SUPERLETTER

Serving SuperBrain® Owners and Users Around the World

Oct./Nov. 1981
Vol. 1 No. 5

We've made some changes.

The most obvious one is with our type face. It's a bit smaller, but now we have greater control of our articles: more information per page within the space we have allotted for copy. And, we can print any important articles or stories that may come in at the last minute.

The other change is in the switching of "Guest Interview" to "Guest Article", a move which has generated much positive response. We're aware that our readers are requesting more and more facts and technical information on the SuperBrain. We feel that's a legitimate demand and we're happy to oblige the best way we can.

However, as you know, there is no plethora of information on the SuperBrain or CompuStar in any of the usual computer magazines. We have to go out and find it. And we have to depend on you to report back to us in writing on what you've discovered and are learning about the machines.

We are still awaiting a thorough comparison of the new Intertec DOS 3.1 with the other commercial enhanced PROMS and BIOS's. That article is unfortunately delayed.

But I hope you enjoy the two articles in this issue concerning CP/M's internal configuration and the affect of the new tax laws on your future computer purchases and sales.

Speaking about sales, we have learned that Computer Sciences Corporation has completed purchase of over a thousand SuperBrains in what was the single largest sale of any microcomputer to a major corporation. Do you think CSC will have to send them, at their own expense, back to the factory for service? I wonder.

Albert Abrams

EDITOR

Guest Article

HOW NEW TAX LAW AFFECTS SUPERBRAIN OWNERS

By Vernon K. Jacobs, CPA

Should you buy a computer this year or next? Should you lease or buy? Are there any other areas of the new tax law that might affect those who own or are thinking of owning a computer. There are at least 109 specific provisions in the "Economic Recovery Act of 1981", and it will be months (perhaps years) before the impact of all the provisions is evaluated.

It's almost certain that we will have another tax bill early next year to correct the inevitable technical errors and flaws in this hastily drafted and complex set of tax law changes. Nonetheless, here is a brief summary of some of the provisions of the new tax law that should be of specific concern to SuperBrain owners, lessees, and dealers.

Full Write Off For Small Computers: One of the provisions of the new tax law will permit businesses to deduct the first $5,000 of business equipment acquired in 1982 and 1983, the first $7,500 of purchases in 1984 and 1985 and the first $10,000 of purchases after 1985.

This means that many small desktop computers could be fully expensed in the year acquired. No investment credit would be allowed on such purchases but the immediate write off would usually be better. If the cost of the computer exceeds the deductible amount, the excess would be eligible for the new depreciation method. This full write off provision is not available for investors. It's only available if the equipment is to be used in a trade or business.

New Depreciation Rules: If you purchased a computer in 1981, the 100% write off won't be available, but the new method of depreciation (called the "Asset Cost Recovery System") does apply to 1981 equipment purchased. Under the new method, computers will be depreciated over a five year period using specified rates for each of the five years. (If computers can be classed as research and development equipment they can be depreciated over a three year period.)

For five year class equipment purchased in 1981 through 1984, the first year's depreciation will be 15% of the cost. The second year's depreciaiton will be 22% of the cost and the rate will be 21% in each of the next three years. The entire cost will be deducted over the five year period.

By contrast, the prior law permitted a computer owner to write off up to 40% of the cost in the first year if the equipment was placed in service before July first. An additional 24% of the cost would be written off in the second year, 14.4% in the third year and 10.8% in the fourth and fifth years. This assumes a five year life, which has been typical for computer owners.

Consequently, owners of larger and more expensive computers won't fare as well under the new law as under the old, but owners of desktop computers, such as the SuperBrain and the CompuStar, will be better off - assuming no other equipment purchases in the year. A good selling tip for retailers to remember.

If the tax deductions won't be available because of other tax deductions or business losses, computer owners will be able to elect to write the equipment off over a 12 year or a 25 year period using a straight line method of depreciation. However, the election to use the slower method is mandatory for each year's purchases - meaning you can't change your mind after a year or two.

The main reason to use a slow method of depreciation is to avoid the possible loss of deductions during a prolonged start up period due to the existing time limit on offsetting losses of one year against profits of future years.

The new law provides some substantial relief in this area - which may make the slower depreciation method unnecessary. Previously, business losses could be carried forward for seven years, but the new law extends this to 15 years - retroactive to 1976.

Continued on page 2

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Continued from Front Page

Changes In Rules For Investment Tax Credits: Computer buyers will realize a small increase in the amount of available investment tax credit for purchasing a computer. Under current law, equipment with a five year useful life is eligible for 2/3 of the full 10% tax credit. Equipment with a five year life will now be qualified to claim the full 10% tax credit for equipment that is depreciated over a period of five or more years.

If the equipment will have a three year useful life (autos, trucks, and certain R & D equipment), the tax credit will be 6% of the cost of the property rather than 10%. These new tax credit rules take effect in 1981 - including property that was acquired before the law was passed. (It was signed on 8/13/81.)

There was no specific change relative to claiming the tax credit on the full cost of a system that included both hardware and software. However, if the tax credit is claimed on the software because the price is combined with the hardware, then the buyer must depreciate the software with the hardware. If the software is purchased separately, and is licensed rather than purchased, then the full software cost can be deducted in the year of acquisition.

New Rules For Defining Leases: Taxpayers and the IRS have been arguing for years about whether a lease is really a lease or just a method of financing an equipment purchase. The new tax law attempts to simplify some of the complex rules that have cropped up in this area of controversy.

Basically, the parties must clearly agree that the transaction is a lease and the lessee must not acquire ownership of the property at any time during the lease. The lessor must be a corporation and must have an investment of at least 10% that is "at risk" in the investment. Generally, the property must be new property.

(EDITOR'S NOTE: Vernon K. Jacobs practices as a tax consultant in the Kansas City area. He edits Tax Angles and publishes Financial Systems Report, a monthly six page report about computer systems for financial specialists. You may contact him at: Research Press, Inc., P.O. Box 8137-P, Prairie Village, KS 66208, (913) 362-9667.)

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Factory News

NEW MARKETING HEAD TAPPED BY INTERTEC

Jim Rutledge has been named new Director of Marketing for Intertec Data Systems.

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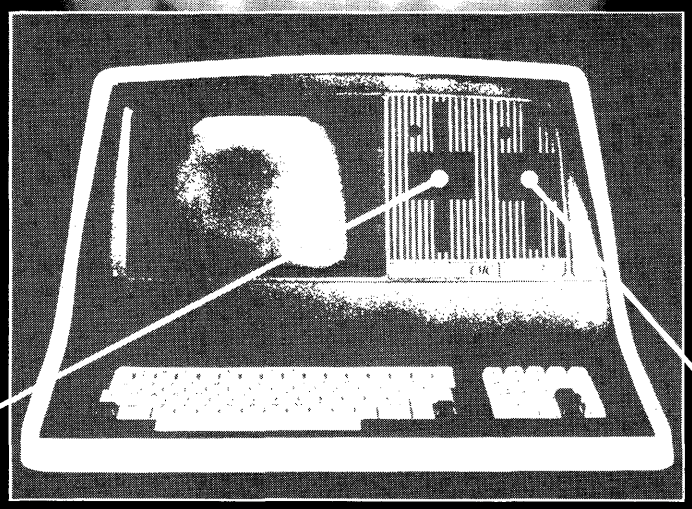

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Technical Corner

CP/M UNVEILED
By Andrew Billson, Ph.D,

Courtesy of "Computer Age", Issue #17

Introduction: CP/M is a suite of software routines written by Digital Research, Inc., which significantly enhances the utility of microcomputer systems using the Intel 8080 microprocessor. Since the Zilog Z-80 cpu will run 8080 code as a proper subset of its own instruction set, this software will also run on Z-80 based machines.

All the popular branded micros now incorporate either the slower and less powerful MLS Technology 6502 or the Z-80, and a very large number of home-brew machines were based on the 8080. Adoption of CP/M on the latter was the basis of CP/M's market success, leading to a large number of machine manufacturers choosing to integrate it with their own hardware products.

The system is satisfactory rather than good, but it is relatively bug-free and is reasonably compact; i.e. it works! The documentation, unfortunately falls way below the generally abysmal industry standards.

The main strength of CP/M is a sensible high-level structure which defines an interface with the hardware and thus allows machine-dependent routines not to affect the outward appearance of its operations. This interface is called the BIOS and is the major concern of this article. First, however, let's recall the system structure, revealed in a Computer Age article by Martin Healey in April, 1980.

Overview of CP/M: In his article, Professor Healey gave a memory map for a typical 48K system. To illustrate some of the possible variation from this schema, I have shown in Figure 1 the memory map for an Intertec SuperBrain with 64k bytes of RAM. The SuperBrain system is in fact larger by 1 kbyte because it is built around CP/M 2.2, and is enlarged still more by code provided by Intertec Data Systems.

Let us first of all compare the two versions of CP/M:

Both use page 0 for I/O and disk buffering, and to hold certain system parameters. In particular, the size of memory available to transient programs (the TPA) is easily found by examining the jump-to address at 0006 and 0007, since a jump to fbase resides at 0005. This area is located at 0100 upwards in standard CP/M systems. Located above the TPA is the CP/M system code consisting of three major areas.

First there is the Console Command Processor which interprets the user's requirements. Version 2.2 has the same built-in functions as 1.4 (DIR, REN, ERA, TYPE, SAVE) and the same facility to look for a ".COM" file of any other name. Some changes have been introduced to support a USER distinction between files, and there are some minor improvements in terminal handling.

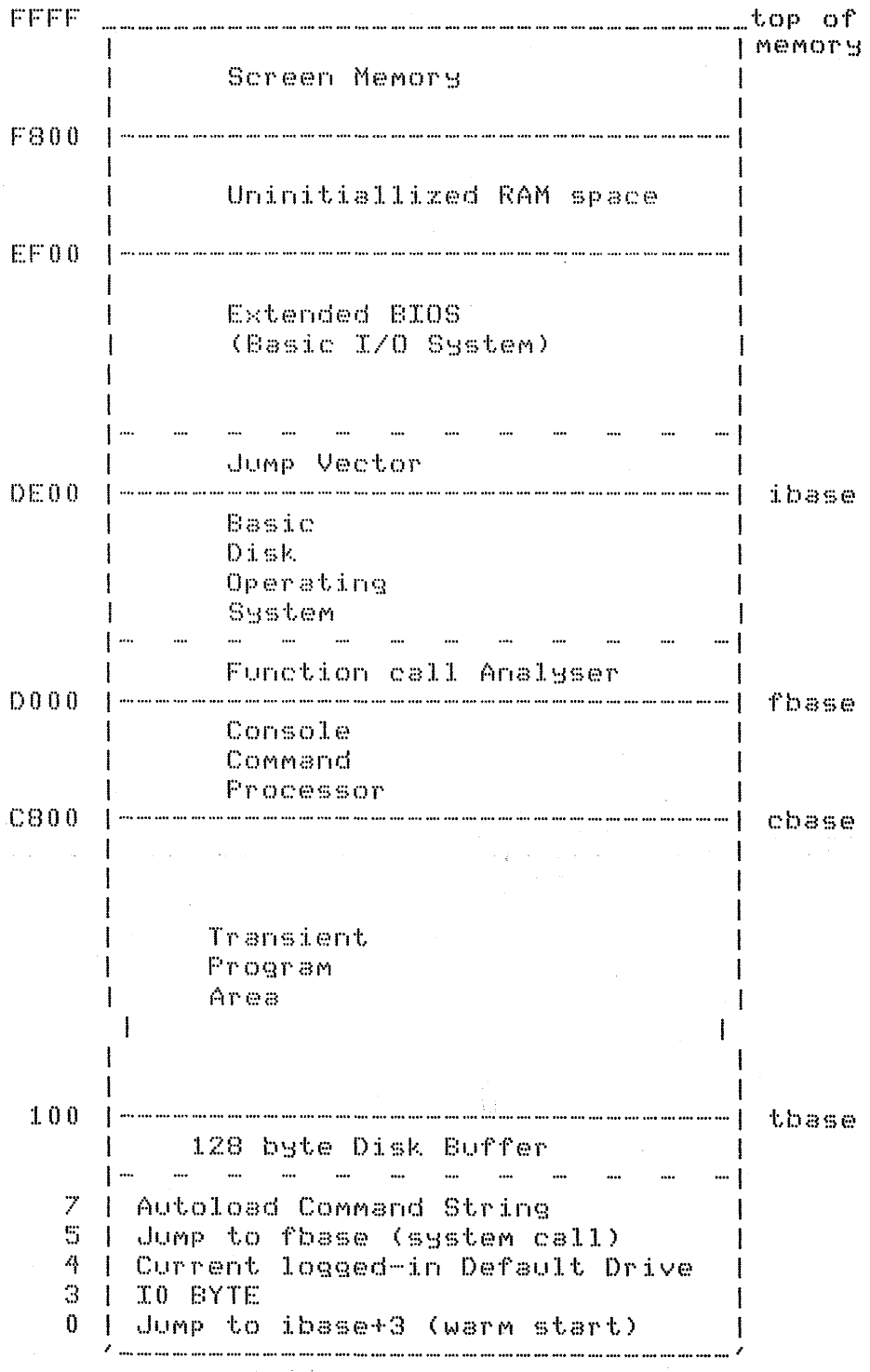

Figure 1. Intertec Superbrain Memory Map.

The CCP occupies the same space in both versions and is placed at the same position on the systems tracks of a disk.

Next comes the BDOS which is considerably enhanced in Version 2.2, there being 11 new function calls and changes to 8 others. The significant improvements relate to better file handling and directory manipulation, including file level attributes (USER, R/W status, SYStem file-types) accessed via the STAT utility, and system support for random access files.

Unfortunately, the file-store has not been made hierarchical so it is not possible, for example, to put SYStem utilities in USER 0 and automatically load them from any other user number. The BDOS code is one page (1/4k) larger in Version 2.2 than in Version 1.4.

Above BDOS, there is the BIOS code provided by the tailoring expert to match the particular hardware; this is typically followed by an area of uninitialized memory reserved for use by the BIOS, and further memory for hardware use.

In the case of the SuperBrain, 4k is reserved at F000; the first half of this space is used by various stacks, and the top half is used to hold the screen display characters.

A look at the BIOS: By way of simplification, it is sometimes said that CP/M 2.2 requires 7k of RAM. This is only true so far that two tracks of an 8" single-density IBM-format floppy disk are assumed to be loaded by the bootstrap process. In fact the CCP occupies 2k of memory, the BDOS code occupies the next 3.75k, and a further 1k is allowed for BIOS code.

In the SuperBrain, however, the BIOS is 4.75k, much larger than the skeletal BIOS in a 'standard' CP/M. The system only reserves two disk tracks for itself, but they are 5 double-density tracks holding 40 sectors each — enough for 10k of code. Thus Intertec's CP/M matches all the parameters of a system tailored to a 57k machine. The free memory space is, therefore, 50k.

BIOS code in a CP/M system starts with a jump vector which is expected, by the rest of the system, to obey certain conventions. The obvious example is that the second three bytes of the BIOS should be a jump to the 'Warm Start' routine (the first three lead to a 'Cold Start').

This is because a warm start, or reboot, is promised as the result of jumping to 0000, and a jump to ibase+3 is specified at that location; thus to complete the sequence a jump to the actual code to be executed must appear at ibase+3 -- occupying the second three bytes of the BIOS. A total of 17 jump instructions are similarly defined by the interface assumed between the BIOS and the rest of CP/M.

The purpose of this jump vector is to permit arbitrary long code routines to be written to perform the required functions and to permit these to be changed or enhanced later.

The location of one of these routines, and hence the jump address, can be determined at assembly or re-assembly of the BIOS; provided that the jump locations are preserved, there will be no need to alter any code which uses or calls BIOS routines as long as they are accessed by way of the jump vector.

While those routines which must be provided by the BIOS are essentially the same for all machines, there may be some which are optional (e.g., a real-time clock) and all will vary according to the selection of particular chips comprising the real machine.

For example, the choice of CRT controller will determine the values to be tested for in its status port and the form in which it will expect data for display, 'Driver' code for the serial port controller (an 8251 USART in the SuperBrain) and for collecting and interpreting keyboard characters are other examples.

Internal BIOS Enhancements: The most significant addition to the BIOS in CP/M Version 2.2 is provision for the ability to mix drives with different characteristics on a single system; in particular, a hard disk can easily be defined as several logical drives. This is accomplished by associating a disk header block with each drive. This contains 3 words for system use and 5 addresses.

The addresses point to a logical-to-physical sector translate table, the shared directory buffer, a disk parameter block shared by drives with similar characteristics, and two scratch-pad areas unique to each drive.

In its turn, a disk parameter block contains values which determine the number of tracks, the number of directory entries and the block allocation size for diskfiles on the drive in question. One minor problem in changing these values is that several inter-dependent changes are typically required.

The fixed data of the disk header and disk parameter blocks are just some examples of constant values built in to any particular system. Other examples in the SuperBrain are the values found at EF00 et seq.; these are used to define serial port characteristics; line frequency, and whether read-after-write verification is to be carried out.

Use of such data by an application program, even mere inspection, is a violation of the system interface leading to potential incompatibility of software on different versions/releases of a system.

A very common violation on SuperBrain seems to be direct use of the memory locations which store the top-of-screen address and the cursor address. Violation of this nature introduces a compatibility problem when enhancing the BIOS as described in the next section; this problem can only be resolved by preserving those locations which are frequently accessed.

External BIOS Enhancements: The public nature of BIOS code lends itself to the construction of improved systems by providing an enhanced BIOS to be integrated with the standard CCP and BDOS parts of the original.

One obvious example is the actual provision of mixed drive systems: 8" single-density drives can now be added to the SuperBrain (requiring a hardware interface as well as BIOS support), double-tracking 5" drive systems have been available for some time, and 5 Mbytes of Winchester disk storage are now available inside a standard SuperBrain cabinet.

A repeating, type-ahead keyboard buffer has been integrated with the SuperBrain, fully compatible with the standard system. This facility improves the throughput of an experienced user and allows autoloading to be implemented as a quite trivial operation. At the same time a keyboard translate table may also be defined to generate frequently used character sequences, such as BASIC reserved words.

As a final example, consider the provision of a real-time clock. It is quite easy to provide a software clock by reserving a few bytes of memory, whose values are regularly incremented by an internal interrupt.

CP/M, however, does not define such a function and so there are no system calls to set or read the clock. Thus, although the clock can be provided, access to it is only possible by way of technical violations of the system interface.

Summary: CP/M consists of three major parts, one of which, the BIOS, is public and defines the interface with the hardware of the real machine. This code is skeletal in the issued system, but has been extended by individual manufacturers for sale with their products.

Further enhancements may be possible by independent software writers, although compatibility issues raise problems which are important to resolve. Some facilities available with an enhanced BIOS may require a technical violation of the system interface in order to access them.

(Editor's note: Dr. Billson is the creator of the "SuperVid" and "SuperBios" modification packages for the SuperBrain. He may be reached c/o MicroMods, Ltd., 53 Acton Road, Long Eaton, Nottingham, NG10 1FR, England.)

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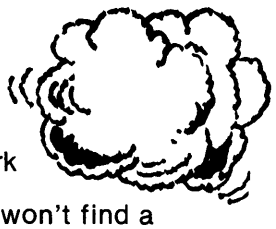

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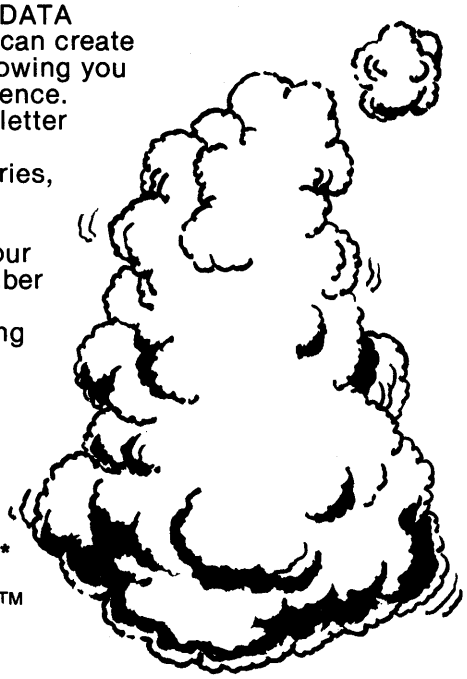

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Letters to the Editor

Our company bought several 10 MB disk drives from Intertec for use with the CompuStar 30. We've encountered what seems to be a "thermal shut-off" problem in each one of the drives.

We'd appreciate hearing from users and dealers if they have encountered the same thing and what solutions they've found. Taking the cover off the disks helps, but it's not the answer.

W. Fred Rump
President
CompuData, Inc.
(215) 667-6843

(Editor's Note: One dealer has attached special small fans onto the side of their disk drives to provide better cooling during the operation.)

I would like to see reports on CP/M networking and high-speed modems (600 to 1200 baud) for the SuperBrain. By the way, Superletter is great, but not frequent enough to feed the hungry.

James G. Worth
Miami Springs, FL

First of all, thank you for the super job you're doing. Superletter is packed with information.

If possible, I would like to see a rundown of modems in the near future. I don't know which is the best to buy. I also would like to see a survey of information sources, like CompuServe and the Source. I'm sure a lot of readers would enjoy it.

Margaret Bailey
24301 Partridge Circle
El Toro, CA 92630

(Editor's Note: It appears as if the subject of modems and information transfer via the SuperBrain is worthy of attention. We're open to any report and/or article from our readers on the subject.)

SuperClassifieds

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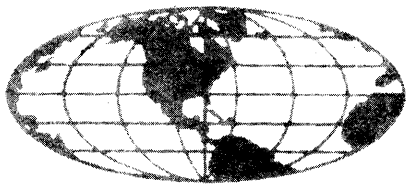

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