

PolyMorphic 8813

Steve North

One could easily divide present-day microcomputers into three generations. The first-generation micros have front panels and LED readouts, and often require the user to toggle in bootstrap programs to get running. The second generation of microsystems have permanent Read-Only Memory monitor programs, which permit the user to enter and display memory, load and save programs on cassette or papertape, etc. The third generation, just coming to the fore, free the user from having to know anything about the low-level functions of the computer. They have either BASIC stored in ROM, or built-in floppy disks. The BASIC-in-ROM feature lets the user start running BASIC as soon as the computer is turned on, whereas systems with built-in floppy disks are somewhat more costly but offer much more flexibility, in that the user can have almost instant access to any number of programs including those he has written himself, and in addition, data files. (So much for a terse, one-paragraph analysis of several year's worth of hardware development!)

The PolyMorphic 8813 is an excellent example of this third generation of microcomputers with built-in floppy disks. The 8813 is based on the 8080 microprocessor and the S-100 bus. In other computers, we might question the decision to use the 8080 over the Z-80, the current pop processor, but most users of the 8813 won't really care, which will also be true of all the other third-generation systems. (For the same reason, one could easily argue that the 16-bit processors will not make the anticipated Big Splash.) The PolyMorphic 8813 incorporates up to three mini-floppy disk drives, each able to store and retrieve up to 90K bytes of information.

Front-Panel Controls

There are only two controls on the 8813 front panel. One is a key-operated on/off switch with a LED on/off indicator. The switch may be desirable in turnkey applications, but it isn't especially desirable when the 8813 is used as a personal computer system. In my own case, I managed to lose the key while transporting the system from work to home, and until I found the key was left looking at a permanently

turned-off computer, wondering how involved it would be to simply short out the on/off switch. In silent mockery, the key bears the inscription, "Do Not Duplicate." The other control on the 8813 is a LOAD button. Just press LOAD and the system restarts itself, by loading and running a program contained on the diskette in drive #1.

The 8813 also includes a video display board, which can be connected to a standard video monitor to provide very high quality output, and a custom keyboard which is attached to the computer with a ribbon cable. The Poly video board displays 16 lines of 64 characters, including the usual alphanumeric as well as Greek letters, math symbols, and graphics characters.

Another nice feature of the 8813 hardware is that the floppy disk drives shut off automatically if they're not accessed within about 15 seconds. This prevents excessive wear of the diskettes in applications where the computer is left on all day, but on the other hand it doesn't degrade performance when the disk is being accessed frequently (because it does take a little time for the disk to come up to speed before it can be read or written).

Disk Operating System

When the system is booted up (by pressing LOAD or by turning the power on) it can begin running a disk operating system, or some other program that you specify. The DOS (called EXEC) permits you to list the contents of a disk directory, delete files, pack a diskette, run programs stored on a diskette, etc. The packing operation is necessary, because when programs are "deleted" from a diskette, in reality they are only marked in the catalog as being deleted. To recover the space used up by deleted files, one must pack the diskette, which results in juggling the positions of the files on a diskette to eliminate the deleted files. EXEC signs on by printing a title, and then waits for your input. However, you may not always want to use EXEC when the computer is turned on or restarted. If any file on the diskette in drive #1 is named INITIAL *that* file, rather than EXEC, will be loaded and run instead. So if the BASIC language program was renamed INITIAL, the

system would sign on with BASIC rather than EXEC, freeing inexperienced users from having to figure out how to get from EXEC to BASIC. (Of course, that isn't very hard either. To run a file, you just have to type its name. So to get to BASIC from EXEC, just type BASIC.) Furthermore, if INITIAL is a BASIC program, the system is smart enough to know that it must load BASIC first, and then your BASIC program. This is a very handy feature, which we haven't seen on any other system.

Disk files stored under EXEC may have names of up to 32 characters and two-letter extensions that identify the file type. For instance, GAME.BS is a BASIC program, LETTER.TXT is a text file, MACHINE.GO is a machine-language program, INVENTORY.DT is a data file for BASIC, and so on. If you don't tell the computer which disk drive to look on for a file, drive #1 is assumed. Thus PROGRAM.BS is assumed to be on drive #1. If you want to refer to something stored on drive #2 or #3, you put the number of the drive in before the file name, as in 2 PROGRAM.BS. It is normally not necessary to use the extensions yourself, unless you have several files with the same primary name but different



The minimum PolyMorphic 8813 system consists of one floppy disk (three are shown here) in the main cabinet, a typewriter keyboard, and a video monitor, plus 16K of RAM memory.

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extensions. Normally, the computer takes care of the naming of extensions.

The system software is oriented toward doing I/O with the 8813's own keyboard and video display. In other words, you can't hook up another terminal and use that instead. But there's no need to, since the video display provides a very readable and flexible means of displaying output. For hard copy, the 8813 has a printer port for any RS-232 device, and a printer driver and configuration routine that permits you to set up all the parameters for your printer in software, instead of by changing switch settings or jumper wires in the hardware. Unfortunately, the 8813 software is not designed to let you say, "Print out everything that's displayed on the screen." Instead you have to use separate commands to specify that something will be sent to the printer. Granted, the video display has many special characters that most printers do not, and in some applications it may be desirable to use the screen for one thing and the printer for something different, but it would be nice to give the user the option to do either. While on the subject of I/O, we'd like to point out another nice feature of the 8813's buffered-ahead input. This means that while the system is busy with some operation, you can type commands for it to execute when it's ready. A light-bulb inside the LOAD button indicates when the system is accepting the buffered-ahead input.

Text Editor

Included in the 8813 system software is a very nifty screen-oriented text editor. The editor operates upon a disk file but the editing is actually done on a buffer in memory. The screen is used as a window on any 16 lines in the text buffer. Text may be added, inserted, deleted, moved as a block, searched for some string of characters, and so on, by using a cursor that may be positioned anywhere in the text buffer. This editor isn't the ultimate, but I would certainly prefer a screen-oriented editor to a text editor that must work around the constraints of a normal terminal and which must use line numbers or some kind of non-visual text pointer. The text editor may be used to create or modify BASIC program files. To use the editor, just type EDIT FILENAME when in EXEC. Sure beats typewriting if you can justify the cost.

In case you are interested in machine-language programming, the 8813 EXEC software has a simulated front-panel mode, in which the screen displays the registers, memory, etc. This helps you debug your assembly-language programs. The 8813 system software includes a disk assembler.

Disk BASIC

PolyMorphic's Disk BASIC seems like a good BASIC. It has most of the features people expect in an Extended BASIC: a full set of functions (SIN, COS, TAN, ATAN, ASIN, INT, SGN, RND...), character strings, arrays, multiple statements, etc. It also has some nice features you may not have seen before: DUMP to print out the values of all the variables used in a program, data file handling, a MAT statement (which works as an implied FOR loop on a matrix), and PLOT for use with the Poly video display. PLOT is really a lot of fun. The video screen represents the first quadrant, and using PLOT you plot X and Y values. The plot extends from 0 to 127 along the x-axis and from 0 to 47 along the y-axis. With suitable offsets and scaling factors, you can plot whatever you want. With only a couple hour's experimentation, I was able to plot parabolas, sinewaves, and even functions in polar coordinates. Of course, it doesn't have the resolution of a real plotter, but it's within the financial reach of many more personal and educational computer users.

We only have two complaints about PolyMorphic's Disk BASIC. First of all, it is necessary to use an EXIT statement to leave a FOR loop prematurely. If EXIT is not used, BASIC assumes that all FOR loops are active unless they have been terminated normally. When EXIT is used, BASIC forgets all active FOR loops. In other words, there is no easy way to leave an inner FOR loop prematurely, and to keep using an outer FOR loop. A lot depends on the internal structure of BASIC, but off-hand it would seem to me that it's much better to have BASIC itself determine when a loop is active or not. One can simply decide that (1) all normally terminated loops are inactive, and (2) all active loops begun after a loop that has been terminated or re-started are inactive. EXIT is non-standard (you won't find it in any BASIC books) and it seems like a kluge. The other problem is that BASIC can't detect the end of a data file, but this can be remedied by merely using a dummy data-item to detect an end of file.

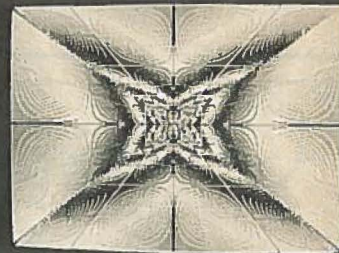
Another good feature is the WALK command, which lets you single-step a BASIC program to see what's happening. This is like a TRACE, but with a little more flexibility. Overall, Poly's Disk BASIC is good.

Error Messages

One of the things that impressed me most about the 8813 was the completeness of system error messages. Generally, a complete description, not a numeric code, is displayed. For instance, BASIC will point to a location in a statement and

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say "Bad Subscript" or EXEC will say "I can't do that to a system file!". Instead of telling the user BS ERROR or ERROR 0232. And, after all, why should people have to learn codes and abbreviations for errors? The 8813 software uses disk overlays so that the functions of the system are not directly limited by the amount of memory in the computer. Since floppies are not as fast as hard disks, the overlays must be planned carefully, so that response time is not degraded to a serious extent. But with the overlays, it is possible to keep BASIC's error messages out on disk, and only call them in when needed.

The 8813 manual is well-written and contains enough explanation for a beginner in using the computer. For example, the manual explains what a floppy disk is, and tells the user that he doesn't want to remove it from its sheath. OK, if you've used diskettes before, that may seem a little stupid, but it isn't immediately apparent to a first-time user that you don't want to take the disk out of its little envelope. Likewise, the manual includes an introduction to BASIC, and a regular full-scale manual.

One of the diskettes that came with our 8813, borrowed for review, had some interesting application programs, for business analysis, planning of a personal budget, etc. These programs aren't available from PolyMorphic—they feel that the computer stores can do a better job of helping customers with applications programs—but they did demonstrate to me that the 8813 is quite suitable for running these kind of applications.

The 8813 can be used with as little as 16K of memory, but of course more may be required, depending upon your application.

Who should buy the 8813? I don't think it's a machine for hobbyists. For amateur computing, a Z-80 system with full-sized IBM 3740 compatible disk drives and an interface to a standard RS-232 terminal would be more useful. On the other hand, the 8813 might be an ideal choice for the professional who has some serious use in mind for his computer and doesn't really want to hack around with computers themselves, or for education. The 8813 has so many well-planned details that we can't remember them all. Although the 8813 is priced at the high end of the microcomputer market, it offers an integrated and people-oriented package of hardware and software, found in few other systems.

