Discount Program News

Once again there are several changes and additions to the University Microcomputer Discount program: Zenith is now shipping one of the products we described in the July newsletter, Hewlett-Packard prices have changed, we have Hewlett-Packard's new UNIX machine at the HelpLine, and we also have AT&T's UNIX PC (the 7300) available for your inspection at the Micro HelpLine. Here are the details:

Hewlett-Packard News

Prices for Hewlett-Packard equipment available through the discount program have decreased. Here are some representative prices:

- 2686A LaserJet Professional PC printer with RS-232 interface, toner cartridge, 10-point Courier font $1999
- 225C ThinkJet printer with parallel interface $284
- 225D ThinkJet printer with serial interface $284
- 7470A001 2-pen plotter, RS-232 interface $627
- 7475A001 6-pen plotter, RS-232 interface $1085
- 45710A HP Portable microcomputer $1714
- 45650B Touchscreen Personal Computer, 256K memory, two 3.5'' floppy disk drives (710K capacity), two parallel ports, one HP-IB port, MS-DOS 2.11 $1999

We now have Hewlett-Packard's new machine (the Integral) at the Micro HelpLine. This transportable machine runs HP-UX (Hewlett-Packard's version of the UNIX operating system). The UNIX kernel is built into Integral's ROM along with P.A.M. (a window manager that acts as a shell between you and UNIX). The Integral's display is a flat-panel electroluminescent screen and there is an ink-jet printer built into the system. The complete system weighs 25 pounds and is very compact. When closed the Integral is about the size of a sewing machine. Here is what it all costs:

- 98807A Integral, 512K memory, one 3.5'' disk drive, electroluminescent display, keyboard, built-in ThinkJet printer, one HP-IB interface, two HP-IL ports, two expansion slots $2858
- 82925A 256K memory card $398
- 82927A 512K memory card $856
- 82919A RS-232 interface card $112

(Discount Program News continued on page 7)
Review:
Turbo Pascal 3.0 for
the IBM-PC family

We have been using the new version of Turbo Pascal (3.0) for the IBM PC, XT, AT, and IBM-compatible microcomputers for two months. Based on our experience, we enthusiastically endorse this product. Turbo is an excellent package at a very low price ($42 at the Minnesota BookCenter). Turbo Pascal is a fast and efficient Pascal compiler with an integrated full-screen editor. (A compiler is a program that takes program statements and translates them into code the computer can execute.)

The Turbo Pascal system requires 39K of disk space. Other Pascal compilers such as Microsoft Pascal require over 300K of disk space. There are other advantages to Turbo's compact size in addition to the obvious one (using less space on disk). Turbo's compiler and editor reside together in memory, so moving from the editor to the compiler during program development is exceptionally fast. Since Turbo resides in memory, switching from the editor to the compiler does not require a disk access. Using Turbo you can enter the editor, create the source text for a program, exit the editor, compile the text in memory, and immediately return to the editor if an error is found.

Turbo Pascal is a menu-driven environment; when using Turbo, you have a menu of commands at your disposal. You select a command by typing a single letter. Each menu item is displayed as a word or phrase, with the key letter highlighted on the screen. From the menu you can edit or compile your program, change the default disk drive, view and change directories, or change compiler options. Since you rarely need to leave the Turbo environment, program development is simple, fast, and efficient.

The Editor
The Turbo editor commands are a subset of the WordStar commands. Because the Turbo editor is intended for program development, it does not include word processing features such as word-wrap, underlining, boldface, italics, or paragraph reformatting. If you are already comfortable with an editor other than WordStar, you can customize the Turbo editor to resemble the editor you prefer. To customize the editor, you run Turbo's installation program and specify the keystrokes to move the cursor up a line, down a line, and so on.

The Turbo editor is an in-memory editor. This means that all the text you are working with must fit in memory at the same time. That's why the editor is very fast. However, this also means that there are limitations to the size of the file that can be edited. In the Micro Group, we have rarely found this size limitation to be a problem. If you are working on an extremely large program, the solution is to use the compiler Include directive. It provides the ability to split your program into smaller modules and put the modules back together at compile-time. The Include facility also aids program clarity: Commonly used subprograms, once tested and debugged, may be kept as a library of files that can be included in any other program.

If the compiler detects syntax errors in your program as the program is being compiled, Turbo automatically returns you to the editing mode, with the cursor positioned on the program line which caused the error. Thus, changing and recompiling programs is fast and painless. These features make Turbo an excellent choice for learning Pascal.

Deviations from Standard Pascal
Turbo accepts almost all standard Pascal statements, as described in the Pascal User Manual and Report by Jensen and Wirth, so it is possible to write highly portable code. However, there are some deviations from standard Pascal. The most notable ones are:

1.) The standard Input/Output procedures Get and Put are not implemented. Instead, the Read and Write procedures have been extended to handle all I/O. This is the most significant deviation, and it is actually an improvement over the standard Pascal. Of course, it's time consuming to convert Pascal code containing Get and Put to Turbo Pascal, and it does diminish the portability of the code. But we have found that using Turbo's more generalized Read and Write statements does have its rewards. Many programs become simpler in the process.

2.) The GoTo statement is restricted to transferring control only within the currently active block.

3.) The Page procedure is not implemented.

(Turbo Pascal continued on page 3)
4.) A program may not pass procedures and functions as parameters to other procedures. This is not unusual, since almost no microcomputer version of Pascal has this feature.

Extensions
Turbo contains several extensions to standard Pascal. The most useful are strings, easy access to the operating system, graphics, and the overlay facility.

Strings
Turbo has implemented strings (a string is a dynamic-length array of characters). This non-standard feature is essential in a compiler, since strings are almost indispensable for most programs. In fact, nearly all microcomputer versions of Pascal have string extensions. Turbo strings and standard procedures for manipulating them closely resemble those found in UCSD Pascal. The maximum length is declared with the string. Strings may not exceed 255 characters in length.

Accessing the Operating System
With Turbo you can access the operating system without using assembly language. For example, there are procedures for graphics, input/output redirection, accessing and changing file directories, and writing directly to memory and ports. If these built-in procedures are not sufficient, you can descend to a lower level. There are many routines built into the IBM ROM and IBM operating system. You can call these routines directly from Turbo by creating a Pascal record of CPU registers. You assign values to the appropriate fields of the record, and then call the INTR or MSDOS procedure with the appropriate interrupt to call the ROM or operating system routine.

Graphics
Turbo Pascal provides built-in procedures for some simple graphics. These procedures let you plot points at specified coordinates and draw lines between two coordinates. There is also a library of extended external routines for more complex graphics, including the capability of putting shapes on the screen, filling them in color, and turtlegraphics. Turbo turtlegraphics is based on the "turtle" concept devised at MIT. To draw graphics using turtlegraphics you give conceptual commands to a turtle. The turtle drags a "pen" as it moves, so commands instructing the turtle to "walk" a given distance and turn through a specified angle result in lines that correspond to the turtle's path.

Overlay Facility
Turbo has a simple overlay facility. The overlay system allows you to create programs that are larger than can be fit into the computer's memory. You preface procedure and function declarations with the word overlay and the compiler will keep track of them. When you execute your program the overlay files will be read into memory as needed.

License Agreement
Borland has a no-nonsense license agreement. The license agreement says, "This software is protected by both United States Copyright Law and International Treaty provisions. Therefore you must treat this software just like a book with the following single exception. Borland International authorizes you to make archival copies of the software for the sole purpose of backing-up your software and protecting your investment from loss."

By saying "just like a book" Borland means that this software may be used by any number of people and may be freely moved from one computer location to another so long as there is no possibility of it being used at one location while it's being used at another. Since a book can't be read by two persons in two different places at the same time, neither can the software be used by two persons in two different places at the same time. Programs compiled using Turbo Pascal can be distributed without additional licenses or fees.

Limitations
Turbo is not acceptable for those applications where you must have a lot of assembly-language support routines, because it has very limited capabilities for handling them. In fact, you must be a guru-level programmer to get them to work at all. This isn't much of a drawback since Turbo has a good interface with the operating system so assembly-language subroutines are seldom required.

Memory in the IBM PC has a segmented architecture. This means that you cannot access the memory as one continuous block; instead you may access memory only in discrete chunks (segments) of 64K. Some Pascals, such as Microsoft Pascal, deal with the IBM segmented architecture by allowing you to have more than one code segment and switch between them. With Turbo Pascal, you...
Updated MacWrite
(Version 4.5)

This article explores some consequences and features of the new MacWrite (Version 4.5) that are not discussed in the Macintosh Update. We also suggest some procedures for working with the new version of MacWrite.

The new MacWrite, a new Font Mover, and an application (System Update) to make installation of the new Imagewriter resource and Finder (Version 4.1) easier, are available in our lab. The lab also has a new MacPaint (Version 1.5) and a new Imagewriter font. All these updates and their documentation fit onto two disks. To make a copy bring two initialized disks to the Microcomputer Systems Lab in 125 Shepherd Lab. We're open Monday-Friday (except for University holidays), 9:30 a.m. to noon and 1:30 p.m. to 4 p.m.

Even if you just recently purchased your Macintosh you may want to get this update. There is usually a fairly long delay between when a software update becomes available, and when the new software is shipped with machines. This happens because there are a large number of machines in the distribution pipeline.

MacWrite (Version 4.5)
The old MacWrite (MW) kept your entire document in memory while you worked on it. The new MW uses the disk to hold the document and uses the 128K (or 512K) memory to hold the section of the document you are currently working on. So you can create and edit larger files with the disk-based MW than with the old version of MW.

The new MW is paragraph-based. Both the old and new MW recognize a paragraph as characters broken up by a carriage return, ruler, picture, or page break. MW 4.5's files can contain a maximum of 500 carriage returns on a 128K Mac (2047 on a 512K Mac). If you create an average prose document with MW 4.5, Apple says you can save a 60-page document on a 128K Mac and a 250-page document on a 512K Mac. (250 pages is the maximum MW 4.5 can handle.)

When you use the new MW to open an old MW document, the old document is automatically converted to work with the disk-based MW. A converted document is always named Untitled. If you don't plan to use that document with the old MW again, save the converted document under the same name as the old (unconverted) version. Note that the old version of MW cannot open a document saved with the new version of MW.

How to Set Up a MacWrite Work Disk
You can store 400K on Macintosh disks. 1K = 1024 bytes = 1024 characters; think of the disk's storage capacity as about 400,000 characters. If you keep the minimum system files and MacWrite 4.5 on your disk, you will have 176K of unused disk space. In our example these minimum files take up 224K of disk space. Here are the files needed on our minimal MacWrite disk:

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finder (Version 4.1)</td>
<td>41</td>
</tr>
<tr>
<td>Scrapbook (empty)</td>
<td>1</td>
</tr>
<tr>
<td>Note Pad (empty)</td>
<td>2</td>
</tr>
<tr>
<td>Imagewriter resource</td>
<td>25</td>
</tr>
<tr>
<td>MacWrite (Version 4.5)</td>
<td>70</td>
</tr>
<tr>
<td>reserved for MW 4.5's</td>
<td>15</td>
</tr>
<tr>
<td>temporary files</td>
<td></td>
</tr>
<tr>
<td>System (and fonts resources)</td>
<td>70</td>
</tr>
</tbody>
</table>

The Mac uses Chicago 12, Monoco 9, and Geneva 9 and 12, so you cannot remove these fonts from the System file. Since we like Geneva, we kept its 10-point size. You get the highest quality Imagewriter print if your System file contains a font definition that is twice the size of the point size you want to print. That's why we didn't remove Geneva 18, 20, and 24 (so we can print Geneva 9, 10, and 12 and get high quality). A System file with these fonts uses 70K of space.

Startup Disks
Disks that contain the system information to start the Macintosh are called startup disks. The files named System and Finder contain this information. These files are usually located in the System Folder, but don't have to reside there. Other files, such as the Scrapbook, Note Pad, and Imagewriter, are also system files. The Mac can use information stored in system files that are not on the disk you started the machine up with. For example: You turn on the Mac and insert a MacWrite disk (with the required startup files) in the internal disk drive. You edit a memo. Then you insert a MacPaint disk in the external disk drive and you create a picture. If this MacPaint disk also has the system files, then the Mac will switch alliance. It will use the MacPaint disk's system files rather than the MacWrite disk. The Mac uses the system files on the disk that started the machine.

(Updated MacWrite continued on page 5)
MacWrite 4.5's Performance
We repeatedly copied five paragraphs from a sample memo to test MW 4.5's capacity. On a 128K Mac we created a 21-page, 43K document (on a 512K Mac we created a 89-page, 178K document). At this point we got the This operation will give this document too many paragraphs message. If this happens to you, save and close the document you are working on. If you must add more text, you will have to delete a carriage return. Our sample memo was not representative of what the average writer would experience. On a 128K Mac you can typically create 50-60 pages (200-250 on a 512K Mac). Unfortunately, when documents get large MW acts sluggish.

We advise you to save your documents frequently and MW 4.5 provides an added incentive for saving. You will reduce occurrences of the Memory is full! This operation can't be undone message if you save often. Saving a document allows MW to do some housekeeping that frees memory. If you want to know how much space is available before you save your document, select the About MacWrite option under the menu. Incidentally, printing with MW 4.5 and the new Imagewriter resource uses much less disk space than with MW 2.2. We have printed a 41K file with only 7K of free space left on the disk.

Using MacWrite with MacTerminal
Text transferred with communications programs like MacTerminal frequently ends up with more carriage returns than MW 4.5 allows. To open a document captured by MacTerminal, select the MW icon along with the document icon. Before MW 4.5 will open this document it asks you: "Should a Carriage Return signify a new paragraph or a line break?" Normally you'd select signify a new paragraph since MW has at least one carriage return between each paragraph. However, if your text had many tables you might choose signify a line break. Then MW 4.5 would put a carriage return after each line. If you suspect your document will end up with too many carriage returns, use the old MacWrite.

Conclusions
We recommend that all Macintosh owners keep a copy of the old MacWrite (Version 2.2). Overall, Apple's updated software won't dramatically improve the performance of a 128K Mac with one disk drive, but 128K Mac owners with two disk drives and 512K Mac owners will find the updated software simplifies several operations.
Q: When I print documents from my Macintosh on the Apple LaserWriter, some fonts look much better than others. Why does this happen? I've heard that there are special fonts for the LaserWriter. Where can I get the LaserWriter fonts?

A: To answer your questions, we need to talk about how the LaserWriter works. The LaserWriter has several fonts built into the printer: Times, Helvetica, Courier, and Symbol. When you print with these fonts, you get the highest quality print of which the LaserWriter is capable. If you ask the LaserWriter to print with a font other than those which are built into the printer, the print quality will not be as good. Why? Because the fonts which were designed for the Imagewriter are defined at lower resolution than the LaserWriter is capable of printing. So Imagewriter fonts look about the same, whether printed on the Imagewriter or the LaserWriter.

Some programs (such as MacWrite) will tell the LaserWriter to substitute one of the LaserWriter's built-in fonts for an Imagewriter font when you print your document. This is possible when an Imagewriter font is similar to a LaserWriter font. The Imagewriter fonts (and their substitutes) are: Geneva (Helvetica), New York (Times), and Monaco (Courier). You can control whether or not substitution occurs by selecting the Font Substitution option of the Page Setup... dialog (located in the File menu).

When you print a document with font substitution, you may occasionally notice that what is printed does not exactly correspond to how the document appears on the screen. If being able to see exactly how your document will look when it is printed is important to you, Dr. Micro suggests that you use screen versions of the LaserWriter fonts, rather than using an Imagewriter font and depending on font substitution. To do this you will need to get the screen versions of the Helvetica, Times, Courier, and Symbol fonts. You can copy these fonts (in 12-point size) at the Microcomputer HelpLine if you bring in an initialized disk.

Q: My friends and I need to type or print class papers, but we don't want to buy a microcomputer or a printer. Where, besides your lab, can we go in the campus area to use a micro and/or a printer?

A: You have several choices. Each of the labs or businesses listed below is a public lab. That is, their use is not restricted to one University department or project. These labs set their own hours, choose their own equipment, and (except for Folwell) are not part of the University Computer Center. Our list probably isn't complete. If you learn of other public microcomputer facilities in the campus areas, let us know.

If you're a current U of M student or staff member you can use these facilities:

On the West Bank you can go to the Micro Lab in 167 Social Science Tower. During the summer they are open Monday-Thursday from 9 a.m. to 6 p.m. On Friday they close at 5 p.m. You can use their facilities if you buy an access card for their lab at the West Bank Bursar's. The card costs $10 and is good until the Fall Quarter begins. They have several Z-100's, a couple of IBM PC types, a Hewlett-Packard LaserJet printer, an Epson plotter, and other printers. Call them at 376-3544 for more information.

You can also go to the Electronic Study Hall in 170 Anderson. They have 10 IBM PCs and 10 Zenith Z-150's. Each microcomputer has a near-letter-quality printer (an Epson LX-80) attached to it. Their summer hours are 9 a.m. to 3 p.m., Monday-Friday. It costs $3/hour to use their facilities. Call 376-8651 for more information.

On the St. Paul campus you can go to the Campus Library. Room B50 has several IBM PC's and a few Macintoshes and Apple Ile's as well as draft printers. Their summer hours are 9 a.m. to 4:30 p.m., Monday-Friday. You buy their $10/quarter access cards at the St. Paul Bursar's office. Call 376-3910 for more information.

(Ask Dr. Micro continued on page 7)
Zenith News

The Zenith Z-148 is now available. For those of you who don’t recall the description from the July issue, the Z-148 is intended to be an inexpensive, entry-level machine. A Z-148 with 256K memory, two floppy disk drives, one serial and one parallel port, composite and RGB video output costs $1040. (You will also need to buy a monitor with the Z-148.) If you are interested in seeing a Z-148, stop in at the Micro HelpLine.

Recently, we had an opportunity to run a simple benchmark on the Zenith Z-200 (Zenith’s IBM-AT compatible) to test Zenith’s claim that the Z-200 runs 30% faster than the IBM-AT for RAM memory-intensive programs. Here is the Pascal program we used to test Zenith’s claim:

```pascal
program test; {bang on memory a lot}
const max = 32000;
var i, j: integer;
a: array [1 .. max] of integer;
beginn
writeln('start');
for j := 1 to 50 do
begin
  for i := 1 to max do
    a[i] := 2;
end;
writeln('stop');
end.
```

The program fills an array of 32,000 integers 50 times. We compiled the program using Turbo Pascal version 3.0 and ran it on several IBM-PC compatibles. Here are the run-times (in seconds):

<table>
<thead>
<tr>
<th>Machine</th>
<th>Time</th>
<th>% of IBM-PC Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zenith Z-200</td>
<td>14</td>
<td>23%</td>
</tr>
<tr>
<td>IBM-AT</td>
<td>19</td>
<td>31%</td>
</tr>
<tr>
<td>AT&amp;T 6300</td>
<td>23</td>
<td>38%</td>
</tr>
<tr>
<td>Zenith Z-150</td>
<td>60</td>
<td>100%</td>
</tr>
<tr>
<td>IBM-PC</td>
<td>60</td>
<td>100%</td>
</tr>
</tbody>
</table>

As with most benchmarks, this just gives you a general idea of speed in one special case. Here we are measuring speed in accessing memory. In this benchmark the Zenith Z-200 was 27% faster than the IBM-AT.

AT&T News

We now have an AT&T PC 7300 at the Micro HelpLine, in addition to the AT&T 6300. To refresh your memory, the 7300 runs the UNIX operating system and the 6300 is an IBM-PC compatible. Stop by and take a look.

Miscellaneous Notes:

- **Attention! Laser Printer Owners!**
  UCC Engineering Services wants to remind you to take some precautions before moving your laser printer. When transporting the laser printer make sure you remove the toner cartridge!!! If you do not remove the toner cartridge from the printer prior to transporting the printer, toner may spill inside the printer. When this happens the entire unit must be rebuilt. (The cost of this is not covered by the warranty nor service agreement). If you do spill toner inside the laser printer, do not turn the printer on.

- **Used Xerox 820s For Sale**
  Two Xerox 820 microcomputers with 8" double-density disk drives for sale. Purchased in 1982. Asking $500 per computer (willing to negotiate).
  Contact: Dana Garvey
  Department of Entomology
  phone: 373-1202, 373-1705
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