since 1K equals 2 to the 10th power.) Because the Z80 has 16 address lines, each of which has two alternatives--it can be either on or off (a "binary" situation)--the Z80 can address a number of bytes equal to 2 to the 16th power, or 64K.

The Micro Decision has 64K of RAM and 2K [4K] of ROM. The first 2K [4K] of RAM has the same address as the first 2K [4K] of ROM. In decimal (base 10) numbers, this address is 0-2047 [0-4095]. In hexidecimal (base 16) numbers, it is 0000h-07FFh [0000h-0FFFh]. (The "h" means that it's a hexidecimal number.) The entire 64K of RAM is addressed (in hexidecimal) as 0000h-FFFFh.

The Micro Decision has a scheme that determines whether the RAM or the ROM will respond when the CPU addresses the first 2K [4K] of memory space. This scheme is called "bank select." The ROM is bank-selected by outputting any value to port F6h. The ROM is deselected by reading from 0F6h. (A port, by the way, is what the Z80 calls addresses when it transfers data to and from the output/input devices. These devices can be outside the computer (terminal, printer) or inside, like the bank select device.)

The figure below is a memory map, showing the overlapping address space for ROM and RAM:

```
1.  0     07ff | 0800 0FFF | 1000...          ...FFFF|
2.  ----RAM------------------------>    RAM-------->|
3.  ----ROM--->|-------------------->    RAM-------->|
4.  ----------ROM--------->|-------->    RAM-------->|
```

The first line gives the address range (with a break between 1000h and FFFFh to allow the graph to fit on the line). The second line shows the RAM bank-selected and covering all of memory (0000h-FFFFh). The third line, for the Rev. 1 PCB, shows the ROM bank-selected and covering the first 2K of address space. The fourth line, for the Rev. 2 PCB, shows the ROM bank-selected and covering the first 4K of address space. When the ROM is bank-selected, the first 2K [4K] of RAM is not accessible by the Z80, but the remainder of the RAM is! Conversely, when the RAM is bank-selected, the first 2K [4K] of ROM is inaccessible to the Z80.

To more thoroughly understand the bank select scheme, you should understand port addressing. A port, as you recall, is the Z80 CPU's gateway to the outside world. The first eight of the Z80's 16 address lines can also be used to address 256 (2 to the eighth power) port addresses. The Z80 CPU can send a signal to the hardware to tell it whether it wants to address a port or RAM (ROM) in any given instance.

Now let's see how the Z80 bank selects between ROM and RAM: To address the ROM, the Z80 first inputs (or reads) from port address F6 hex (F6h). When outputting to port F6h, "any value" means that the Micro Decision hardware doesn't care what byte value the Z80 loads onto its eight data lines during the output. Similarly, when reading from port F6h, the program that instructs the Z80 to read doesn't care what value it reads. Reading from port F6h simply causes the hardware to switch the RAM into the first 2K [4K] of memory space.

Now that you've learned all this, let's have some fun: In effect, you can use software instead of a screwdriver to take your Micro Decision apart. To explore your ROM as I did you will need to use the program DDT.COM or, better yet, SID.COM. SID and DDT are programs able (among other things) to list, in assembly language, instructions such as those found in COM files or in the Micro Decision's ROM. SID can deal with instructions that are within the repertoire of the Z80 CPU, but not within the repertoires of some other CPUs used in CP/M 2.2 computers, like the 8080 and 8085 chips. DDT, on the other hand, can handle all of the 8080/8085s' instructions, but not all the instructions of the Z80 CPU. The Micro Decision's ROM instructions were written for a Z80 CPU. When DDT finds an instruction that is in the instruction set of the Z80 but not in that of the 8080/8085, it will display it as "??." SID, however, will list all of the Z80 instructions.

Another capability of DDT and SID is the display of ASCII characters. (What you are reading now is in ASCII, i.e., letters, digits, punctuation, etc.) The Micro Decision's ROM has, besides machine language instructions, binary codes known as ASCII strings. Here is an example of an ASCII string found on the Rev. 1.3 ROM:

Testing memory -- please stand by:

You can use DDT or SID to reveal this and other secrets of the Micro Decision ROM.

In the following paragraphs I describe a way for you to look at and investigate the programming inside of your Micro Decision's ROM. My procedure is certainly not the only way to go about it, but it works and I won't discuss alternatives in this article. If you work with this long enough and do other reading, you'll understand more about what is happening and other ways to do it. One place to start studying is in the CP/M 2.2 Operating System User Reference Manual. In the CP/M 2.2 manual, read the chapter on the Dynamic Debugging Tool (DDT). (If you

have CP/M Plus, which was distributed with hard disk Micro Decisions, read the Symbolic Instruction Debugger (SID) manual.) I also recommend reading Z80 Assembly Language Programming, by Lance A. Leventhal, published by Osborne/McGraw-Hill.

In the following examples, what you type is underlined, while the computer's responses are not underlined. "<CR>" means hit the Return key.

First boot up your Micro Decision, and then type the lines as shown below. You will actually be entering the instructions of a little program! Do not type the semicolons or the comments that follow them; they are there only to show you what the program does. The instructions you will be entering are in the mnemonics code of the 8080/8085 assembly language; they will work only with DDT, not SID.

```
A>DDT<CR>
DDT VERS. 2.2
-A5000<CR>
5000 OUT F6<CR>          ;Select the ROM
5002 LXI H,1000<CR>      ;Count=max ROM length (4K)
5005 LXI B,0000<CR>      ;Source of ROM code
5008 LXI D,8000<CR>      ;Initial ROM code destination
500B LDAX B<CR>          ;Get a byte of ROM code
500C STAX D<CR>          ;Store a byte of ROM code
500D INX B<CR>           ;Ready to get next byte
500E INX D<CR>           ;Ready to store next byte
500F DCX H<CR>           ;Decrement count of bytes left
5010 MOV A,L<CR>         ;Test if count has reached 0
5011 ORA H<CR>           ;Are H and L both zero?
5012 JNZ 500B<CR>        ;Move next byte if not done
5015 IN F6<CR>           ;Deselect the ROM
5017 RST 07<CR>          ;Return to DDT control
5018 <CR>                ;Leave assembly mode to check
-L5000,5017<CR>          ;  what you've typed
                         ;Check the listing that follows
                         ;  against what you should
                         ;  have entered
-g5000<CR>               ;This will execute your program
*5017                    ;And this is what shows up in
                         ;  the end
```

What has happened is that you have just run a short program that ended by returning control to DDT. The program first bank-selected the ROM so that it could be accessed by the CPU. The program then read all of the ROM bytes and copied them all into the RAM at addresses 8000h-87FFh [8000h-8FFFh]. The reason that you copied the ROM to this location is that in order to run DDT, you need to have the RAM bank-selected. After copying the ROM, the program you ran did just that. You can now use DDT to examine the ROM "image," which is located at 8000h in the RAM.

Let's see if you have succeeded in copying the ROM correctly. Enter either one of the following instructions, depending on what revision PCB you have.

```
-D8620,87EF<CR>          ;For Rev. 1 PCB

-D8E30,8EAF<CR>          ;For Rev. 2 PCB
```

You should be able to read some of the messages that your computer sends to you from time to time, including those that you see when you push Reset. You can start and stop the scrolling by using Control-S.

Notice the minus sign ("-") that always appears. This is DDT's way to prompt you to enter the new command, which is:

```
-L8000<CR>
```

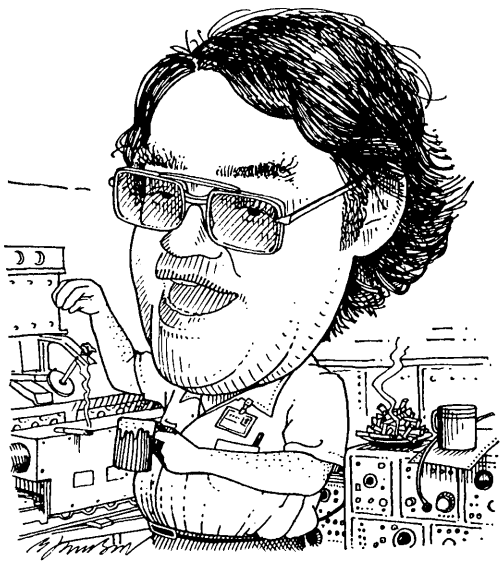
You'll see a series of jump (JMP) instructions, also known as a "jump table." The address at which each jump instruction begins is known as an entry point and is listed in hexidecimal to the left of each jump instruction. The address to jump to, which is listed on the right, is the address at which a particular routine in the ROM begins.

Rev. 1.3 and 2.5 ROMs both have a jump table with nine jumps. The jump at 0000h (which you copied to 8000h) is the first instruction to execute after you turn on the power or push Reset. After this instruction, the Z80 will take its next instruction from the address it was instructed to jump to. The routine at this next address is what initializes the hardware, prints messages on the screen and does some of the other housekeeping chores mentioned.

Others of the nine jump vectors are responsible for more detailed jobs like disk reading and writing and sending messages to the screen. The initial ROM routine (jumped to from 0000h) actually also makes use of some of the other routines in the jump table, using them as sub-routines.

Ten years ago many computer users, after turning on the computer, would have to use switches on the machine's front panel to manually enter instructions into its memory before the computer would do anything at all. This was known as entering a bootstrap routine. The Micro Decision's ROM has the bootstrap routine already inside itself, though, which lets us avoid having to enter that routine via the front panel switches of long ago--and that's a relief! Today we can get the computer going with very little knowledge of how it actually works.

But knowing how the computer works is essential to diagnosing problems and reasoning one's way out of perplexing situations. Understanding the hardware and firmware, as well as the operating system (e.g., CP/M), is a part of this. I know I left a lot unsaid in this article, but the manuals that were supplied with the computer contain large amounts of information. Admittedly, the system is not easy to understand, and there is a whole lot to know. However, if we don't want to be controlled by our environment like leaves blown by the wind, then we must use knowledge to remain in charge of our lives. Anyway, have fun with your computer! ■



TOOLS FOR TYROS

by Mike Allen

Well, guys, here I am again. In this column, I shall try to describe exactly what you got when you purchased your MD.

What you probably got were two cardboard boxes, one larger than the other. In the larger of the two boxes was something that looked like a TV set without knobs and half a typewriter--the keyboard half. There were also several cables and an instruction book. You have probably identified the contents of this box as your "terminal."

The smaller of the two boxes contained a beige and gray metal box with one or two slots and a push-button on the front and several connectors and a switch on the back. This was your Morrow Micro Decision computer. You also found a bunch of books, some diskettes and a power cord.

To understand what you really got, let's consider what actually makes up a computer system. There are three components to a computer system: the computer itself, the peripherals and the software.

The computer consists of a central processing unit (CPU), some control circuitry, working memory and input/output (I/O) circuitry. The function of the CPU is to get its instructions from the working memory, perform some function on information that it got from the memory and/or the I/O channels, and then send the results to the memory and/or the I/O. The instructions that the CPU is acting upon are called a program. When the computer is using those instructions it is called "running a program."

Peripherals are those devices that are on the other end of the I/O channels. The most obvious peripheral is the terminal. Information that the program decides should go to you is sent to the terminal, where it is displayed for you to read. When the program needs information or instructions from you, it gets them from the keyboard part of the terminal where you have typed them in.

Another important, but not so obvious, peripheral is the mass storage device. ("What the hell does that mean!" echoes through readerdom) One of the problems that computer systems have is that the memory within the computer (well, most of it; I'll get to that later) suffers severe amnesia when the computer is turned off. We need to be able to store those programs and data that we will need at future dates in some manner that does not require power.

In the early days punched paper tape was used for this purpose. It worked, but it was slow (and noisy) to read into and punch out of the computer. Once a tape was punched, it could not be modified--a new tape had to be punched. If you were doing something like keeping payroll data, you could go through a lot of paper tape. The next step was magnetic tape. The big computers used special tape and tape drives that were designed just for that purpose. They were expensive. The home computer market started to use regular audio cassette tapes. The best that could be said for them is that they were better than paper tape. The real revolution for home computers came with the coming of inexpensive floppy disk drives.

Why do they call it a floppy disk? If you take a diskette and wave it around it doesn't flop. That is because what you have is a floppy disk inside a protective sleeve. If you were to open this sleeve (don't, if you want to use that diskette again!) you would find what looks like a disk of the same material that they make audio recording tape from. It sure will flop. It works much the same way that audio tape works.

If you look at a diskette, you will notice a long slot on both the front and back where the actual disk is exposed. There is a large hole in the center. This large hole is engaged by a motor inside your disk drive and the entire disk spins (at 300 rpm) inside its protective envelope. A recording/playback head inside the disk drive is placed in contact with the disk through the slots previously mentioned. If you have a double-sided drive (MD3s and up) there are two heads, one for each side of the disk. I'll get into how the information is actually stored on the disks in a future column.

Those of you lucky enough to own an MD5 or up also have a hard disk drive. Hard drives have been around longer than floppies. Until the last few years they were just too expensive for the home computer market. They are much like a floppy disk except that they hold much more information and can get that information much faster. Rather than use a magnetic tape material, hard disks are made of metal that has magnetic material on it. Sometimes there is more than one disk driven by the same motor. The disk spins at about 3,600 rpm.

Another peripheral that most of us have is a printer. It's kind of like the half of the typewriter that was left out of the terminal box. You can do many things with a computer without a printer, but the machine is so much more useful if you can put something on paper. This process is sometimes called "getting a hard copy."

The final common peripheral is a modem. Modem stands for MOdulator/DEModulator. All it really does is allow our computer to exchange information with another computer by way of the telephone. You cannot just connect a modem to your computer and the phone line and have it start working. There is much more to be done and that, too, is a subject for a future column.

Now we come to the software. What we have talked about so far is all hardware. It is called that because it is physical. You can really get your hands on a disk drive or a CPU. You can hurt your hand if you try to punch out your MD when you are mad at it. Morrow makes hard machines!

Software, on the other hand, does not exist except as some small magnetic fields on your disks. Software is the set of instructions that makes your machine do what you want it to. There are two kinds of software: the operating system and application programs.

If you remember, I mentioned that most of the memory in a computer forgot everything when power was removed. There is an exception. There is a small chunk of memory called a Read-Only Memory (ROM) that never forgets. It never changes its mind either. There is a little program in the ROM. When you first turn on your MD, the MD will start to run this program. The program sets up the MD so that it can talk to its peripherals, checks to make sure that the rest of the memory is OK and then tries to get the operating system from a disk drive. If it can't get the operating system, it tells you so that you can take the appropriate action, like putting a disk in one of the drives. This process is called "booting," since the computer is trying to pull itself up by its own boot straps. Without the operating system, you will be unable to proceed and use your computer.

Well, what is this operating system? An operating system is a program that allows all the components of a computer system to work together in a coordinated manner. An operating system is like an office manager who gets accounting to talk to sales, to talk to marketing, to talk to manufacturing, ad infinitum, ad nauseam.

The operating system that our MDs use is called CP/M, which stands for Control Program for Microprocessors. It was written by Digital Research. If you have an MD3 or lower, you should have version 2.2. The hard disk MDs use version 3.0. CP/M does many things, but for now let's just consider its function of executing commands that you give the computer from the terminal.

There are several commands that CP/M recognizes immediately, since they reside within CP/M. These are called resident commands. They are ERA, DIR, REN, SAVE, TYPE and USER. They all have to do with information stored on a disk. ERAse will erase information from a disk. DIRectory will tell you what information is stored on a disk. REName changes the name under which information is stored on the disk. TYPE will try to display information stored on the disk on the terminal. USER is a command that I'll explain at a later date.

If you give CP/M a command that it does not recognize as a resident command, it will then look for that command stored on a disk. If it finds the command on the disk, it will transfer the command program into memory and execute it. Since the command is only in memory when it is required, it is called a transient command. Application programs are transient commands.

Application programs are the reason you really bought your MD. These are the programs that turn your MD into a word processor or a speadsheet calculator or a database manager. They really are the bottom line when it comes to what you can do with your machine.

Well, I've rambled on enough for now. In the next issue we'll take a harder look at memory, I/O and CP/M. (See, you've already learned some of the jargon!)

PROJECT OF THE BIMONTH: One of the transient commands that is supplied with CP/M is STAT, for STATistics. Go to the utilities section of your CO-PILOT Menu and then select the option for executing CP/M commands. Try the following one at a time:

```
STAT<cr>
STAT A:<cr>
STAT *.*<cr>
STAT *.* $S<cr>
STAT DSK:<cr>
STAT DEV:<cr>
STAT VAL:<cr>
```

Note: <cr> means "press return."

If you are curious about what you see, look up the STAT command in your CP/M user reference manual. Hint to Lessen Confusion: Morrow does not use the IOBYTE.

Connecting a Portable to Your MD

by R. O. Marwin

In his "Chaos Manor" column in Byte magazine, Jerry Pournelle has mentioned writing on his NEC PC-8201A while on trips and then uploading the files into his home computer for editing and printing. Since I have one of the NEC portables as well as the Morrow MD3, I thought I would give it a try.

My MD3 came bundled with the MP100 daisy-wheel printer; but as you know, it is quite slow for such tasks as listing a long program, so I added a dot-matrix printer to connect to the RS-232 serial port. Changing between printers is simply a matter of using SETUP. I wanted to use this port to connect to the portable computer for transferring files without losing the use of the port for the serial printer. The instructions for changing jumpers inside the computer to configure the serial port for a modem are in the Micro Decision User's Guide appendices. As delivered from the factory, the jumpers are configured for a printer. However, it seemed impractical to open the case every time I wanted to change from printer to computer interface. By studying the information provided, I determined that only one signal needed by the portable (or modem) was missing, which could be provided by adding one more jumper plug. (See Figure 1.)

After removing the cover from the MD3 I found there were no extra jumper plugs, so I went to a local computer store with one from the computer as a sample and found a set of six of them for less than $1. After replacing the sample one I had removed to its original location, I added one more on JPB from pin 22 (5B) to 23 (4B). That's the blank spot right in the middle of the ones that are there. See your Micro Decision User's Guide, Appendix D, beginning on page 92, for a description of this operation. Then I replaced the cover and reconnected the system. Just to make sure this would have no effect on the printer, I tried it and it operated normally. Now it is a simple matter of moving the plug from the printer to the portable to make data transfers, and back again to use the printer. If you do not have an RS-232 cable, Radio Shack sells them for less than $30. Get the pin-to-pin type with male connectors on both ends, not the null modem cable that has pins 2 and 3 crossed.

The rest of the operation is entirely software and it took some experimenting to find the right combination to get it to work. It primarily involves the use of the resident TELCOM program in the portable and the PIP (Peripheral Interface Program) function of the CP/M operating system of the Morrow.

First, TELCOM has to be set to provide the format that Morrow will accept. Perform the following steps:

a. Turn on the portable and select the TELCOM program.

b. Press the f-4 button to select STAT.

c. Enter: **5I81XS<CR>**. This will select the following parameters:

C = 1200 bps
P = Ignore parity bit
B = 8 bit word length
S = 1 stop bit
X = Control according to X parameter
S = Control according to shift in/out param.

This will become the default setting for the portable unless changed at another time.

Next it is necessary to set up the Morrow to accept data. For my own personal needs, I put my WordStar program disk, including PIP.COM and SETUP.COM, into drive A and a formatted file disk to receive files from the portable in drive B. If you use the AUTO program to bring up WordStar, return to the system by pressing **X** to get the A>. Now type **SETUP<CR>** to check the current printer assignment. Make sure "B" selects RS-232 Serial, then select it and press **E** to make a temporary change. Then **ESC** to return to the A>. You are now ready to transfer a file.

With the RS-232 ports of the two computers connected together, on the portable select the TELCOM program and press the f-5 key to select "Term" (Terminal). Now press the f-4 key to select "Up" (Upload the portable file to the Morrow). When the portable asks "File to Upload?" type in your file name but do not press <CR> yet. Now on the Morrow following the A>, type:

A>PIP B:FILENAME.DO=RDR:<CR>

This will cause the Morrow to momentarily access the B drive while it creates a temporary file. Wait for it to do this. The cursor will move down to the next line on the monitor when it's ready. When it does, press the return on the portable and the "Up" will go

---

Richard Marwin is an electrical engineer for Lockheed, where he works with digital electronics. With computers, though, he says, "I'm as much of a beginner as most other people."

to reverse video while the file is being uploaded. Again, wait for it. When the "Up" returns to normal video, the file has been transferred to the Morrow's memory--but there's one more thing to do. On the portable type **Control-Z.** This will tell the Morrow that the transfer is complete (end of file), and you will notice it load the file into the B drive and the A> will reappear.

Now for the proof of the pudding. Type **WS<CR>** to get into WordStar. Then type **LB<CR>** to log onto the B drive. If you now look at the directory, you should find your FILENAME.DO ready to be edited. If all is well, press "D" to open a file and call for your FILENAME.DO. What appears on the screen is surprising, since the data will run off the right side of the screen. To see it normally, you will have to set your desired margins and reformat your file by typing:

^QQ^B

Now that the file is in WordStar, you would think that you can do with it as you like and it will print the way you see it, or that you could use Correct-It to check spelling. Yes, all this is true except for one more little hitch. When the portable sends carriage returns at the end of paragraphs, they do not contain line feeds. So, although it looks fine on the screen, if you print it now, you will get overprints on the first line of every paragraph. To fix this, simply add another return in WordStar at the end of every paragraph so that on the screen there is a space between them. On the printer this space will not appear, and you also won't get those overprints.

As an added bonus, it is also possible to use this setup to transfer files from the portable to the monitor only, if you just want to review them. To do this, follow the former instructions except use the following PIP command:

A>PIP CON:=RDR:<CR>

It is also possible to transfer files from the Morrow to the portable as follows:

A>PIP PUN:FILENAME.DO=B:FILENAME.(whatever)<CR>

Of course, to do this the portable must first be set to receive the file. Use TELCOM and Term and press f-5 (Down). When the portable asks "File to Download:" type in the name you want it called with the .DO extension; and in this case press return immediately. The "Down" will go to reverse video, and it will wait patiently for the data until you use the above PIP command. When the download is complete, on the portable press Shift f-5 ("Bye"). It is interesting to watch the screen on the portable during the download because it displays the file as it is received.

I strongly recommend reading the CP/M 2.2 Operating System User Reference Manual that came with your computer in the section on PIP beginning on page 17, paragraph 1.6.4. It will give you the definitions for PUN (punch) and RDR (reader), not to mention several interesting parameters that can be used with the PIP command.

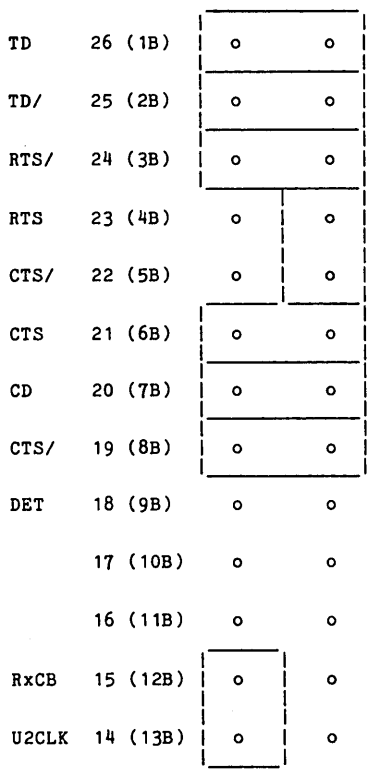


Figure 1: Factory Jumper Settings for JPB. (reproduced from Micro Decision User's Guide, p. 98)

Although these instructions are specific to the Morrow MD3 and the NEC PC-8201A, I suspect that with minor modifications they could also apply to the Radio Shack Model 100 and the Olivetti M-10, since all three are similar and are made by Kyocera.

I am told that using one of the public domain modem programs is simpler than using PIP, but I do not have either a modem or any of the public domain programs so I am not qualified to comment on this aspect. Those of you who do may find it interesting to experiment with them. For me, the use of PIP seems simple enough.

Since making this change to my system, I have found it very handy to write a letter on the portable while the MD3 is busy printing something on that deadly slow MP100 printer, and then uploading the letter for editing and final printing. Works great for me.

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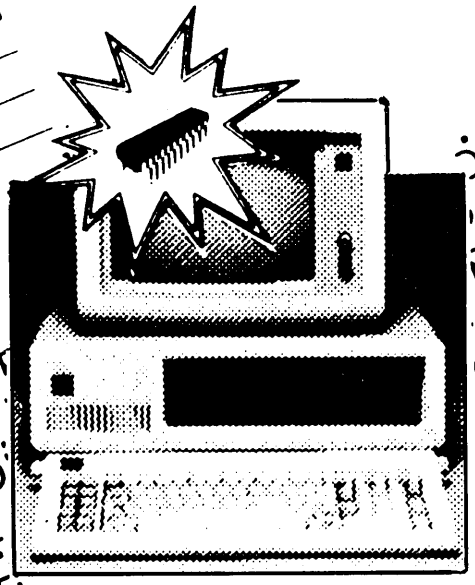

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About Printer Buffers & Speed

by Sypko Andreae

After a frustrating wait for your computer to unload a WordStar file into the printer, you must have wished for a solution to this annoyance. One option would be to install the WordStar internal printer driver (see MOR Vol. 1, #2, p. 19, and Vol. 1, #4, p. 33), which allows you to edit a file other than the file currently being printed. Or, you could use a program like ShadowPrint (MOR Vol. 2, #4, p. 49, and Vol. 2, #5, p. 19), which runs "in the background" while WordStar runs in the "foreground"; i.e., ShadowPrint manages a print spooler, which allows you to empty a WordStar output file into another (invisible spooling) file from which the printer is fed piecemeal, thus freeing WordStar to do other things.

But the easiest, smoothest--and most expensive--way to solve the problem is by using a printer buffer. A printer buffer is basically a chunk of memory placed between the output port of the computer and the printer (MOR Vol. 1, #5, p. 45). The MicroBuffer in the cover photo is such a device, and it has 64KB of capacity, good for more than 20 pages--or a full hour of printing with an MP200.

If you use the serial port and a serial printer, you have to choose baud rates on both the input and output sides of the printer buffer. For instance, you could set the baud rate of your serial port to 19,200 and match that setting on the input of the buffer. The baud rates of the buffer output and printer input also must be matched, perhaps at 2,400 baud.

You would think that at 19,200 baud WordStar would be emptied in no time, free for the next task. But, alas, it doesn't work that way. The new bottleneck is now WordStar itself. No matter how high you set the baud rate on the printer serial port of your computer, WordStar won't be able to get rid of more than about 3,000 bits per second (bps), which is roughly equivalent to the synchronous transfer of bytes at 3,000 baud.

Why is WordStar so slow? Well, it's doing a lot of formatting on the fly, and with a 4 MHz computer that's all the "throughput" you get from WordStar. I measured some other transfer speeds and came up with the following (give or take 10 percent, depending on file properties): NewWord, 7,000 bps; PIP, 14,000 bps (LST device); SuperCalc, 15,000 bps (hurrah!).

Now, if you have an MD3 (without Dave Grothe's modification, page 17) don't feel bad about having no more than 9,600 baud available on your serial port. It will make no difference to WordStar or NewWord which, as it turns out, are the real bottlenecks.

Tales of Power

by Sypko Andreae

Have you ever stopped to think about power issues related to your personal computer? Have you noticed an increase in your electricity bill, and are you blaming your computer and its peripherals? You may be partially right. But let's take a closer look at how much power is really consumed by all the equipment that changed your life and, to a certain extent, your utility bill.

Just like many household appliances, the power consumption of your computer equipment is not entirely constant; it depends on what the equipment does or what state it is in. When a washing machine starts up, for the first fraction of a second it consumes a current that can be five to 10 times higher than it will use in its steady state, where it just hums along. Especially in houses with old wiring, you may notice the lights dim for a moment during the washer's power surge.

This surging also occurs when your disk drive starts up or your printer starts running, but these surges are by far not so significant as the washer's. What is more important is the state the equipment ends up in. A printer will consume 50-100 percent more power when it actually prints compared to when it just sits there with the power on.

An MD3 all by itself consumes no more power than a weak (40 watt) lightbulb, but if one of the disk drives spin, the MD takes an additional 20 watts. Of course, your MD3 isn't much use without a terminal, and an MT70 with the power on consumes another 55 watts. Still, that's not too bad, don't you think? If you total up the items in the table below that apply to your system, you'll know what your computer's contribution to your utility bill is.

Equipment	Quiet	Floppy On	Printing
MD3	40 W	60 W	
MD11	80 W	100 W	
MT70	55 W		
MP200	60 W		80 W
OKI92	55 W		100 W
MicroBuffer	15 W		
Hayes Modem	25 W		

After I took the trouble to measure these devices, I felt a lot better knowing the power consumed was only in a league with lightbulbs. I hope you feel better, too.

UPCOMING THEMES

The contents noted here are not articles already written--they are suggestions we hope you will take as inspiration to write. Of course, material of general interest is also always welcome.

AUG/SEP86 **Repairs and Maintenance**
A vital concern for Morrow owners nowadays. Where do you go for repairs? Where do you get spare parts? How to do simple repairs and maintenance yourself. How to make good use of the MOR Manuals. How to deal with consultants.

OCT/NOV86 **Educational Software**
Programming languages to write your own, instructional programs for toddlers to techies, the role of computers in education.... If you know about them, write about them. Know of any good CP/M educational software you'd like to review?

DEC/JAN87 **Desktop Publishing and Graphics**
With the arrival of more reasonably priced laser printers and new software, desktop publishing for CP/M machines is becoming a reality. The graphics capability of our Morrow terminals is negligable, but graphics software for printers is great. What programs are you familiar with? How are you using desktop publishing?

FEB/MAR87 **Programming Languages**
Perhaps you want to try a little programming of your own? But what "language" to use? What is a programming language, for that matter? Which ones are available for CP/M? Tips on using MBASIC, PILOT, Turbo Pascal, not to mention the C compiler in its many versions. Is Fortran a viable idea? What about assembly language?

ALL WRITERS NOTE: If you are interested in writing for MOR, submit a proposal of one to two paragraphs, indicating how you will approach your topic and your related experience.

If you are interested in reviewing software, indicate the need or concept addressed by the program and how you will approach assessing whether the program meets that objective. If available, please include a sample of your (published or unpublished) writing. Direct your correspondence about articles Attn: Managing Editor. Published ms. of 1,000-word minimum earn the author a one-year subscription to MOR. For all submissions, please follow the **Writers' Guidelines on page 1.**

EVERYONE is most welcome to contribute programs to the Floppy of the BiMonth (FLOB) for all these issues. One cannot live by the printed word alone! Send Attn: Editor.

REVIEWS

HARDWARE REVIEW

PRODUCT: **Bondwell 2**

MANUFACTURER: Bondwell Industrial Co., Inc.
3300 Seldon Court
Units 10/11
Fremont, CA 94539
415/490-4300

PRICE: $995

by Timothy Perrin

Some months ago, as I struggled to complete a writing assignment in a hotel room using my NEC PC8201, I made myself a promise: My next computer would be the only one I needed for both office and on-the-road use. I think I may have found the right one in the Bondwell 2, a compact lap-portable computer that seems to fill the bill.

I had been using the NEC as my portable machine for a year and a half, and, although a good stopgap machine, it had definite problems: The screen was just too small (40 columns by 8 lines); file storage was tiny (64K in my machine); word processing was primitive; and there was no modem until I installed one myself.

Other lap-portables that had hit the market all came with disqualifying shortcomings. The Data General 1 and its ilk, besides being expensive, run MS-DOS, which means I would have had to duplicate my entire software library in two operating systems (my main machines at home and in my office both run CP/M). The Epson Geneva, while a CP/M machine, has no disk drive, an 8-line screen and, by the time you add a modem and an adequate RAMdisk, is expensive. Its software comes on chips, meaning that Epson has the market cornered and the price inflated. Also, you can't patch software on a chip, and I like lots of patches in my software.

Last spring, a friend returning from the Japanese Comdex showed me a brochure for the Bondwell 2, a lap-portable computer he had seen in Tokyo. Made by a Hong Kong company, the Bondwell seemed to be the answer to my prayers. It runs CP/M, has a real disk drive (3.5 inches) and a full-sized liquid crystal display (LCD) screen, 80 columns by 25 lines. By Comdex Fall in Las Vegas last November, Bondwell had expanded their market to North America, and I finally got to see a Bondwell. I bought one on the spot.

The basic Bondwell has a single disk drive built into the side of the machine and comes with WordStar, CalcStar, DataStar, ReportStar and a scheduler. Options include a 256/512K RAMdisk, a 30-baud modem and a second, external disk drive.

The Operating System

The Bondwell's operating system seems to be a standard implementation of CP/M. So far, all the software I have moved over and tried has run fine, including SmartKey and Write-Hand-Man, both of which load in high memory and fool around with memory vectors. I've even managed to patch the commercial telecommunications program "ReachOut" to operate on the Bondwell. Installing software from other CP/M computers is fairly easy because Bondwell has included a fairly comprehensive list of screen control codes and I/O ports in the documentation.

My only complaint, and a fairly technical one it is, is that the IOBYTE is fairly limited. CON is limited to the keyboard and screen, RDR and PUN to the serial port. LST can be assigned to either the serial or parallel port, however. Changes there will have to wait for some industrious assembly language programmer to write new drivers for the BIOS. [For an explanation of what the IOBYTE does, see the CP/M manual. The IOBYTE is not implemented in Micro Decisions, but in most other CP/M machines it is. --Ed.]

The CP/M disk, in addition to having a program for copying files on a single-drive machine, has the standard CP/M utilities (ED, DDT, STAT, etc.) and several telecommunications programs. Two of these telecommunications programs are useful only if transferring files to another Bondwell computer (they make an entire line of CP/M and MS-DOS systems). Another controls the optional 300-baud modem you can install in the computer. There is also a copy of good ol' Modem 7 communication program, modified for the Bondwell.

The SETUP program lets you reconfigure the serial port for synchronous or asynchronous communication at speeds from 75 to 19,200 baud. It also lets you load up to 16 keystrokes into each of the 16 function keys on the Bondwell. These options can then be stored in an executable .COM file or in a special .KEY file. The key files are used by a special AUTORUN program

---

Tim Perrin is a free-lance writer based in Vancouver, Canada. He uses a Morrow MD3 in his office, an Osborne 1 at home and a Bondwell 2 in between. In addition to writing about computers and new technology for several magazines, he also produces what he hopes are among the better manuals for computers and printers.

that autoboots on each disk, then lists the program files. When you specify which one to run, if it has an associated .KEY file, it will let you load it.

Software Bundle

The applications software that comes with the Bondwell is all made by MicroPro International Corp.: WordStar (Vers. 3.30), DataStar, CalcStar and ReportStar all seem to run as they should and are patchable. So far, I have improved the screen display of the WordStar and patched it for print spooling when printing (see MOR Vol. 1, #2, June 1984, p. 19, and MOR Vol. 1, #4, Oct. 1984, p. 33), both with no problems.

Due to the slower clock speed of a CMOS CPU (2 MHz vs. the 4 MHz in most CP/M machines), some of the software seems to run a bit slow. Spreadsheet recalculation can take a moment, but I didn't find the delay intolerable, by any means.

The Hardware

The Bondwell 2 packs a lot into a 12-pound package. The main computer has one 3.5-inch disk drive, an 80-column by 25-line LCD display and a full keyboard.

The disk drive uses normal 3.5-inch disks, the same kind as used on the Macintosh and several other machines. After years of careful handling of 8-inch and 5.25-inch floppies, the 3.5-inch disks are a joy. Their hard plastic shells make them a lot easier to deal with, and a metal slide that protects the disk surface means that you don't have to be as fastidious around your disks. When formatted, they hold 360K of data. Minimum file size is 2K.

The LCD screen suffers from the weakness of all LCD screens: It's hard to read in poor light. However, in good light, it's quite adequate and offers something few CP/M machines do, bit-addressable graphics. Unfortunately, there's nothing in the

The Bondwell 2: A Mixed Blessing

by Dan Drasin

When I got my Bondwell 2 about five months ago, I immediately retired my aging Kaypro. The Bondwell serves me as well, runs lots of generic CP/M and even some Kaypro-specific software, and is a true "portable." But mine has its share of design flaws and defects, some curable, some not. For example:

The Bondwell's biggest headache is its charging arrangement. More than 12 hours on charge will damage the "gel-cell" battery. There's no way to simply keep it plugged in for desktop use--you must run it on the battery until the "power" light starts blinking, then save your work to disk, make a note of the time, plug in the charger (which crashes the system), then reboot from scratch to continue your work while the system charges. Twelve hours later (usually the next morning) you unplug the charger. Cure: I installed a switch to cut out the battery once it's fully charged, and a "make-before-break" power input jack system (a standard Switchcraft audio mini-plug and jack).

For portable use around town, battery life is adequate (about six hours), but on the run you may be out of luck. You can't replace the rechargeables with throwaway dry cells; instead you connect an external battery pack.

The 80-character by 25-line liquid crystal display (LCD) is legible enough, and its flexible hinge is brilliantly designed. But the screen demands a lot of overhead illumination--which tends to wash out the blinking "low-battery" power warning light. This could lead to disaster if you've forgotten to save your text to disk. The frosted "non-glare" screen cover simply spreads out the glare, further reducing display contrast. Cure: I've replaced mine with clear plexiglas.

The keyboard has a good feel but takes a bit of getting used to. It's a nonstandard arrangement, similar to that on the NEC PC-8201 portable, and some old manual typewriters. Many of the punctuation symbols seem to be in the wrong place, if you're accustomed to the standard "Selectric" arrangement found on most CP/M computers and portables such as the Tandy Model 100. The excellent cursor cluster is similar to the NEC's--a logical "star" arrangement. On the other hand, I find the carriage return key much too small. Several keys (caps lock and a few function keys) have been unreliable since day one--and haven't improved with use.

The printer cable that came with my unit was short, stiff, heavy and poorly made. Several of the internal wires were cut almost clean through (due to sloppy cable stripping), and the cable failed within a few days. Cure: I replaced the stock cable with a homemade ribbon cable.

The communications cable was wired to mate with another computer, not (as is normally the case) a

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manual about how to use them. (Bit addressable or bit-mappable graphics are a feature that enables you--with the appropriate software--to generate displays far more sophisticated than our Morrow (character-oriented) terminals are capable of.)

The poor character quality on the screen can probably be remedied by an electroluminescent screen upgrade available from the Axonics Corporation, 417 Wakara Way, Salt Lake City, UT 84108 ($300, includes shipping).

The keyboard is very similar to the Radio Shack Model 100 and NEC 8201 keyboards. The keycaps and layout are largely the same, and the feel is just as good. Its major failing is the inability to access several control characters from the keyboard: "^\," "^]," "^^" and "^_." Normally this would not be a problem, but several good programs, notably WRITE, do use them. They can be programmed into the function keys, however, which is an adequate fix.

There are three plugs to the outside world on the back of the computer. The RS-232 serial port and Centronics parallel port both use unusual plugs and interesting pin-outs. However, the manual details which signal goes on which line, so making up cables is not impossible. Of course, Bondwell offers cables as well. The third plug is for an optional external disk drive.

Power comes from an internal lead-acid battery that takes about 12 hours to recharge and is supposed to provide about eight hours operating time (though my experience shows it to be shorter). There is no battery compartment, and you cannot put in conventional batteries. When the battery begins to get low, the red power light begins to flash, and you either have to plug in the power supply (13.8 volts, 1.3 amps) or shut down.

Options

The Bondwell 2 has several available options, some of which slide into a slot on the bottom of the machine.

modem. Even so, it was mis-wired. Cure: I corrected the wiring and installed a small switch in the DB-25 connector shell to cross lines 2 and 3 for use with a modem.

Speaking of communications, the Bondwell's screen keeps up nicely with a 1200-baud modem, but at 2400 baud it randomly shifts some lines to the left, losing the first character.

The original MODEM.COM software for the optional 300-baud modem module, and MODEM7.COM for an external modem, were both unmitigated disasters. The latter wouldn't download ASCII textfiles, and the former seemed to be designed only for communication with another Bondwell 2. Cure: John Bek's CBBS, an electronic bulletin board in Los Angeles, at 818/788-1093 (business hours only, please). His new BWMODEM.COM works well with an external modem, and BWIII.COM handles the Bondwell modem module fairly well. Incredibly, the Bondwell's keyboard will not generate a Control-^ (control-caret) command, essential to the functioning of both programs. Cure: I programmed a function key to generate the Control-^ command.

The 300-baud modem module itself is rather tricky to operate, even with the proper software. Cure: I use an external modem and use the empty module housing as a perfect disk-storage drawer.

The optional RAMdisk module does work well but lacks any sort of battery backup. This means it must be specially programmed and software copied into it, etc., before each use; and any files written to it must be saved to floppy disk before shutdown. Unless you've installed a battery switch and special power jack (see above), a "low battery" warning means an elaborate save-shutdown-plug in-bootup-reprogram-copy routine before you can continue with your work. Cure: I never use the RAMdisk.

The external microfloppy "B" drive is flawless--but its cable is quite thick and stiff, and its metal housing has no rubber feet. Thus, it won't stay put on a smooth surface, and the plug is always in danger of working loose. Cure: I added some self-adhesive rubber feet and installed a ribbon cable. It was quite a job changing the cable, but it was also more than worth the effort.

Bondwell also offers an external 5.25-inch drive that reads and writes Kaypro, Osborne and Bondwell single-sided formats, and several Bondwell double-sided formats. Unfortunately, there's currently no program for reading and writing Morrow formats. I've used the unit to PIP a whole library of Kaypro disks over to the Bondwell 2, saving hours of file-transfer time. Unfortunately, the drive uses a special (and somewhat buggy) version of CP/M that can't be used for normal operation and that won't necessarily format "alien" disks properly. For example, it tried to put 80 tracks onto a single-sided (40-track) Kaypro disk, which didn't do the drive mechanism any good.

Last but least (sic), my unit seems to be the only computer in town with no "bell" or "beeper" (normally activated by an incoming Control-G or various software functions). No big deal.

The bottom line: The Bondwell 2 with its optional external microfloppy drive makes a fine, cost-effective, full-function CP/M "desktop portable," if you're willing to put up with (or fix) some of its glaring annoyances. ■

A 256K RAMdisk is one of those. When it is installed, the computer automatically recognizes that it's there and boots the operating system from a ROM chip on the RAMdisk or from a floppy, as you wish. The RAMdisk is also expandable to 512K by the addition of eight chips and a little soldering. It looks to be a fairly straightforward job for the technically minded, although I must confess that I haven't had a chance to give it a try yet.

A 300-baud modem can also plug into that same slot (meaning that you have to chose between a modem or the RAMdisk). It has autodialing software with it but will also run off of other telecommunications packages such as MDM7 and commercial packages. (You can also hook an external modem to the Bondwell's serial port, but you will need a special cable.)

The machine also supports an external 3.5-inch disk drive. When plugged in, the computer automatically recognizes that it is there and designates it drive B. (The RAMdisk is normally drive A when it is plugged in and the internal drive becomes drive C. With no RAMdisk plugged in, the internal drive is designated drive A.)

Documentation

Bondwell's documentation is sparse but adequate. That's not to say that you don't get lots, but most of it consists of standard CP/M manuals from Digital Research and the MicroPro manuals for the software. The user's manual for the computer itself is a slim 110 pages but includes fairly complete information to help you get started. It covers unpacking and setup, the basics of CP/M (file names, wild cards, etc.), how to connect peripherals and the operation of the SETUP program. There are appendices outlining how to recharge the battery, screen control codes, CP/M logical-physical device assignments, I/O port addresses, memory maps, a trouble-shooting chart and specifications.

Conclusion

The Bondwell 2 is a practical, cost-effective alternative to both inadequate lap-portables and bulky "transportables." A basic system lists at $995, while adding all the options (RAMdisk, modem, external drives, special cables, carrying case) adds another $800. The software bundle is adequate but nothing that will knock your socks off. The CP/M operating system, which undoubtedly puts some people off, is a bonus. With a RAMdisk, CP/M is everything MS-DOS claims to be. It's a proven system with an incredible array of available software. While not as sexy (to some) as the IBM-compatible, gimmick-ridden products available, CP/M products do get the job done, at a price the rest of us can afford. ■

HARDWARE REVIEW

PRODUCT: **Z-171**

MANUFACTURER: Zenith Distribution Corp.
800 Mariposa Street
San Francisco, CA 94107
415/621-8545

PRICE: $2,399 for two 360K DS/DD 5-1/4 inch drives, 256K RAM (expandable to 1 MB), AC adapter/charger and MS-DOS.
Optional battery pack: $69.
Optional internal 1200/300 baud modem: $379.

by Bill Steele

The Morrow Pivot II is alive and well and living under an assumed name, as the Zenith Z-171 Portable. The version being marketed by Zenith is said to be essentially the same as the Pivot II, although Zenith claims to have made some improvements inside. Since we haven't been able to get a Pivot to review, I jumped at the chance to play with a Z-171.

The name "laptop" is something of a misnomer for this machine, not because of its weight--a tolerable 14 lbs.--but its shape. Closed, it stands 9.5-inches high, 13-inches wide and 6.6-inches deep, about the size and weight of a TV cable converter box. The front folds down to become the keyboard. In this position the "footprint" is about 13-inches wide by 14-inches deep. Since the weight is still in the vertical part of the box, trying to balance it on your knees will result in its falling over backwards onto the floor. Carrying it with the detachable shoulder strap (there's no handle) is about like carrying a heavy camera case; if I were going to do it a lot, I'd invest in a foam shoulder pad. A foam-lined nylon case is available, adding about two pounds.

The disk drives are mounted vertically in the right side of the case. The manual warns that you shouldn't remove a disk when the red LED disk access light is on, but you can't see the light from in front. It's also a bit difficult to push disks into the spring-loaded drives while sitting in front of the machine. The drives are quiet; in a normal office I usually couldn't hear them.

A small door on the left side of the case covers the on-off switch, screen brightness control, AC adapter socket and battery compartment. With frequent disk access, you can run about two hours on a charge; and the battery automatically charges while running on AC. The manual warns against switching between battery and AC without turning off the computer. At the rear are a serial and a parallel port (both with DB25 connectors), a modular phone plug, a composite video output for an external monochrome monitor and an RGB output for a color monitor. Neither the color nor the monochrome output works without an optional color video card, and the phone plug is useless without the internal modem.

The screen is a full 25-line by 80-character liquid crystal display (LCD) with electroluminescent backlighting, showing dark gray letters on a bright field. I'm told Zenith uses a different screen from Morrow, and my first reaction was "Good for Morrow!" because I didn't like the Z-171 screen's pale turquoise color, which at first reminded me of an oscilloscope. After a while it grew on me, though, and I started thinking of it as "sky blue." Room light doesn't wash it out; it was easy to read on a desktop six feet from a window on a sunny day. I found rewriting on the screen to be a tad slower than on my MD, probably a characteristic of the LCD display.

The keyboard is full-sized, but condensed: Many keys perform two or three functions, selected variously by holding the "Left Shift," "Right Shift," "Ctrl" and "Alt" keys. This gets confusing, and the Right Shift is a bit awkward to reach. The block of keys below 7-8-9 serve as a numeric keypad activated by the "Num Lock" key. The numbers, like some other alternate functions, are printed in very small characters on the corners of the keys. A bit too small for fast data entry, perhaps. Several special keys are located at the bottom of the keyboard, on either side of the space bar; when touch typing, my fingers found the shift keys in the expected places, but whenever I felt those extra keys below them I got confused. All this makes for a lot of hunt and peck when doing anything other than typing text. The keys have as good a feel as any standard computer keyboard I've used.

Above the regular keyboard are function keys F1-F10, close enough to the screen to be labeled by software on the status line, and four "icon" keys, all on a membrane keyboard which requires a firm push, making them a bit slower than "real" keys. Plastic templates designed for the IBM keyboard won't fit, of course.

The icon keys are for moving around in the built-in ROM software. When you turn on the machine, the screen displays a world map, a calendar for the current month and the time. Using the function keys, you can cycle the clock to any time zone in the world, with the map showing where you are. This is one of those flashy features that really isn't good for much; I'd rather they'd used the space for a more versatile calendar. You can cycle the calendar forward or back one month at a time and move the cursor to any day of the month. Pressing F1, labeled "Schedule," will bring up an appointment list for the date under the cursor. In this mode you can enter an alarm setting for any appointment, and the computer will beep at you five minutes before the set time, but only if it's on.

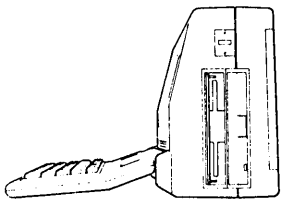
(continued)

Bill Steele works in Ithaca, New York, as a free-lance writer specializing in science, medicine and technology. He is a member of the MOR Editorial Council and also writes the Mailbox column for MOR.

Pressing the phone icon brings up a directory; numbers stored in it can be auto-dialed from the optional built-in modem. That puts you in a "dumb" terminal mode, i.e., there's no built-in communications software for transferring disk files. The appointments and phone directory share 4K of non-volatile memory, not expandable. The calculator icon turns on a standard 4-banger with memory, with a display that windows over whatever else is on the screen.

You can call any of the built-in functions from inside any other program, then return to where you left off. Pressing the disk icon when you're looking at the world map boots the disk in drive A, or returns you to software already running. You can also boot directly on startup, skipping the map display. Pressing the clock icon takes you back to the map. Although it's used for initial boot-up, the disk icon is not a reset; you get that by pressing three keys at once, awkward but hard to do by accident.

Zenith bundles in no software except MS-DOS, but the Z-171 is almost totally IBM compatible, running every program anyone has tried except IBM BASIC, which is ROM-specific; that's no loss, since GW BASIC is identical. Only three other MS-DOS machines (one made by Zenith) offer such complete compatibility. The processor is an 80C88, a CMOS (very low power drain) version of the 8088, running at 4.77 MHz.



Despite its compatibility, I probably wouldn't want this as my only computer, mostly because of the tricky keyboard. But if you really need a portable, and don't really need to run it on your lap, I can't imagine a better choice. At least until a real Pivot comes along.

HARDWARE REVIEW

PRODUCT: **DriveC2**
& Interface

VERSION TESTED: 1 Megabyte DriveC2

MANUFACTURER: WestWind Computer
1690 65th Street
Emeryville, CA 94608
(415) 652-3222

TESTED ON: MD-3 (ROM rev. 3.1)
NOTE: WestWind products can be installed in most Z-80 computers including all MDs. There is a stand-alone unit available for the MD-3P (portable).

PRICE:
Interface - $100
512K DriveC2 - $349
1 megabyte DriveC2 - $499

Note: WestWind has just announced a special deal: The interface, 1 megabyte DriveC2 and a 5 megabyte hard disk for $995.

by Erik Preminger

Let me say right off that I love my DriveC2.

I consider my Morrow the Volkswagen beetle of computers: reliable and cheap but frustratingly slow on the pickup. Now imagine a supercharged beetle that zips along like a Ferrari. Well, that's how my Morrow feels since I added a DriveC2.

For NewWord users, the DriveC2 means no more pauses while NewWord accesses the floppy disk for an overlay or moves data back and forth when the current document exceeds the working memory. For Personal Pearl users, DriveC2 eliminates switching disks when printing reports that require a sort. It also cuts the sorting time by 25-50 percent. For spreadsheet users, DriveC2 comes with SuperSize SuperCalc2, which is compatible with regular SuperCalc files but allows for much larger spreadsheets. And for everyone, the DriveC2 virtually eliminates waiting for documents to be printed because it includes a full control print buffer.

What is a DriveC2? Basically, it is a state-of-the-art RAMdisk (i.e., a circuit board containing a number of Random Access Memory chips), which the computer treats as another floppy drive but which responds up to 20 times faster than a floppy because it's totally electronic. DriveC2s come in two sizes, 512K and one megabyte, and up to three can be combined to make one giant three megabyte RAMdisk. Installing all three inside the Morrow is possible; however, it pushes the Morrow's power supply close to its limit. Therefore, WestWind recommends installing a third DriveC2 only as a stand-alone unit or with one of their hard disks that has its own power supply. Regardless of where they are physically located, all DriveC2s attached to a particular computer combine into one large unit as far as the computer is concerned.

There is one hitch (isn't there always?) with the DriveC2--or any RAMdisk, for that matter. Because it's basically a collection of memory chips, everything in it is lost when the computer is turned off or the power fails. This means the user must be careful to backup all data onto a floppy or hard disk. I knew about this before I got my DriveC2, and I was concerned that backing up my files onto floppies was going to be very tedious. In practice it's become virtually automatic and I hardly notice the time. It certainly doesn't compare with the constant aggravation of waiting for disk access.

Installing the DriveC2 requires first installing a WestWind Interface. This interface, which includes software and a small circuit board, permits the full line of WestWind enhancements (DriveC2s, hard disks, removable hard disks, tape backup systems, and their multi-user network called WEB) to be added to the Morrow with nothing more than a screwdriver and often not even that.

The ease with which the interface can be installed depends upon the location of the Z-80 chip (the Morrow's central processor) on the motherboard and whether it is soldered to the motherboard or simply plugged in. The first thing you need to do, therefore, is locate the Z-80 chip. To do this, disconnect the power and remove the cover of your computer. The Z-80 chip is one of the large chips (about 1-3/4 inches long, 1/2 inch wide, and notched at one end) and is usually labeled either on the motherboard or on the chip itself with some form of "Z80-CPU."

If your Z-80 chip plugs into the motherboard, installation of the interface requires only unplugging the Z-80 chip and plugging the interface into the socket in its place. If your Z-80 chip is located under your disk drives, they must first be removed. For either of these cases, WestWind's instructions are well illustrated and clearly written. Anyone comfortable with a screwdriver (which WestWind even supplies!) should be able to handle it.

On the other hand, if your Z-80 chip is soldered to the motherboard (as was mine), you should not attempt to install the interface yourself. Trying to unsolder your chip without professional equipment can ruin the motherboard. Any qualified computer repair shop can install the interface for you, and WestWind will do it without charge if you bring or send them your CPU.

Erik Lee Preminger is a free-lance writer living in San Francisco. His most recent book, GYPSY & ME: At Home and On the Road with Gypsy Rose Lee, has just be re-issued in paperback.

After the interface is installed, the DriveC2 is secured inside the CPU with an "L" bracket and six screws, plugged into the interface and plugged into the Morrow power supply. WestWind supplies all the necessary hardware, and again their lucid instructions make this a breeze.

Like all computer hardware, the DriveC2 depends on system and utility software to function. Here, too, WestWind has excelled, making the DriveC2 virtually effortless to use. Every morning, I boot my computer with a special DriveC2/NewWord/Correct-It disk that I created (see DRIVEC2 on FLOB/JUN86, Diskette #7) in drive A and my data disk in drive B. Less than two minutes later I'm at NewWord's opening menu, all automatically. From then on I work as I always have, except faster.

A word here about speed. Although it's fast, everything does not happen instantly with a DriveC2. A Ferrari might be faster than a VW in getting from point A to point B, but it still takes some time to make the trip. So, too, does the DriveC2. For example, without the DriveC2 it takes Control-QC 7+ seconds to scroll from the top to the bottom of this document. With the DriveC2, it takes 3+ seconds. Four seconds may not sound like much, but in practice those seconds and the many others saved by the DriveC2 add up to a smoother flow of ideas and words that can't be appreciated until experienced.

I use my Morrow mostly for writing with NewWord; however, I also use Personal Pearl to maintain two databases from which I prepare various list-type reports, and I have found the DriveC2 very useful for these applications. Because of the size of the Personal Pearl programs, the way they access drives and the large temporary files created by PSORT, I created two disks for Personal Pearl on my DriveC2 (see DRIVEC2 on FLOB/JUN86, Diskette #7): one for designing reports, designing forms and entering data; the second for producing reports and sorting. I boot or reset my computer with the appropriate disk in drive A, and 90 seconds later my programs are loaded. I place my data file disk in drive B, and I'm ready to work. If I want to prepare a report, I copy the appropriate files from drive B to the RAMdisk in order to take maximum advantage of the DriveC2's increased speed during sorting. For all other Pearl functions, I access and save the data files directly to and from drive B, thus minimizing the risk of data loss due to a power or computer failure.

The other major feature of the DriveC2 is its print buffer. It can take up as much or as little of the DriveC2 as you choose when you create your WLCONFIG.SYS file (see DRIVEC2 on FLOB/JUN86, Diskette #7). Unless you chose to give it specific instructions, the print buffer acts invisibly, accepting whatever you send to the printer at computer speed and then passing it on to the printer at printer speed while you use the computer to work on another file or even another program. Or you can use WestWind's print buffer program (PRINTPAC) to set the buffer to print from 1-255 copies of up to four different documents in any order you choose. PRINTPAC also allows you to pause in the printing of one document to print another.

WestWind supplies many other handy utilities with the Interface and DriveC2: There is a disk manager (DISKMGR) that permits deleted files to be restored, maps out bad sectors on a disk, displays a detailed status of files and disks, and more. There is a program for backing up files (ARKIVE) that is extremely valuable to hard disk, dBase II and spreadsheet users because it allows large files to be backed up onto more than one floppy. There's a program for creating menus (MENUPAC) to fit the special needs of your various applications, which strikes me as particularly useful for hard disk users when many people are using the same system.

Two application programs come with the DriveC2: SUPERFILE, which permits the indexing of all your data files, and SUPERSIZE SUPERCALC-2, which allows for over 512K of spreadsheet memory when used with the 1 megabyte DriveC2 (256K on the 512K DriveC2) and provides for backing up these large files onto more than one floppy disk when necessary. I am not familiar with either of these programs; but I did try them, and they seemed to function as promised.

So what's wrong with the DriveC2? Nothing major. The manual is a little unwieldy because it covers all of their products, so you have to wade through the hard disk instructions even if you're dealing only with a DriveC2; also, it needs an index. The print buffer is not totally independent of the computer, so the printer pauses during certain operations that require the constant attention of the CPU, such as massive spreadsheet recalculations and copying files from one disk to another. Some programs (THOUGHTLINE and HOME ACCOUNTANT, for example) can't be run with the DriveC2 because they use more than the 55,814 bytes of transient program area (that part of the Morrow's basic 64K used for running programs) available after the DriveC2 operating system is booted. WestWind reports that some Osborne users have had trouble running Personal Pearl for this reason, but I've encountered none with my MD3. All of these programs can, of course, be run normally by simply not initializing the DriveC2. And, finally, there's the expense. None of WestWind's products is cheap; however, the cost of the DriveC2 seems a small price to pay to put the heart of a Ferrari in your Morrow.

WestWind's slogan is "CP/M Lives." Unlike most in the computer industry who have turned their backs on us, WestWind has put together a full line of enhancements that will allow us to continue using our computers--and, more important, our software--for years to come. My only suggestion, given the extraordinary performance of the DriveC2, is that they change their slogan to "CP/M Lives...in the Fast Lane." ■

SOFTWARE REVIEW

PROGRAM:	**Alist** **Alphabetically Ordered Lists**
VERSION TESTED:	2.2X
MANUFACTURER:	Irata Software 2562 East Glade Mesa, AZ 85204 602/898-6484
PRICE:	$39.95

by Phyllis Brooks

It isn't hard for me to review a program like ALIST from the point of view of a novice user. Despite its explanatory subtitle "Alphabetically Ordered Lists," ALIST is a simple database program. I have taught myself something about several database programs but have made continuous use of none of them. I once used Personal Pearl to compile a lengthy alphabetized glossary but I forget how I did it and I would have to relearn everything in order to recreate the process. So, virgin I'm not, but blunderer (i.e., typical first-time user) I am.

Being methodical, and trusting the word, I took the ALIST manual and started. Already, on page 1, I was thankful that I was not really a database virgin! What's a "record"? What's a "field"? What does "specify conditions" mean? What does "menu driven" mean? (Look, I learned these the hard way myself and know how opaque--good computer term!--such terminology is to someone who simply wants to learn how to store some information and make alphabetical lists from it.) The writers of this manual know their material backwards. But they did not consider deeply enough the needs of a first-time user, the one person who will rely on the manual. They did show what some basic notations, like [RET], mean. (The first time I encountered "Press <CR>"--in the LogiCalc manual--I typed every combination imaginable of the characters "< C R >," including holding them all down at once, before giving up and calling a friend who told me to try the carriage return.

I plunged into the tutorial. I could tell that the writers were trying to be helpful--they used informal language like "stuff will appear on the screen"--and I decided to relax, be very uncritical and meet them halfway whenever there was any room for doubt. Still, I was puzzled when the first thing that appeared on the screen after I entered the date was a list of "initialization files." The manual tells me to expect a list of data files. Deciding they were the same thing, I went on. (They aren't, but it didn't hurt me to assume they were.)

Studying the sample address list provided as the basis of the tutorial was painful: distorted forms like "Santa Clause," "Paul Bunyon," " Mack the Knive" and, possibly worst of all to a cartoon aficionada, "Wyllie Coyote." The user wonders whether carelessness in the surface things may extend to carelessness in features of the program itself. (The software catalog supplied with the program is also rife with spelling errors.)

Still, I checked through the list, added a few entries, printed a list or two--selecting names according to conditions--and corrected the existing entries to get rid of the worst spelling problems. Unfortunately, both the manual and the on-screen instructions continued to confuse me. In the face of on-screen instructions like "Type R to re-enter INPUT" I went wrong. I assumed this meant something like "Make the entries you have just typed a permanent part of the file holding this list of data" when it actually meant "Go back into the state where you can continue to make new entries for ultimate incorporation into this file." I should have known that "re-enter" here is an intransitive verb and that INPUT in all caps refers to a mode and doesn't refer to the data itself. But "should have known" isn't the same as "does know." There's plenty of space on the screen for a much clearer statement, maybe something like "Press R if you want to type in some more entries." We end users want to do things with the program, not learn the inner pathways of the program.

When I religiously did what the tutorial told me, I was generally OK. But the program has quirks each user has to find for him- or herself. Here's one I found: I was taught how to select specific sets of items for printing. One of the examples involves listing all people with the name John. I had added some names to the file, among them a Johnson. Sure enough, William Johnson's entry was printed out with the others.

Important bits of information are just plain omitted. I found out only by trial and error that I could use the backspace key to correct my typing any time before I had pressed <CR>. No, the rub out or delete key doesn't work. Other information is given in a perversely confusing order: Right after I was told that I could use either upper- or lower-case letters to enter one-letter commands, I was told to type "G" as a start letter. I typed a lower-case "g," and nothing appeared on my screen. Then the tutorial told me that typing "g" at that point will not work; I must type "G." (Yes, there is a difference between a command and a start letter--but I'm a novice user, remember?) Entries the learner is to type are sometimes given with a beginning space, which is pointed out only after the event, when most people will have made the entry without a space. And so on.

The main overall problem, however, is one of inappropriate terminology, both in the on-screen instructions and in the manual. Terms like "print mask," "internal buffer," "mode" and so on intrude to

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Phyllis Brooks has taught writing at U.C. Berkeley for 17 years and has also been a free-lance translator, journalist, editor and technical writer.

confuse the beginner. Throwing in a few expressions like "let's try that one more time" does not make a manual user-friendly!

Still, I worked my way through with only a few complete blocks. (I was, for example, never able to retrieve a record I had erased.) But it wasn't easy. For example, I wanted to wipe out an entire file in which I had made too many mistakes and could find no command that would let me do so. I eventually discovered that most such housekeeping tasks must be taken care of by leaving the program and using CP/M commands.

When I got to the point of using the data from one list to compile another list, to be sorted in a different way, I nearly gave up. But I had a review to write. I was told suddenly that I could go no farther in the tutorial until I jumped ahead and learned how to use the ALISTU program, which had not been mentioned up to this point, even in the introduction. ALISTU was described as being in Section II. I found no Section II. Oh, there it was--a heading on page 31. But all the section listings were for "2," not "II" (not the same in my vocabulary). Then a false effort to simplify terminology betrayed me. I was told that ALISTU lets me create my "very own files." I thought that was what I was doing as I added data to the sample files. On reading farther on, I found out that with ALISTU I could create my own forms to hold data and sort it. That's what those .INI files are! They don't hold the data, only the form. Aha!

In learning about ALISTU, I created yet another name and address file. Can ALIST be used for anything other than names and addresses? Not if you go by the manual. (Confession: I find my little address book more convenient than a computer for storing names, addresses and telephone numbers, and I like to address Christmas cards by hand.) The manual should provide some suggestions for other uses of the program. Even I found some, and only then was I impressed by what the program can do.

I often have to compile bibliographies and glossaries, which become cumbersome to alphabetize as the number of entries rises. I tried creating a glossary first, with two entries: WORD and DEFINITION. As I created my new form with ALISTU, I had to choose from an array of 13 printing options. The explanations both for their use and for the mysterious TBS settings are obscure. The printing options are not even listed completely anywhere in the manual. Only the first five appear in the command summary for ALISTU. I had to find out about numbers 6-13 by trial and error. I made many misassumptions, but I finally found a way to print each word on a new line, skip three spaces and then print its definition on the same line.

The bibliography then was easier. After setting up entries for AUTHOR, TITLE, PLACE, PUBLISHER, YEAR and PAGES, I carefully juggled the print options so that all entries in each item would print continuously, with new items starting on a new line. By remembering to end AUTHOR, TITLE, YEAR and PAGES entries with a period, PLACE with a colon and PUBLISHER with a comma, I got a very respectable looking alphabetized bibliography in a file I could edit with WordStar or NewWord. (All lines ended in hard carriage returns and were a nuisance to reformat. Obviously, more exploration and experimentation are in order.)

Could I put a bibliography in order by year of publication? Since I was shown in the tutorial how to set up a file sorted numerically by ZIP code, I knew that the program had some number-sorting ability. I tried putting entries in order by a set of random numbers. The order was like an alphabetical list rather than numerical order: 12, 134, 1546, 23, 345, 36, 7, 815, 8267. ALIST will give a true numerical order only if all the items are whole numbers (no decimals) with the same number of integers. Still, that means any year since 1000 A.D. could be used as an entry by which to sort bibliographic items. But how to alphabetize items within each year? If I create my bibliography first, alphabetizing it by author, and then create a new file in order by year, merging in the data from the previously alphabetized file, I should get what I want. Hey, this isn't such a bad little program after all.

Now that I know how to use it, I'll use ALIST again. But a decent manual and clearer, result-oriented on-screen instructions would have saved me hours of frustration and false starts in the learning. ■

SOFTWARE REVIEW

PROGRAM:	**Alist Plus**
VERSION TESTED:	3.00
AUTHOR:	Michael Blake
MANUFACTURER:	Irata - Alist 2562 E. Glade Mesa, AZ 85204 602/892-0015
DISK SPACE:	42K - data entry 42K - data design & output 20K - installation
PRICE:	$49.95

by I. I. Butler

Alist Plus is a simple filing database, in compiled BASIC, for keeping lists of data sorted alphabetically or numerically. It will keep a mailing list, easily outputting to Rolodex or addressbook forms, mail labels and merge-print files. Because it will search and extract by condition on any or all fields and its field lengths are generous, it also seems suitable for such lists as bibliographies; client, customer or investigation lists with extensive background and credit information; legal file data with service-by-mail lists; and personnel and payroll data.

Because this program can perform calculations, it is also usable for keeping lists of bank account deposits and withdrawals with a running balance, inventories, and other numerical data. However, it lacks the full capabilities of a spreadsheet and does not have special features built into the program or instructions in the manual for user-friendly exchange of data with spreadsheet programs.

Why Should You Want It?

Alist Plus is an exceptionally well-designed program, relatively easy to learn and use. Most people can have it up and running in one day of intensive learning, or one weekend of just fooling around, without having to cover the whole manual before getting it going. Design of data entry is simple, because no definitions of field length are required (all fields have up to 254 characters), no field other than the first one in any record needs to be filled, consecutive numbering of records and sorting by the first field in each record are automatic, and trimming of unwanted spaces between fields in output is automatic.

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Most users should have such a program. Simple filing database programs are user favorites. Even users owning more powerful relational database programs with programming capability will probably appreciate this inexpensive program and use it for short to medium lists not requiring relational capability. Such lists can be handled more quickly and easily than setting up a new format in a more powerful program, and exchange of data in a relational program is quick and simple since the data are in ASCII.

Within the category of simple filing systems, this is probably the program of choice for users who work with both CP/M and MS-DOS, because Alist Plus works identically and has interchangeable data and index files in both operating systems. It is probably also the program of choice for those who work with more than one CP/M format. It makes a minimum of BIOS calls, has been found by experience not to be machine-specific and needs only minimal installation for terminals and printers. It can be obtained in 48K and/or 64K RAM versions and does not need a full 80-column or 24-line screen in any version.

How Does It Work?

Like many other database programs, Alist Plus is really two programs. It would have been slightly more user-friendly if you could exit either program and enter the other from the menu without exiting to the operating system.

In one program, you enter data; or search for, extract, correct and/or delete data previously entered; or output data in previously designed formats to a disk file, your screen or the printer. From this program, you can also create a "sub-file," which is a database file with identical format characteristics containing all or any part of the same data, or just an empty shell data file. (This is only one of two ways to clone a database file.) You can also merge-input data from a different database file with different format characteristics.

Designing Data Entry and Output Formats

The second of the two programs is the one that allows you to design a structural format for the kinds of data you want to enter, and the formats in which you wish to output it--whether to screen, printer or a disk file--all called "Print Styles" in the manual. (I would prefer the terminology "output formats.")

One of seven output modes completely solves the first-name-first, last-name-first problem. The name data are entered only once, in last-name-first format. Then, at your option (e.g., depending on whether the output is a last-name-first address list or a first-name-first mailing label) the output will either leave a listing of "Surname, Given-Name" as-is, or list it as "Given-Name Surname."

This program is the most flexible way to clone an

existing database format, and it allows you to specify a different sort field (if you want it to sort on the same field, just delete the new sort field). By this process, you can also add, rename, change the order of and/or delete fields, and retain or change the default conditions for sorting and output. Many of these functions can be performed on an existing database with data in it. But since there is no function to rebuild an index, functions such as adding and reordering data fields and specifying the default sort condition of an existing database must be done on an empty, cloned database, into which existing data is then merged, using the first program.

This second program is better than "good." It has merge-printing with print-formatting of output, all done from a menu and not requiring an internal programming language such as is used in both in dBASE II and in WordStar/NewWord dot commands. While you're designing output, you can send data from the first record to the screen or printer to see what it looks like and if you'd like to make any changes. (If the database is empty, it will print or display field names instead of data.) This is in addition to the more complete test that can be run from the first program, outputting onto screen any or all records in any output design.

This program also permits flexible use of "dummy" fields, which are not part of the datafile, but are only in the index file. These may contain punctuation, characters to fill in spaces (a line of periods across a page), spaces and line feeds to format the output in conjunction with the menu commands. These fields are required to perform numerical calculations. They may also contain control characters and some escape sequences, which will turn on and off printer capabilities, such as bold and italics, or ring the "bell" of a terminal. Since they may not contain carriage returns, they are not well-suited to printer-initialization sequences, which turn on bidirectional printing and often contain carriage returns (e.g., the initialization sequence for Diablo & compatible daisy-wheel printers). The easy solution is to run a word processor first, print a file that pauses before printing any characters, then cancel printing.

However, anything that falls within the concept of designing computer output by entering sequential commands becomes less easy to learn and do and less easy to explain by manual or menu the more features it has. Merge-printing and print-formatting fall, by their natures, into the category of "A computer program does what you tell it to do, not what you want it to do." And the more you can tell it to do, the more you have to learn, and the more you have to test.

This program is a very good compromise between number of features and ease of use. It has more features than one would expect in a program of this type and price. Although manual explanations are cryptic and may require more knowledge than some users possess, at least they are in plain English, cover all features, and give tutorials and examples that work as indicated. Better explanation may not be needed, because it is possible to learn by using the samples, menu directions, and trial and error. Also, you do not have to learn all sophisticated output features and techniques to start using the program with the excellent sample files, learning as you go.

Best Features

Some of the best features of Alist Plus have already been mentioned: up to 40 fields per record and up to 254 characters per field, with no need to specify field lengths; excellent demonstration examples; clever uses of dummy fields; and menu-driven on-screen print tests of output from both programs.

Another outstanding feature is excellent error prevention and recovery. Prevention takes five forms: One is functions that cannot be performed at all, if they would be damaging, such as adding or changing the order of data fields in an existing database with data in it without changing the index. The second is the existence of a number of places in both programs where you have a menu option to abort a process. The third is on-screen messages, including a warning for low free memory. The fourth is occasional auto-abort and exit to the operating system, when certain invalid commands are made. The fifth is the automatic backup file, with the option, in the installation program, to work with three files (like WordStar/NewWord), a backup, a temporary and a working file, thus maximizing security against data loss, or to erase the backup first, freeing disk space.

Error recovery includes the ability to switch working and backup files back and forth, while working on data, in case you inadvertently wipe out something in the working file.

But wait! Like a TV mail-order ad, there is more: One single field in a record of up to 40 fields can contain an entire address, or name and address, of up to 254 characters. This is because you can specify any printable character not to be printable but instead to generate a line-feed in any output format. (I recommend backslash "\," used as an output control character in WordStar/NewWord headers and rarely needed in names, instead of the default value slash "/," which is needed in "c/o" and in some names.)

Because of the other program features, you can still output a near-perfect merge-print file without bothering to count the number of lines per address listing when you first enter data. Using the design program, you can specify the number of total lines in any output. You can also cause all lines/fields to be enclosed within quotation marks in output to a merge-print disk file. All commas will be enclosed within quotes and will not be recognized as field-dividers in

merge-printing. Any record may exceed the number of lines of output specified without losing data, since that command is executed last in output. What it does is line-feed from the end of a record down to the correct line for the following record. So only those records with too many lines need editing, and no data from them are erased involuntarily.

There is a feature that permits extracting and sorting by ZIP codes (five- or nine-digit, without specifying length).

A Wish List for Upgrades

The original Alist had an unadvertised label-generating utility program, provided only on request (since the publisher sells a separate label program?). This program provided greater output flexibility, including multiple columns of labels on one output sheet, with a vertical sort by column, a feature missing in most word-processing merge-printing. Since the conceptual programming is done, all that is needed to modify this for Alist Plus is user demand.

The author has worked as a programmer for the publishers of SuperCalc and has the ability and knowledge to add a utility program allowing user-friendly import and export of data with spreadsheet programs.

Ability to sort on more fields, e.g., three to five, would improve output. Since it is only really required for output, this could be a separate utility, available later, keeping earlier and later versions compatible. Wildcard and sounds-like search/extract would be a bonus.

Data files, now in ASCII, could be made more compact, without sacrificing data exchange with other programs, by using squeeze-unsqueeze conventions in the public domain. This would slightly enlarge program size and reduce speed in some operations. Using the present program, in my experience, a DS/DD floppy will hold 800 to 1,000 address records with 15 fields, including multiple addresses per record and extensive commentary fields, including credit information.

Alist Plus could stand more aggressive marketing and more open distribution with greater risks, such as giving limited permission to copy and placing the original version in the public domain with skeleton documentation. When people find out how good it is, user demand should ensure improvement and continuing support. I would also like to see a catchier name, such as "dFILER, the nicest way to lose your virginity in database," or dFILE , as in, "First get dFILE'd before you become totally dBASE'd." This program has sex appeal. ■

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ZX3: Fast file access, copy, edit, type utility
ZFILE: File find utility, esp. useful on hard-disks

----------FLOB/JUN86 DISK #2 174k----------
FTNOTE: Update to Footnote in AUG85 FLOB Version 1.4
SD112: Update of SUPRDIR on FLOB/FEBR86 #1 (SD or SV)
SFILE26: File find utility, searches by user area
XCCP: CCP Replacement, runs as program

----------FLOB/JUN86 DISK #3 168k (CP/M Plus)--------
BU13: Quick and selective hard-disk backup
CCP102+: CCP replacement--named directories, etc
MDHDTST1: Hard disk testing and formatting utility

----------FLOB/JUN86 DISK #4 158k----------
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----------FLOB/JUN86 DISK #5 162k----------
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CPM22PAT: Patches for DRI system software
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DIR1ST31: Types out 1st line of all text files on disk
DR23: Lists # of records in each file
SUPZAP33: Like DU, but menu-driven; simpler to use
ZX2: Like ZX3 on FLOB#1, but smaller

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DISKX11: Disk/drive exercise and test program
I/O-CAP: Outputs everything on-screen to printer
LBRDSK23: Library-making utility
REFSORT: Sorts paragraphs alphabetically; for indexing
SSTAT18: Directory/STAT-like utility

----------FLOB/JUN86 DISK #7 178k----------
------- Articles, sidebars and miscellaneous ----------
ALISTPLS: Detailed version of review on page 49
AUTOFORM: Automatic diskette formatter for drives B, C, and D; see article on page 11
CITATION: Comments on a special file management system
CPMDIR: Exploring the CP/M file directory system
DISKERRS: Experiences with hard-disk errors on MD11
DRIVEC2: Sidebar to review page 47: software installation
FORMAT: Diskette formatter includes FINDBAD, CP/M system
M300DIAL: New version of MM300 autodialer on FLOB/FEB86
LETRQUAL: Review of NLQ conversion kit for GEMINI printer
MTAB: Explanation of MTAB in BIOS; see article page 5
PROUSART: How to program the 8251A USART chip; MD1/2/3
SETPORT: A program to control the 8251A USART chip
SERIPORT: How to add a second serial port to a Rev.1 MD
TRM19200: Detailed installation instructions; see page 17

----------FLOB/JUN86 DISK #8 352k----------
This is a DSDD floppy with MD3 system program source files (ASM and MAC) for AUTO, BACKUP, CBIOS (3.1), FORMAT, KEY, ROM (3.1) and SYSGEN. All code is commented.

For a complete directory of all FLOBs published thus far, ask for the **MOR FLOB Directory** by mail (include SASE).

A User's Guide to Understanding FLOBs

by Maxwell Syndstrom

When you receive your FLOB, accessing the programs and documentation files on it isn't always as straightforward as it might seem. Here are a few suggestions that will help you on your way.

Generally, it's not a good idea to put the FLOB in drive A. We don't put CP/M tracks on the FLOBs (if we did, we'd be violating Digital Research's copyright), so you can't boot a FLOB from drive A. So you can either copy the files off of the FLOB in drive B onto a disk in drive A that has already been SYSGENed, making it a "system" or "program" disk, or you can use SYSGEN to make your FLOB into a bootable disk.

DOC or TXT files: These can be printed out or read using WordStar/NewWord (or with NSWEEP using the "V" command); they are usually documentation to help you learn how to use the programs you've ordered.

COPYING FILES: To copy files off of the FLOB--your safest choice--you should use NSWEEP. NSWEEP is a file-copy utility, like PIP but more sophisticated and simpler to use. (If you have never used NSWEEP, read the article by Peter Campbell in MOR Vol. 2, #4, Aug./Sept. 1985, p. 54, or read the NSWEEP documentation, NSWP206.DOC, on FLOB/AUG85, Disk #1). You need NSWEEP more than anything else except NULU if you purchase FLOBs because, since your FLOB is, in essence, your distribution disk, you should copy the files off of the FLOB onto another disk. NSWEEP is usually named NS.COM, or sometimes NSWP207.COM. To run it, just type its name ("NS" or "NSWP207") without the .COM filetype, press return, and you're in the program. Type a question mark to get a relatively self-explanatory menu.

LBR files: To access these files, you need NULU, which is used to get into library files. A library is a collection of programs and documentation all "contained" under one entry in the directory, e.g., ADVENTUR.LBR. Libraries are useful because the files in a library take up less disk space together in the library than they would if they were listed separately. With NULU.COM in drive A and ADVENTUR.LBR in drive B, type: A>**NULU B:ADVENTUR<CR>**. This will "open" the library so that you can extract files. Now, at the NULU command prompt, type: **-F**; this puts you in "NSWEEP mode," i.e., you can then work as if you were tagging and copying files off of one disk onto another. Use the "W" command to "Wildcard" tag files, and when it asks for which files, type: ***.***, which means all the files in the library. ("*.COM" would tag all the files with filetype .COM, and so on.) Then use the "M" command to Mass copy the tagged files to another disk, and specify either A, if you have enough room on the disk in drive A, or C, after which you can swap in a new floppy as your Morrow reassigns drive A as drive C.

SQUEEZED FILES--DQC, CQM, QQQ, ETC.: These, and any others with the middle letter of the filetype being a "Q," are what is known as "squeezed" files; e.g., NS.DQC or ADV.CQM or NEWS.QQQ. They need to be unsqueezed with NSWEEP before they can be used. Squeezing a file, especially if it's a text file, reduces it to about a third of its original size; we can put much more on a FLOB if we squeeze files, which is why we put you through the trouble of having to unsqueeze them. (Note: You can use the "V" command in NSWEEP to view a squeezed file without unsqueezing it first if it is a .DOC file.) To unsqueeze a file, go into NSWEEP again, tag the file, using either "W" to tag *.DQC (all the .DQC files) or just "T" to tag files individually. Then use (appropriately enough) "Q" and answer "U" to the question as to whether you want to squeeze ("S") or unsqueeze ("U") a file.

COM files, DAT files, PTR files, etc.: These are not readable by TYPE, WordStar/NewWord or NSWEEP; they are command, data and pointer files, respectively, i.e., anything that gives you "letter salad" on the screen. If the file is a .COM file, then it is a runnable program. To run it, just type all the letters before the .COM in its name, then hit the RETURN key. Some .COM files, like ADV.COM, also need associated overlay files, which usually have such filetypes as .DAT (.DQT if it's squeezed), .OVR, etc. Be sure those files are on the same disk as the program's associated .COM file before you try to run it, because the program needs occasional access to those files while it is running.

Common Question: I got a huge bunch of files with modem programs on them, and they don't work.

Answer: Any one of a number of things could be wrong. First, make sure you've run SETUP.COM according to the instructions on the FLOB; otherwise your modem will not be communicating out the right port, or with the right protocol, or at the right speed, etc. Second, be sure you are using a specific "modem cable," which usually just means that the wires connected to pins 2 and 3 at one end of the cable are switched. Finally, be sure you have a Hayes-compatible modem. The Morrow modem (MM300) cannot be used with the public domain programs on the FLOBS.

We hope this alleviates some of the panic and frustration out there. If you need more help, contact a local users' group or a knowledgeable friend. ■

Maxwell Syndstrom is a generous, kind person dedicated to helping people free their spirits from the pressures technology tends to place on them.

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MD2 / Silver Reed EXP770 Printer near new. $1495 or best offer. Andy Jones, P. O. Box 2795, Laguna' Hills, CA 92654 (714) 458-8446

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SURPLUS MD-3/11 SOFTWARE. Customer ordered replacement copies of Quest, Pearl, SuperCalc, etc. never paid for or picked up. Dealer cost $200. Civil Computing Corp., (415) 455-8086, 2111 Research Drive, Suite 1, Livermore, CA 94550

EUROPEAN USERS GROUP. If you're interested in helping to start one in southern Germany, contact: Timothy Slater, Briener Strasze 44, D-8000 Munchen 2, WEST GERMANY telephone: (089) 529092 (MOR apologises for printing the wrong address when this classified ran in the Feb/Mar '86 issue.)

MD3, MDT 50 term, WordStar, Correct-it, Logicalc, Bazic, Personal Pearl, BASIC, Quest, Piot, All software manuals, excellent condition. $795 Call Rudy (415) 851-8453 after 4 PST.

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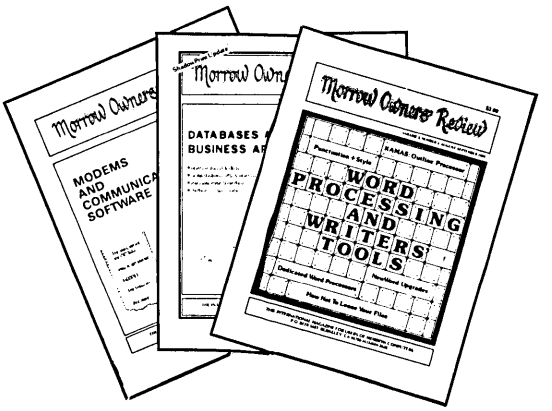

VOL 1, #1 APRIL 84

Technical and Foreign Language Text with WordStar + NewWord vs. Wordstar + Meet the Disk Drives in your Morrow + Adding Disk Drives to your Morrow + Serial Port Communications + The "Lo-Tech Electronics" RS-232 Switchbox + Using the Hayes Smartmodem + Quieting down your Morrow MD3 + Inexpensive PASCAL

VOL 1, #2 JUNE 84

Concurrent Editing and Printing with WordStar + Installing WordStar For Dot Matrix Printers + Customizing NewWord + Preliminary Review of Reachout + MCI Mail + Trouble Shooting Your Micro Decision + Experience with the E-Systems "Piggybank"Ramdisk + About Serial Communications + Diskettes Deteriorate

VOL 1, #3 AUG 84

Graphics Package for the Morrow + Friendly Telecommunications + Review of Micro Link II Communications Software + A Very Simple Modem Program + Connecting Your MD to a Radio Shack + Connecting Your MD to an Epson HX-20 + Proportional Spacing with WordStar + Patching WordStar for an Epson Printer + Installing WordStar 3.0 for the MP100 + WordStar Patches for the Okidata Printer + Using Basic to Control Your Printer

VOL 1, #4 OCT 84

Manuals + How To Tell What MD You Have + About Surge and Spike Protectors: I Thought It Would Never Happen to Me + Never Too Old to Start with a Morrow + More Printing and Editing Concurrently with WordStar + Brightening Your Day with NewWord + Programming Your Function Keys with NewWord + Public Domain Software Made Easy

VOL 1, #5 DEC84

George Morrow Faces the Nation + Notes from a SmartKey User + Speeding Up Your Computer + ZCPR3 Makes CP/M 2.2 Shine + Deciphering Your Terminal Manual + WordStar Emergency Treatment + Customizing WordStar's Terminal Defaults + Spool-Away with Printer Buffers + Soul of CP/M

VOL 2, #1 FEB85

Teaching with PILOT + Trouble-Shooting Your Morrow + Micro Justification and Prop. Spacing in WordStar + Toward a More Useful MD2 (1876K disk-space) + Getting Started with TURBO PASCAL + SmartKey Alert!

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PILOT Programs for Children + Morrow Drive Error Messages + MDBITS, a Program to Replace SETBAUD + SUBMIT to Less Work + Saving Time in SuperCalc with X (eXecute) + MEX, A Great PD Modem Program + The Morrow Toolbox + Automatic Formatting with PILOT + SOFTWARE: UniForm, a File Transfer Utility + The CP/M Plus Handbook --Book Review

VOL 2, #3 JUN85

Modems: What's All the Fuss About? + MM300 Modems and Communications Software + The CTS MM300 Modem With MITE + Short Introduction to FIDONET + Getting Started with Modem Programs + The Smartest Modem of All (Visionary) + Morrow Printer Ribbons + Locked Out of LOGICALC? + Adding Z-CLOCK to MD3

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The Basic Morrow Word Processor + Upgrading NewWord: Why and How? + The MD3 as a Dedicated Word Processor + In Search of the Perfect Writing Tool + New Tricks for WordStar + KAMAS, an Outline Processor + EUREKA! A CP/M Disk Cataloger + Punctuation & Style + ShadowPrint (SPRINT), a Print Spooler + ShadowPrint at the MOR Office + MultiForm, a File Transfer Utility + Day-Old Computers + New Product: The Turbolink 1200 Modem + NSWEEP: A Public Domain Jewel

VOL 2, #5 OCT85

Running a Small Business with a Morrow + Reflections on dBASE II, Comparing Gold to Pearl + dBASE II Hints for Morrow Users + An Overview of Personal Pearl + Let's Get Rid of Personal Pearl, Look at Options + POIL: A Fix for Personal Pearl's INSTALH.DAT + Accrual Bookkeeping on QUEST Version 1.2 + Affordable Computing (Almost) + Eliminate Sort Disk Swap when Using Pearl + ShadowPrint (SPRINT), an Update + Pearl File Load + Free Filer + How to Make Money with Your Micro + James River Group's Accounting for Micros + Computer-Assisted Investment Handbook

VOL 2, #6, DEC85

The Word from New York Dealers + The Co-Processor Board Confusion + CO-POWER 88 for the MD3 + Adding a Co-Processor Board to an MD11 + The Dvorak Keyboard--Life after Qwerty + Converting your Morrow Keyboard to Dvorak + Indexing with Correct-It + Genealogy with Personal Pearl + Telecommunications: National and International + Handicapped Users and the Morrow + Software for the Visually Impaired + New Software Announcements + Block Letters for Toddlers + Conway's Game of Life + The Animal Game + Labor Turnover and Career Mobility + VersaLedger II + More James River Accounting for Micros

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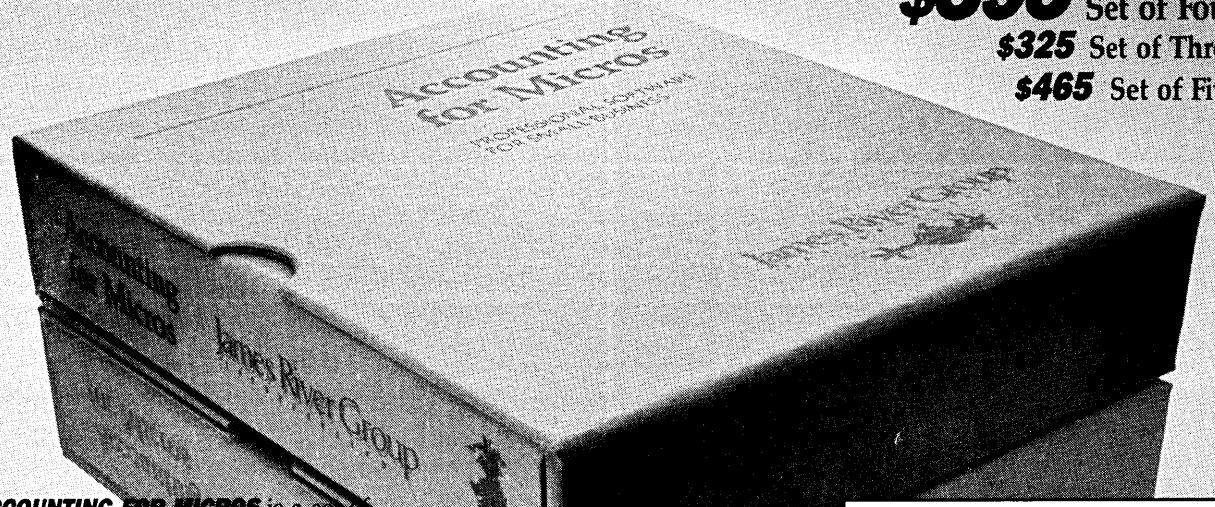

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