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MICROSYSTEMS TESTS THE:

Morrow Designs Micro Decision

by Bill Machrone

Morrow Designs, headed by George Morrow, is one of the pioneering companies in microcomputers. They are relatively unusual in that they are not only still a viable company today, but have also continued to innovate and lead the industry. The Micro Decision is their latest product, and it breaks new ground, both for Morrow and the computer industry. Unlike their former products, it is not based on the S-100 bus. It is a single-user single-board computer with integrated disk drives and a pair of serial ports.

Overview

The Micro Decision is a marketing-driven machine, not a technology-driven machine. That means that new ground is broken only in price and software features, not hardware or new technology. This is not to say that the unit is not well engineered. The objective of the Micro Decision is to bring CP/M-style computing into a lower price range than has previously been available. In order to accomplish this, they have done some nice design and packaging work.

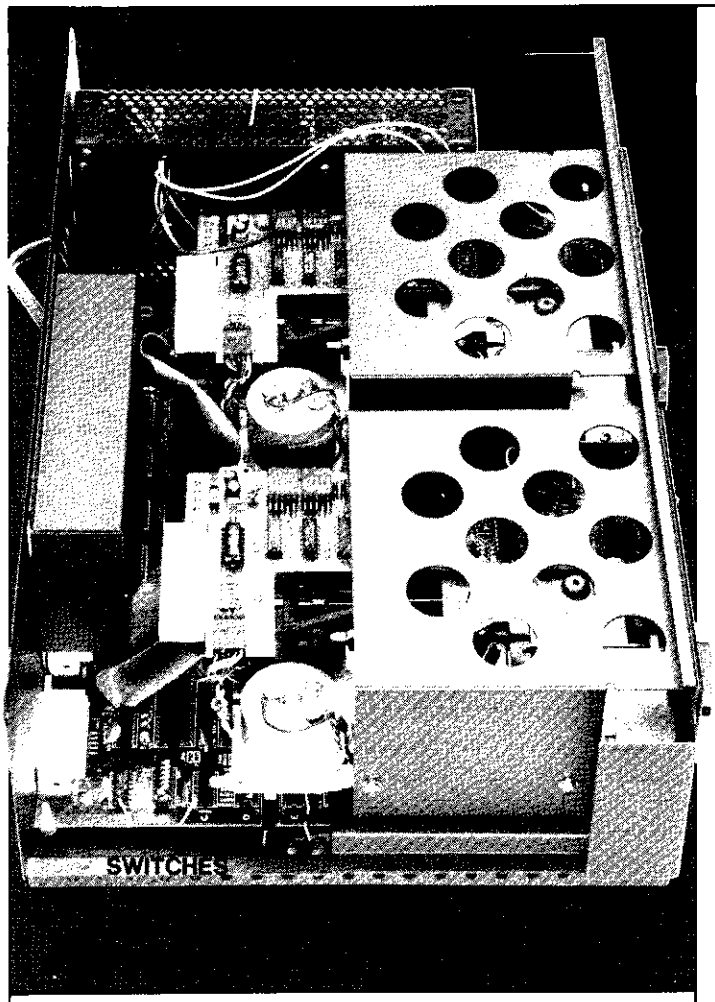
For $1,790, you get one drive (for $2,140, two drives), 64K of memory, a terminal and a keyboard. A hallmark of CP/M-based systems is the RS-232-based terminal instead of an integral video display and keyboard. This immediately identifies the Micro Decision as more of a "business" machine than a "game" machine. The other determining factor in calling this a "business" machine is the software that comes with it. Seven packages are included: WordStar, Microsoft Basic, BaZic, Logicalc, Correct-It, Pilot, and Micro Menus.

Bill Machrone, P.O. Box 291, Fanwood, NJ 07023

Hardware

The Micro Decision is attractively packaged, using the same general design as the IBM Personal Computer. The drives are integrated into the cabinet, avoiding the "collection of boxes" syndrome common to Apple and Radio Shack products. The terminal and keyboard are the same shade of beige as the cabinet, with charcoal-grey accents. The terminal is actually a Lear-Siegler ADM-20, one of the models intended specifically for OEM applications. It is one of the key factors in the cost-effectiveness of the Micro Decision, since it costs only $595 separately. You can, in fact, buy the Micro Decision without it, which may not be a bad idea (see the section on performance later on).

Looking inside the sheet-steel cabinet, there is a small switching power supply off to one side. The two disk drives are two-thirds height single-sided models with filler panels to bring their front panels up to the normal bezel size. Thus, the designers had the option of making the case even lower, sim-



ply by widening the box a bit and laying the switching supply on its side. You may be glad they didn't, because the availability of half-height drives means that you can fit four drives into this diminutive box. If this is your objective, you would do well to order the Micro Decision with only one disk drive. The drives, by the way, keep the head in contact with the disk surface the entire time the drive access lever is closed. This can be a little unsettling if you are used to drives that load and unload the head, but there is no additional disk wear once the drives stop rotating.

The single-board computer is at the base of the cabinet. Only chips such as the Z80, the bootstrap ROM, the disk controller, and the RAMs are socketed. The two serial ports are brought out on the back of the machine, with plastic female DB25 connectors that right-angle mount right to the circuit board. There are no cable anchor sockets for the screws normally found on RS-232 cables. There is also a card-edge protruding from the rear panel labelled "expansion drives."

The baud rates of the serial ports can be selected by clearly labeled DIP switches on the board, from 110 to 19,200 baud. Each port has a set of jumper pins to enable more advanced configuration, such as operation with a modem or a handshaking scheme other than that provided. The UARTs, by the way, are the popular Intel 8251As. The printer hardware handshaking method provided is keyed to the CTS line. I found this to be somewhat unusual, since DTR seems to be more of an emerging standard. Anyway, a combination of jumper pin changes and some judicious wire wrapping can get the Micro Decision to handshake with just about anything. Not to jump ahead into software, but one of the CP/M logical devices (LST:) supports X-ON/X-OFF handshaking.

The cabinet is convection-cooled, which is quite adequate for the minimal amount of heat generated. There isn't much else to say about the hardware side, other than that the power switch is located at the rear and there is a combined reset switch and pilot light on the lower right front corner. The pilot light is a necessity, since the machine runs dead quiet when the drives cycle off.

Software

CP/M 2.2 is provided with the Micro Decision. After spending a short amount of time with it, it is obvious that some good work went into the BIOS. It intercepts the usual "BDOS ERR ON d:" messages, gives a meaningful error message and says, for example:

Disk error on drive B: Drive not ready.
Type R to try again, A to Abort, I to Ignore.

The overall speed of the machine indicates that there is good work inside the BIOS in other areas as well, such as deblocking and disk access.

Another interesting feature is the Virtual Drive. No, it isn't a memory-resident disk, it's just another intelligent function of the BIOS. Here's how it works: If you ask for a drive that isn't really there (DIR C:, for example) the system tells you that it is reassigning drive A: to C: and to insert a diskette. It then performs the requested operation on

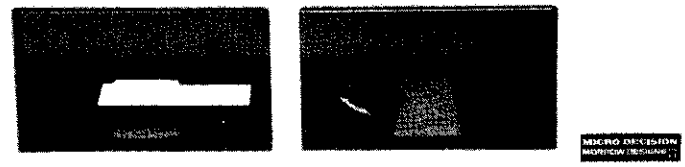
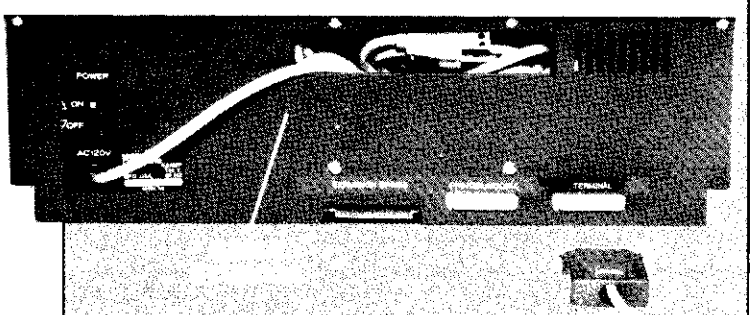


Figure 3. *Computer unit, front view. The sheet-steel cabinet is 16¾" wide, 5½" high, and 11⅛" deep.*

The Morrow Micro Decision is a good little computer. The amount of machine and software you get for the price is simply stunning. . . . It is unlike any other entry-level package offered to date.



drive C:, even though it is physically in the A: drive. These operations can be reads or writes. After the operation is done, you simply put the original disk back in A: and all returns to normal. This can even be done inside application programs, including WordStar. It's a very handy way to retrieve a block of boilerplate text or an old letter from an archival disk for current editing without a lot of starting and stopping, PIPing and control-C'ing. There is a copy of the CBIOS on the distribution disk, and it makes interesting reading. Morrow doesn't provide any information on regenerating a modified CP/M, but this probably wouldn't be of interest to the typical purchaser of the Micro Decision, anyway.

Lots of utility programs come with the Micro Decision, including the usual disk formatting program. Most interesting are the disk compatibility programs that permit it to read minifloppies created on other machines, such as the Osborne 1, Xerox 820, and the IBM PC. This is a first among users of 5¼" drives and will greatly ease the pains of software acquisition normally experienced by owners of a new system. Morrow's "native" format uses 1024-byte sectors to provide 200K on a formatted disk. After the reserved tracks for CP/M are taken, the net storage space is 186K. This is pretty good for an inexpensive system, but could and should be upgraded to the new higher densities.

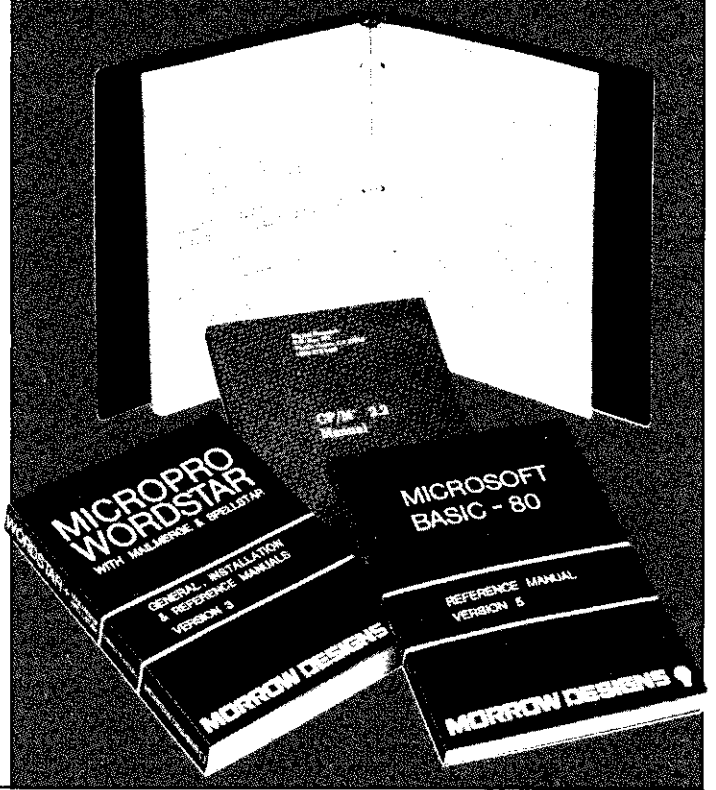
All the commercial packages performed as documented. This is not a review of the packages, just a collection of brief statements on how they perform on the Micro Decision. It is interesting and advantageous to have two Basic interpreters, as Microsoft's Basic-80 is the de facto industry standard, while BaZic gives the CP/M user access to the wholly different world of North Star Basic. It offers some unique advantages in channel-oriented I/O and file handling. You may not like its string handling conventions unless you grew up on a Hewlett-Packard.

Logicalc is a spreadsheet program of average capability. Its screen display is somewhat small, showing a 4-by-10 matrix at any one time. It runs quickly on the system, taking advantage of the system's fast disk access and 4MHz processor.

Correct-It is a spelling checker and corrector with a 36,000-word dictionary. It is of the type that marks each word that it doesn't know. There is a second-pass program that permits you to substitute correctly spelled words for marked words without having to re-enter the file with WordStar. It is necessary, however, to use WordStar again if the original file was column justified. This is no different from any other spelling corrector. I found Correct-It to be fast and effective.

Pilot is used to implement the Micro Menus feature of the system, which permits you to execute most CP/M commands from a menu-type screen. This can be a great help to the neophyte user, but is ponderous for the experienced user. No documentation for the pilot interpreter was in-

Figure 5. *Documentation supplied with the Micro Decision*



The overall speed of the machine indicates that there is good work inside the BIOS in other areas as well, such as deblocking and disk access. . . . The disk access speed may, in fact, be the Morrow's single best quality.

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cluded, but it appeared to be a fairly advanced version, allowing cursor control and chaining to external programs, among other functions.

Documentation

The manual for the Micro Decision itself is quite good. It doesn't make any assumptions about the user's proficiency and tells in plain English how to set up and run the system. It is indexed and is organized from "basic" to "advanced" in terms of what you need to know to make it go. I had no difficulty finding the topics I was interested in, but kept yearning for more technical detail. For example, the terminal appears to behave like an ADM-31, but no list of its escape and control codes is to be found. More documentation on the RS-232 ports would have been more helpful than a suggestion to pick up the Intel data sheets for the 8251.

Morrow was one of the first to distribute the CP/M manuals in a form other than their original multivolume typewritten format. They issued a compact softcover book, instead. Well, they've done it again here, and with two additional manuals that really needed taming: WordStar and Microsoft Basic. There is no change in content for either manual—just a more convenient package. The other documentation is in a three-ring binder. Both Logicalc and BaZic are well documented, but Correct-It is a little brief for my taste.

Performance

I have used only one 5¼" disk system that is faster than the Micro Decision, the Altos Series 5-15D. All the others are noticeably slower. The speed is truly laudable, as it makes WordStar's overlays unobjectionable, while they are generally excruciatingly slow on most other minifloppy systems. The disk access speed may, in fact, be the Morrow's single best quality. Certainly there is nothing remarkable about the 4MHz 64K Z80.

It's nice that the series ports can go to 19,200, just in case you have a fast terminal. WordStar at that speed begins to rival the memory-mapped systems. With the advent, however, of telecomputing and micro networks, I think that a third serial port would have been a worthwhile addition. It is simply too much trouble to open the system up and reconfigure the printer port for a modem. If they had selected some other UART, such as the Zilog S10, they could have had four ports with no net increase in board real estate. As it stands, the Micro Decision is utterly unexpandable, with the exception of the additional drives.

There is a potential problem area with the disks. Either Morrow's disk duplicator is out of whack, or the data recovery circuitry is too fussy. The distribution disks were very hard to read successfully and generated many disk errors. Disks created on the machine were completely reliable. Another Micro Decision owner that I spoke with had the same problem. We did not have a chance to exchange disks to see if the problem was the distribution disks or the machines. My suspicion is that the distribution disks were at fault; the machine was too mannerly the rest of the time for the fault to lie within.

Figure 6. *Micro Decision keyboard*

The terminal portion of the system is a curious combination of good and bad. The video quality is excellent; the keyboard is execrable. First off, there is absolutely no rollover. This alone puts it outside the viable choices for word processing by a merely competent typist. Second, the keyboard is not stepped or dished and the space bar is higher than the bottom row, making it an easy target for inadvertent striking. If I were George Morrow, I certainly wouldn't have put my name on it regardless of the price.

Summary

Aside from the limitations of the terminal, the Micro Decision is a good little computer. The amount of machine and software you get for the price is simply stunning. Until now, the only other machine to offer so much for so little was the Osborne 1, a system not without some idiosyncracies of its own. Okay, I would have liked a little more horsepower in the I/O department, and I could always make a case for more disk storage. But this is an entry-level package, and it's unlike any other entry-level package offered to date. The basic marketing decisions were right on the money: People don't necessarily want portable computers, they want cheap computers with lots of software.

Would I recommend this system to a first-time user? Sure. But I'd caution him to pick out a terminal that he liked first. With the addition of a database manager, it would fulfill 90% of most people's needs for light business and virtually all home computing.

For more information about the Micro Decision please contact:

Morrow Designs
600 McCormick St.
San Leandro CA 94577
(415) 430-1970