

SUPERLETTER

Serving SuperBrain and CompuStar Users Around The World

Oct/Nov 1982
Vol. 2, No. 5

Technical Corner

INSIDE THE SUPERBRAIN II

by Jonathan Platt
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A Review

The new line of Intertec Data Systems microcomputers introduced as the "SuperBrain II" includes all the CompuStar models as well. Certainly the most visible features of the new microcomputers are the excellent video enhancements comprised of character-by-character reverse video, half intensity, blinking and underlining, features sorely missed by users of the original machines. Equally refreshing is the addition of a continuous power time/date clock in hardware.

Intertec's new microcomputers show a marked improvement on all counts - and they are cheaper. Early reports from conversations with Intertec dealers indicate a substantial increase in reliability. The DOA rate which occasionally approached 50% with the old machines has now dropped to practically nil. Factory support for the end-user also seems to be improving. Outdated parts such as the hard-to-use triple-supply EPROMs have been replaced with the much simpler single supply EPROMs. Circuitry has been improved and the same circuit boards and power supplies used in the new SuperBrains are used in the CompuStars. The hard-disk port cables are just tied off in the back of the SuperBrains.

If both machines are the same, why doesn't everyone just get the CompuStars? They are more expensive. The CompuStars are supplied with the interface board for Intertec's DSS system and two extra ports out the back for the DSS cables. If you are absolutely sure that you will never want to expand to Intertec's DSS system, get the SuperBrain II. But how often have you asked yourself,

Continued on Page 3

As promised, we now begin a series of reviews of the new SuperBrain II computers.

We will be following Jon Platt's Technical Corner with end-user oriented articles in the future to give you an overall look at this new generation of SuperBrains and CompuStar.

Digital Research has announced the upcoming release of CP/M 3.0 which will replace the current CP/M 2.2 version. Improvements will include faster response time, easier-to-use operating commands, and, at last, new easy-to-understand instructions and documentation.

We will strive to keep you up-to-date about the new release and the cost for upgrading. Your current software and diskettes will all be usable with CP/M 3.0.

We are making plans for regional SuperBrain and CompuStar seminars around the U.S. Dealers, distributors and end-users will be invited to attend.

The meetings, if there is enough interest, will provide technical workshops, a market to demonstrate new products and add-on devices, and an open forum for the exchange of ideas and information.

We would like to cap the seminars with a Super Sunday at the NCC in Anaheim in 1983. If you would like to participate in any aspect of these shows, please let us know. Also, if you would like to initiate a similar meeting in Europe, we will help you publicize the event. Plans are also for the U.S. meetings to be held in Boston, Atlanta, Los Angeles and Seattle.

Those of you who have the talents and ingenuity should take advantage of the growing need for graphic EPROMs that will work in the SB II line. We have been asked by several companies if we know of any firms or individuals currently making these EPROMs. Something to think about and act on if you want to corner the market.

A new graphics board for the Model I SuperBrain is going to be released soon by an American company doing business in Japan. We'll have more details in our next issue. But it appears that you will be able to get reverse video, underlining, strike-through, blinking and highlighting on all or parts of the screen. The graphics, through dip-switches, will be under both computer and software control.

Many thanks to reader Edward Sayle for his positive mention of Superletter in a recent edition of "Desktop Computing" Magazine. His article considered our software sales a "bright spot" in the jungle of direct-mail software dealers.

Incidentally, you can still take advantage of our 10 MB Hard-Disk offer. They are still available for a limited time at the \$2500 wholesale price tag.

In addition, we have made arrangements with another wholesaler to offer you the new 40 CPS Daisywriter letter-quality printer, (with sheet-feeder!) for only \$2395 complete.

Our next prey? A 1200 Baud SuperBrain compatible modem with all the features of a top-of-the-line model for less than \$550.

If you would like to send us an article for publication, please send it on diskette with CR's at the end of each line. We will send you back the diskette after the type has been set. This method saves us time and insures better spelling accuracy before printing.

We'll be at COMDEX in Las Vegas at the end of November. If you're planning to attend, let us know and we'll arrange a time to meet and chat at the show. But even if you aren't able to make it, let us hear from you. We value and look forward to your feedback.

Albert Abrams
EDITOR

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Letters to the Editor

DEAR SUPERLETTER:

We have a copy of the CP/M User's Group Library on SuperBrain 5 1/4" quad diskettes. There are 47 diskettes full of public-domain programs in the library.

We can sell the entire library, including the costs of all diskettes and shipping. Or, if a reader wants a selective program, we will sell them a directory, and any program diskettes individually.

Vernon Lemens, Jr.
Southwestern Computer Services
1509 Guadalupe, Suite 300
Austin, TX 78701
(512) 476-2609

DEAR SUPERLETTER:

CMC is looking for Superletter readers who are providing secondary Eproms for the SBII addressing the area of Graphics, ASCII, Foreign, etc.

We are also looking for anyone who has a tape drive running of the SuperBrain. And, we would be happy to consider any new SuperBrain/CompuStar proprietary software developed by your readers in our dealer software directory.

Rick Wicklund
CMC International
11058 Main Street, Suite 220
Bellevue, WA 98004
(206) 453-9777

DEAR SUPERLETTER:

I recently purchased a KayPro II, a portable CP/M-based computer, to take to classes with me at the University of Alaska. I have a SuperBrain at home and I want to move programs back and forth between the two machines. I'd like to do it directly without going through a downloading to a Xerox 820 disk, which the KayPro II reads.

Bob Hickey
P.O. Box 222
Eagle River, AK 99577
(907) 688-9185

(Editor's Note: You can try a hard wire transfer of data via the serial ports at 9600 baud. Woolf's "Move-It", Microstuff's "Crosstalk" or Byrom's "BSTAM" are software packages designed for this purpose.

DEAR SUPERLETTER:

I have a CompuStar system and I'm using it in business applications.

I have most of the system at one store and a remote site communicating via DC Hayes SmartModems with enhancement of SuperSoft's Term III communications package. (Somewhat a problem to get implemented, but it's beautiful!)

My problem is getting the remote site communicating with the DSS-10 without disabling a complete console. I understand it can be done by changing the BIOS, in particular the IOBYTE.

Hopefully, one of Superletter's readers can offer me some help.

Tom Yarbray
Yarbray Television Center
2717 Pineroft Road
Greensboro, NC 27407
(919) 855-0390

DEAR SUPERLETTER:

We thought you readers would be interested in some of the reliability problems we have encountered using a SuperBrain DD and some solutions for them.

1. Disk Drive Problems:

As reported in the August/September issue, some SuperBrains will not read and write reliably, since different disk drives were interchanged in machines built at the factory. This is true even for newly aligned drives. To test for this, we have written and sell a drive test-program that writes, verifies and reads on all tracks of the disk surfaces. Based on our experience, Tandon drives all appear to be okay.

2. Spindle Motor Problems:

For long-term reliability, it is important to turn off the disk drive motor when not in use. Intertec publishes an ECO showing how to disconnect the drive motor control signal from the edge connector and strap it to the select line. The drive motor will then go on and off with the activity LED. There is a possible race condition between the motor getting up to speed and disk data transmission, but so far we have not had problems as the head access time always appears to be longer than the motor acceleration time. Unfortunately, the current required by simultaneous drive head select and motor startup presents a transient load to the 12 V power supply that aggravates another reliability problem:

3. Power Supply Problems:

The 5 and 12 volt power supply seems to collapse at times, giving it a reputation of

unreliable. Actually this power supply works well over a power line voltage range of 80 to 105 VAC. In the range of 105 to 125, especially at 125, it will fold back into current limiting under disk transient loads. A test for this is to verify reliable operation at 125 volts line while switching between drives A and B. Use Control/C from drive B. If the power supply collapses, trim the Q1 Emitter Resistor (about 0.5 ohms) by placing a 5 ohm resistor in parallel with it or insert a 30 ohm 5 watt resistor in series with the power supply AC input.

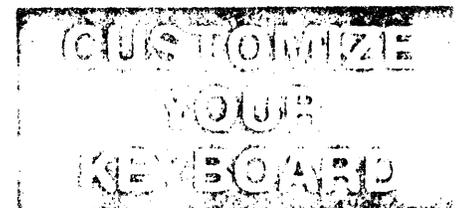
4. Intensity Jitter:

Several units have developed jittering CRT displays, marked by intensity and position variations. This has been caused by loose connections at capacitor soldered terminals on the video board. Intertec use vertically mounted capacitors, and the larger sizes stress their solder joints during shipping vibrations, causing some intermittent connections. The solution is to inspect and resolder as required.

If anyone has additional practical procedures to enhance SuperBrain reliability, or comments on our findings, we would appreciate hearing from them.

Arthur Zucchi
Optimized Devices, Inc.
220 Marble Avenue
Pleasantville, NY 10577
(914) 769-6100

Editor's Note: Our own SuperBrain has always had intermittent jitters. Now we know why! To be fair, we would like to note that Intertec has already made a determined effort to eliminate many of the problems outlined above. But we always appreciate close scrutiny and critical reviews from our readers.



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Technical Corner, Continued from Page 1

"How can I get more storage space out of this thing"? I believe that the continuous flood of requests for information regarding eight inch floppy and hard disk drive interfaces for the SuperBrain is a good indication of just how many people have asked this question.

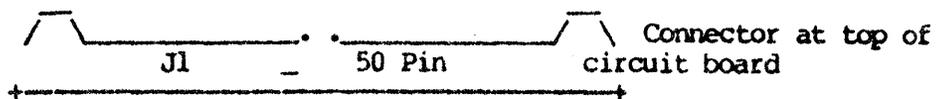
After using one of the first of the new machines, I was very disappointed that Intertec STILL had not implemented motor-off. Now three months later, both the SuperBrain II and the CompuStar models have magically turned up having this feature. Thus, buyers of the early new machines were short-changed. Not only is motor-off built in but the drives are also run independently. Power is applied only to the active drive. This provides a substantial increase to the useful life span for diskettes and the floppy drives.

Still lacking in reliability however, is the data separation circuit for the floppy drives -perhaps the most important aspect of the data storage/recovery system. Chances are, there will be little decrease in disk errors. If Intertec would simply use either a Phase Lock Loop (PLL) data separation circuit, or even better, the new Western Digital FD 2791, which has its own internal PLL separation circuit, CRC errors and the like would be unheard of. Perhaps when the "SuperBrain III" is introduced...

Only two apparent problems exist with the video system. First, the cursor is displayed one scan line too high. This probably will not offend any but the most demanding users. A little more offensive though, is when underlining passes through the last scan line of a lowercase descender. It makes the descender hard to read.

The Video System

The video display is the single most revised system of the new Intertec microcomputers. It centers around the addition of EPROM



Alternate Character Set (B)	Primary Character Set (A)
← — — — →	← — — — →
275	280
2516-35	2516-35
Single Voltage	Single Voltage
← — — — →	← — — — →

defined character sets and logic for four character by character attributes. The old CRT video display generator (VDAC) has been discarded. Discrete video logic is used in its place. No attempt will be made here to analyze how it works. How to use it is examined instead.

The Character Set EPROM

Refer to the map below for character set EPROM assignments. Intertec schematic nomenclature is used.

The TMS-2516-35 is a 16,384 bit (2K x 8) Erasable Programmable Read Only Memory (EPROM). Its usage is greatly simplified by the single +5 volt power supply. The -35 suffix signifies an access cycle rate of 350 nanoseconds.

As you can see there are sockets for two character generation EPROMs. The EPROM on the right (designated A) is the primary character set EPROM. If there is only one EPROM, this is where it resides. An alternate character set (designated B) may either be purchased from Intertec or you can make your own. It is placed in the socket on the left. This can be used for such applications as graphics or emulation of another terminal's character and graphic set.

These EPROMs provide the character bit pattern for a ten scan line by seven column set of pixels. The character field is the same size as the character font, giving access to every pixel on the screen via the character EPROMs. The EPROMs hold 128 character definitions with 16 bytes of 8 bits each devoted to every character (2K bytes total). Each byte of a character group defines one scan line with one bit to spare since a character is only seven pixels wide. So the first ten bytes of a character group define the entire character field displayed. There are six bytes to spare since four address lines have to be used to count from zero to nine (ten total) making character group resolution every 16 bytes.

Continued on Page 6

-New Products-

MEDIA CONVERSION SERVICE

TriStar Data Systems
Cherry Hill Industrial Center
2 Keystone Avenue
Cherry Hill, NJ 08003
(609) 424-4700 or (215) 629-1289
CONTACT: Dan Brown

SOFTWARE:

TriStar announced the beginning of its "Media Conversion Service", to act as a translator between different microcomputer formats, such as 5 1/4" hard sector to soft sector, diskette to mag tape, 8" to 5 1/4" and visa versa. The service is to include formats for the SuperBrain/CompuStar family as well as other micros. No prices or date of commencement of this service was announced.

CYC-48 BAR CODE READER/DECODER

Abrams Creative Services
369 S. Crescent Drive
Beverly Hills, CA 90212
(213) 277-2410



HARDWARE:

Those little black and white striped square bar codes you see on magazines, labels and packages at the supermarket are becoming the standard for encoding valuable information in a small space.

And now, SuperBrain/CompuStar users can read and create these important bar codes using the serial ports on their computers.

We have been asked to represent and market the CYC-48, with its special reading wand, that translates CODE 39 alphanumeric bar code format into computer readable ASCII form. Conversely, ASCII data can be turned into bar code format as well. The bar codes can then be printed on a wide variety of labels or papers using many of the popular dot matrix printers, such as the Epson MX-80.

These striped labels can be affixed to products on assembly lines, on inventory shelves, or for whatever suitable purpose where encoded data is important. Among applications being used include inventory

control, parts tracking, file tracking, point of purchase and repair control.

Voice output can be used as an extra option to verbalize both scanned data and replies from the computer.

The CYC-48 is a major breakthrough in the use of micros for retail and industrial use and is a faster, accurate alternative to keyboard input of important information about products.

BAR-GEN Bar code generating software..... \$395
CYC-48 Bar Code Reader/Decoder \$695

DIRECTORY OF ONLINE DATABASES

New York Zoetrope
80 East 11th Street
New York, NY 10003
(212) 420-0590
Contact: Susan Cohn

This is the first comprehensive guide to all known existing databases available via computer terminals.

All of the well-known databases are listed such as CompuServe and The Source. But there are hundreds more listed in detail, in-

cluding such exotic ones as INIS, the International Nuclear Information System, and INFOLAW, a database for lawyers.

Pertinent information such as prices, contents, addresses, producers, analyses and phone numbers are all indexed in a 222 large-format paged book. Priced at \$29.95.

ATARI-CP/M CONNECTION

USS Enterprises
708 Landerwood Lane
San Jose, CA 95120
(408) 997-0264

HARDWARE:

Now you can buy an inexpensive Atari 400 and have it use the keyboard, disk drives and printer on your SuperBrain or CompuStar computer. (Note: the difference between the Atari 400 and the 800 is the keyboard).

You get assembled and tested cables, RS-232 interface, power supply and software. For a detailed review and even more information see the July 26th issue of InfoWorld.

Price: \$147 complete.

CATALOG

SRX Systems
2812 Westberry Drive
San Jose, CA 95132
(408) 926-9411
Contact: Ruth E. Wood

SOFTWARE:

CATALOG, a master-disk cataloging system for CP/M files.

Unless you're on a hard-disk system, you're plagued by the ever-present question, "I wonder what's on this diskette?"

CATALOG scans every diskette you place in Drive B, lists them, provides you space for descriptions of each file, indexes them, prints them out in a master sheet, and dates them according to last examination.

You end up with an organized master printed catalog of all the various diskettes you have stacked away in drawers, office cabinets and boxes. Each diskette is given a number and can be listed by that number or by the file summary and description you specified.

Priced at \$75, the time saved in organization more than pays for this package when you consider it can mark the end to diskette whereabouts and filename confusion.

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Features:

- Copies files to multiple diskettes.
- Copies files larger than one diskette.
- Wildcard copy feature, similar to PIP (*.COM).
- Restores multiple diskette sets to hard disk.

These programs can save time copying files to and from the hard disk. It beats trying to figure out what files will fit on a single diskette using PIP.

HSAVE (backup) will automatically prompt when one diskette is full and next diskette is to be inserted.

HLOAD (restore) will also prompt for the proper sequence of diskettes to be restored to the hard disk.

The cost for both programs is \$179.00. The programs will be supplied on quad-density diskette along with instruction documentation. A single-system license will be required.

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Manufacturer/Product	Your Price	Manufacturer/Product	Your Price	Manufacturer/Product	Your Price
AMERICAN TRAINING INT'L		ITHACA INTERSYSTEMS		Quick Gen	\$119
dBase Power	\$69	✓ Pascal Z	\$399	✓ Report Gen	\$145
ARTIFICIAL INTELLIGENCE		✓ Pascal BZ (Business version)	\$399	✓ Menu Gen	\$70
Medical	\$820	✓ Pascal Z and BZ Combo	\$599	✓ Convert.	\$55
Dental	\$820	KEY BITS		SORCIM	
ASPEN SOFTWARE		WordSearch	\$175	Pascal/M	\$349
Grammatk	\$140	String 80	\$82	Pascal/M (8086)	\$425
Proofreader	\$125	String 80 (Source)	\$275	STAR COMPUTER SYSTEMS	
Both	\$250	LIFEBOAT		... Call for discount prices on all modules.	
FRONTIER/ASYST DESIGN		T/Maker	\$249	STRUCTURED SYSTEMS	
SOFTWARE		METASOFT		... Call for discount prices on all modules.	
✓ Prof Time Accounting	\$525	✓ The Benchmark	\$399	SUPERSOFT	
✓ Fixed Asset Management	\$325	✓ The Benchmark Mail List	\$219	✓ Ada	\$263
✓ General Subroutine	\$262	MICROPRO PRODUCTS		✓ Diagnostic II	\$85
✓ Application Utilities	\$429	✓ WordStar	\$299	✓ Forth (Z80 or 8080)	\$149
BYROM SOFTWARE		✓ Mail-Merge	\$99	Fortran	\$217
BSTAM	\$145	WordStar/Mail-Merge	\$365	Fortran w/Ratfor	\$287
BSTMS	\$145	DataStar	\$239	Tiny Pascal	\$84
CAXTON		WordMaster	\$115	Disk Doctor	\$84
Cardbox (Card File)	\$199	SuperSort I	\$195	Utilities I	\$54
✓ CHANG LABS		SpellStar	\$169	Utilities II	\$54
Microplan	\$349	CalcStar	\$225	Nemesis	\$40
COMPUTER CONTROL		Customization Notes	\$350	Dungeon Master	\$40
Fabs	\$155	MICROSOFT PRODUCTS		Analiza II	\$45
Ultrasort II	\$155	Microsoft Basic 80	\$285	Term II	\$165
CONDOR COMPUTER CORP.		Microsoft Basic Compiler	\$324	Scratch Pad	\$258
✓ Condor II	\$595	Fortran 80	\$345	✓ Data View	\$174
✓ Condor III	\$849	Cobol 80	\$569	✓ Stats Graph	\$174
DIGITAL RESEARCH PRODUCTS		✓ Macro 80	\$144	✓ Optimizer	\$174
PL/I-80	\$450	✓ Mu Math/Mu Simp	\$219	TARGET	
MAC	\$83	✓ Mu Lisp/Mu Star	\$170	PlannerCalc	\$50
SID	\$63	M-Sort	\$170	MasterPlanner	\$290
Z-SID	\$88	Edit 80	\$100	UNICORN	
TEX	\$88	✓ Multi-Plan	\$259	Final Word	\$269
DeSpool	\$48	MICROSTUF		Mince	\$145
BT-80	\$175	✓ Crosstalk	\$139	Scribble	\$145
CB-80	\$450	MICROTAX		Both packages	\$245
Pascal MT+	\$419	Level I (Individual)	\$225	A POTPOURRI OF EXTRAS	
Pascal Compiler	\$305	Level II (Professional)	\$925	✓ Plan 80 (Financial Modeling)	\$447
Pascal SPP Speed Program	\$175	Level III (Partnership)	\$700	✓ Access 80, Level I	\$241
Access Manager	\$279	Combined package (II and III)	\$1,500	Access 80, Level II	\$400
DJR ASSOCIATES		NEXUS		Statpak	\$429
✓ FMS-80	\$850	Zip (MBasic or CBasic)	\$149	Lynx	\$199
✓ Accounting Plus		Zip COMBO	\$199	Quic-N-Easi	\$319
... Call for discounts on all modules.		OASIS		Mailman (Mail List Manager)	\$100
ECOSOFT		The Word	\$70	SB/E PROM and BIOS	\$165
Microstat	\$219	The Word Plus	\$140	SB/E Diagnostic	\$165
EPIC COMPUTER		ORGANIC SOFTWARE		Syntax CP/M Self-Tutor	\$120
✓ Supervyz	\$99	Textwriter III	\$109	✓ Catalog	\$75
FOX AND GELLER		Datebook	\$259	✓ Citation	\$235
Quickscreen	\$135	✓ Milestone	\$279	✓ CP+	\$145
dUtil	\$85	PRO/TEM SOFTWARE		✓ Datebook II	\$279
Quikcode	\$249	Synopsis	\$120	✓ Move-It	\$95
INTERNATIONAL SOFTWARE		Footnote	\$120	✓ The Protector	\$159
Mathe-Magic	\$95	QUALITY SOFTWARE		✓ Superfile	\$179
		✓ GBS Data-Base	\$295	✓ Ten OPUS 5 1/4" DSDD Diskettes	\$25
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EPROM Character Group Layout

The following chart shows how the EPROM is set up internally for character generation. Bits having no effect on character display are filled in with zeros. They could just as well have random garbage - it makes no difference. Each bit (dot) represents a character pixel on the screen. If a "1" is placed in a bit, that pixel will turn on. If a "0" is placed in a bit, that pixel will be off.

The rightmost bit (zero) will appear on the left edge of the character displayed on the screen. This is because the bytes defining each scan line of a character are shifted right and out into the video stream which runs left to right on the screen. So to get the real picture of the character in the EPROM chart below, it must be rotated on its "vertical" axis such that bit zero is on the left and bit seven is on the right. But ignore bit seven since it is not used.

The program which Intertec supplies for making your own character set, CSEEDIT, allows you to create characters on-screen without having to mentally transpose them. It will let you intuitively enter the character patterns and then swap the bits for you to create a memory image file of your character set.

Base = ASCII Character Value (0 through 127) multiplied by 16.

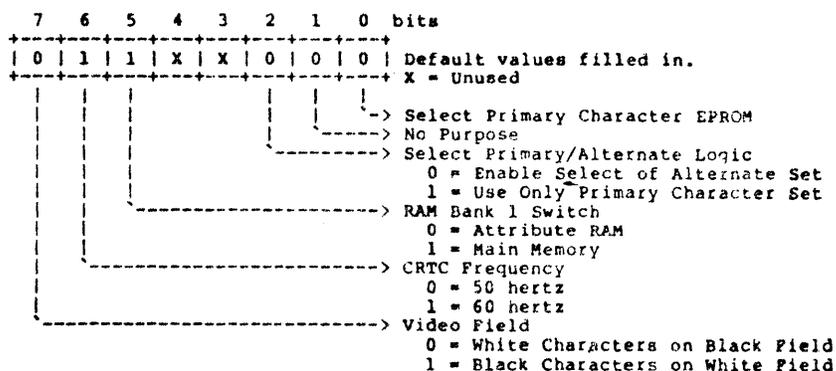
	Bits							
	7	6	5	4	3	2	1	0
Base + 0	0	.	.	.	.	.	.	.
Base + 1	0	.	.	.	.	.	.	.
Base + 2	0	.	.	.	.	.	.	.
Base + 3	0	.	.	.	.	.	.	.
Base + 4	0	.	.	.	.	.	.	.
Base + 5	0	.	.	.	.	.	.	.
Base + 6	0	.	.	.	.	.	.	.
Base + 7	0	.	.	.	.	.	.	.
Base + 8	0	.	.	.	.	.	.	.
Base + 9	0	.	.	.	.	.	.	.
Base + 10	0	0	0	0	0	0	0	0
Base + 11	0	0	0	0	0	0	0	0
Base + 12	0	0	0	0	0	0	0	0
Base + 13	0	0	0	0	0	0	0	0
Base + 14	0	0	0	0	0	0	0	0
Base + 15	0	0	0	0	0	0	0	0

Earlier, I mentioned that the cursor was displayed one scan line too high. Character patterns indicate that Intertec uses BASE + 0 as their blank scan line to separate rows. If every byte in the character field were shifted up one and BASE + 9 was used as the blank scan line, the character field relative to the cursor would be correct. This would also solve the problem of the underlines passing through the last scan line of a lowercase descender since the BASE + 9 position is used for underlining. The character EPROMs are not addressable by either CPU. It would have been nice to

be able to place a compatible static RAM in the alternate EPROM socket and dynamically create characters. Instead, some hardware modifications would have to be made to implement this feature.

New Video Logic

The only hardware change in the new machines not transparent to controlling software (i.e. BIOS) is the bit definitions for port A of the Programmable Peripheral Interface (PPI) and the meaning of the high bit in the screen memory map. The new PPIA bit assignments are as follows:



PPIA-0 selects which EPROM is used for generation of the primary character set. When the high bit of a screen character (from the video memory map) is reset (zero), the primary EPROM will be used to obtain the video definition for that character. Conversely, when the high bit of the character is set (one), the alternate EPROM will provide the character's video definition. The default is for EPROM "A" to be used as primary. An escape sequence allows you to reverse this, affecting the entire screen retroactively.

PPIA-1 and PPIA-2 are not used for any real purpose now. Intertec had originally planned to use a different EPROM to which logic from these lines apparently controlled a character-blanking (invisible character) feature.

While PPIA-1 no longer has any real function, PPIA-2 has a side effect which was part of the original logic. With PPIA-2 normally reset, the high bit of a video map character will select whether the primary or alternate character set is used to display that character. But if PPIA-2 is set, selection of the alternate character set is disabled. In effect, the high bit of the video character is ignored so that the primary set

is always used. In the original logic this transferred use of the high bit to character blanking dependent on the value of PPIA-1 and the character's high bit.

PPIA-3 and PPIA-4 are not used.

PPIA-5, when reset, switches bank one into the character attribute RAM (discussed later) so that the various character video attributes may be turned on or off according to escape sequences used. PPIA-5 must be set for normal execution of programs in the range of bank one (4000H to 7FFFH).

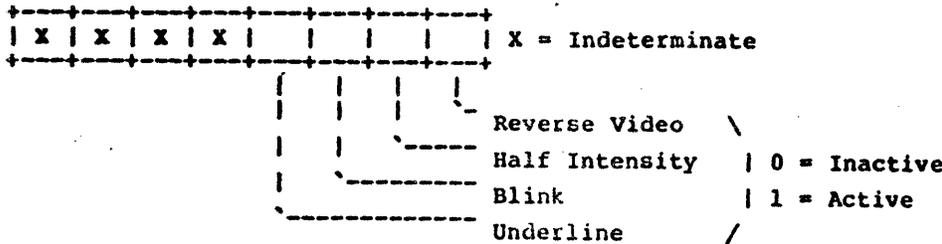
PPIA-6 and PPIA-7 have retained their original definitions. PPIA-6 selects the pro-

per line frequency for your supply of power. Europeans use 50 Hertz. PPIA-7 selects the video field as it did before. This affects the entire screen, reversing video on all character fields. Intertec has finally included an escape sequence in their DOS for setting reverse or normal video. Reverse video is a white field with black characters. A single character that is already reverse video will, of course, become reverse reverse (normal) video.

The Video RAM

Bank one of CPU-1's address space is switched into the video attribute RAM by resetting PPIA-5. Bank one spans locations 4000H to 7FFFH. Of course there need only be 2K of attribute memory to represent the 2K screen memory map. Thus, video attribute RAM addresses "wrap around" every 2K, or 800H. The standard practice is to address memory which wraps around beginning at its base address. So in effect, the video attribute RAM is addressed from 4000H to 7FFFH when it is switched into memory. From this wrap around effect, location 4000H is the same as location 4800H. 4001H is 4801H is 5001H and so on to the end of bank one.

The video attribute RAM is 2K in length and four bits wide. The lower four bits of the data byte are the video bits. These four bits determine the video attributes of one given character. Any number of bits may be on or off at the same time. The upper four bits are indeterminate since they do not exist in hardware. Each video attribute byte corresponds with a character byte in the screen's memory map. The memory map begins at location F800H. For example, the attributes for the character stored at location 0F81FH in the memory map are at attribute memory location 0401FH.



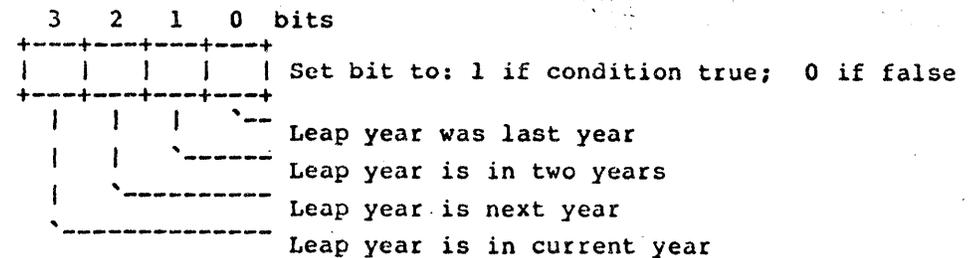
The Internal Time/Date Clock The internal clock is National Semiconductor's MM58174 Real Time Clock (RTC). It has a battery attached to it to keep time even when the machine is turned off for long periods of time. This chip is an old version which has a few bugs in it. While disassembling Intertec's TIME program, I found that they have messages which are only useful to the new version of the chip (MM58174A). Apparently, Intertec plans on changing over to the new chip and may have already done so. The new chip does an automatic leap year calculation except for centennial leap years. This did away with the Years Status Register so it was replaced as a mode select for 12 (AM and PM) or 24 hour operation (military). The bugs were also worked out.

Hex Port Address	Clock Function	Addressing Mode
30	Test Only	Write/Only
31	Tenths digit	Read/Only
32	Units of seconds	I/O
33	Tens of seconds	R/O
34	Units of minutes	Read/Write
35	Tens of minutes	R/W
36	Units of hours	R/W
37	Tens of hours	R/W
38	Units of days	R/W
39	Tens of days	R/W
3A	Day of the week	R/W
3B	Units of months	R/W
3C	Tens of months	R/W
58174	3D	Leap Year Status
58174A	3D	Hours Mode
	3E	Start/Stop
	3F	Interrupt & Status

The test function (30) is for production testing only and has no system use. For normal operation the chip must be set to the non-test mode by writing a zero to the test port. This only has to be done once. If it is

set to one, the 32 kHz oscillator input is connected directly to the tenths of a second counter. The time and date functions (31 through 3C) all use BCD representation with the lower four bits of the data bus. The upper four bits are meaningless because the RTC does not use them. If, during a read operation, the addressed register is being updated, the illegal BCD code of "1111" (0FH) will be returned. Software must check for this after the read and try again if 0FH is returned. The typical retry limit is ten retries. If any other illegal BCD code is received it probably means that the clock has been improperly initialized.

The leap year function (3D) on the older chip is used to indicate which year is the leap year. The Years Status register is a shift register of four bits. It is rotated left every year midnight December 31-January 1 to place a "1" in bit 3 if the new year is a leap year or a "0" in bit 3 if it is not a leap year. Thus, the "1" will wrap around into bit 3 once every four years.



The Hours Mode Select register (3D) on the new version of this chip selects either civilian (AM and PM) or 24 hour (military) format. Writing either a zero or one to this register selects which mode is used. Reading the register will return mode and AM or PM if it is in the 12 hour mode. This is only preliminary and may not be quite accurate.

The start/stop function (3E) allows loading of time and date into the clock and its precise starting. The low bit of the data byte set to logic "1" and written to port 3E will start the clock running. A logic "0" will stop the clock. Units and tens of seconds are

reset to zero when the clock is stopped.

The RTC has an interrupt feature (function 3F) which Intertec has left unattached and thus, cannot be used unless a modification is made to the processor board. Pin 13 is the interrupt output pin. Interrupts may be coded in single or repeated intervals of 0.5, 5.0 and 60.0 seconds. Further interrupt programming information for the technically inclined can be found on this chip's data sheet.

New Escape Sequences

All these sequences control attributes of one sort or another. The sequence is issued with ESCAPE TILDA and followed by an attribute qualifier. The hexadecimal representation of this is 1B 7E cc where cc, the qualifier, is one of the following characters. Any number of these sequences may be in effect at the same time.

The following take effect character by character from the point of their selection. They will not affect what already appears on the screen even when their corresponding alternate is selected.

- B (42H) - Turn blinking on
- b (62H) - Turn blinking off
- H (48H) - Turn half-intensity on
- h (68H) - Turn half-intensity off
- R (52H) - Turn reverse video on
- r (72H) - Turn reverse video off
- S (53H) - Select alternate character set
- s (73H) - Select primary character set
- U (55H) - Turn underlining on
- u (75H) - Turn underlining off
- N (4EH) - Normalizes. Turns off B,H,U

and R attributes beginning with next character printed The following four escape sequences affect the entire screen retroactively.

- A (41H) - Switches screen to normal video
- a (61H) - Switches screen to reverse video
- G (47H) - Select EPROM A as primary and B as alternate
- g (67H) - Select EPROM B as primary and A as alternate

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