

# SUPERLETTER

Serving SuperBrain and CompuStar Users Around The World

June/July  
Vol.3 No.3

Several issues back we mentioned our hesitation to recommend Peachtree products due to that company's failure to support the Intertec format.

We visited Peachtree's booth at the NCC and had several phone conversations with their technical people since then regarding the problems SuperBrain II and CompuStar users were having with the "improved" Peachtext word-processing software.

Now, Peachtree has formally told us they will not support the SuperBrain II format. They do not want to buy the machine and will not list it as a computer for which they will provide help.

They intend to move their interest into the 16-bit computer market and will limit their software support only to the 8-bit computers they have on hand.

Considering the thousands of Intertec computers being used and purchased for government and business, including IRS and FAA national installations, we question the soundness of this business decision.

**Editor's note:** *As we went to press, Peachtree called and said they were reconsidering their position. They wanted to know if a SuperBrain II could be made available to them in the Atlanta area to work on. We put them in contact with Equipment Resources, Inc. We'll stay on top of the story.*

Turning back to the subject of the NCC, we had the opportunity to visit Intertec's exhibit and speak to some of the people working there.

The exhibit itself was in a large, prominent area of the Anaheim Convention Center. A CompuStar multi-user system was in operation with seats in front of various VPU models for hands-on demonstrations. SuperBrain II's were featured in their own area.

We found the exhibit busy and the sales-people quite attentive. We gleaned from the

show that Intertec will be having an introduction of new products coming out soon, including the Irwin-technology internal hard-disk drive machines.

In reality, there was nothing new. But that isn't necessarily bad.

It means Intertec is focussing on its current line and not feeling the need to follow the rush to frantically put out new products at every other trade show. In a sense, that's good for the current owners, because it provides more stability in the areas of service and support for the current model lines.

We are impressed with the continuing flow of new software products now coming out for the Intertec machines. Two of them, "MCS", and "Seek and Search," were designed on SuperBrains, then being adapted for other CP/M machines following their debut in the market. The same goes for "The Ultimate", which takes advantage of the new SuperBrain II graphics character enhancements. We will be reviewing the latter two products in our next issue.

On the hardware scene, we have been given early notice of a new development in Intertec add-on products coming out by a third-party manufacturer. These include an enhanced color monitor with dense pixel graphics, and an add-on memory board with high RAM storage. We hope to be the source for these products for you in the very near future.

There is a special national BBS phone number just for SuperBrain and CompuStar users, courtesy of Dr. Paul Kelley. Crosstalk, Move-It, or other modem software will get you on-line in seconds. Call (617) 862-0781 at 300 Baud and have fun!

*Albert Abrams*  
EDITOR

## Technical Corner

### IOBYTE IMPLEMENTATION OF SUPERBRAIN CONSOLE AND PORT DRIVER ROUTINES

Written by

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410 Chipeta Way  
Salt Lake City, UT 84108

As a research biochemist, I use my SuperBrain for writing manuscripts and processing experimental data. In addition, I have developed software which allows the SuperBrain to emulate a DEC VT-52 terminal for a PDP-1170 minicomputer system. Over the past two years, I had amassed more than a hundred floppy disks and decided to consolidate these on a CMC Targa 10 megabyte winchester disk, obtained through SuperLetter.

I had been previously using Information Engineering's SB/E enhanced BIOS and was disappointed to learn that the new BIOS provided by CMC was a hard disk extension of Intertec DOS 3.2. Several of my programs made heavy use of SB/E's flexible IOBYTE reassignments, using both the main and auxiliary ports to drive a printer and digital plotter. Additionally, my installation of WordStar used the CP/M list device connected through the main port at 9600 BAUD with XON/XOFF software handshaking. Clearly, neither the above programs nor WordStar would work with the CMC BIOS. Rather than change my programs and WordStar to run on the new BIOS, I decided to modify the CMC BIOS to emulate SB/E's IOBYTE reassignments and software handshaking.

The routines listed below provide full I/O device reassignment and software hand-

*Continued on Page 2*

shaking for both ports. Either Intertec DOS 3.x or CMC Targa BIOS for the SuperBrain I can be modified. Not having seen Intertec's DOS for the new SuperBrain II, I'm not sure if these routines will work without further modification. I used Z80 assembler mnemonics to facilitate use of the Z80 relative jump and bit test instructions. Fitting the new routines into the CMC BIOS was quite a squeeze, and since a relative jump can be encoded with only 2 bytes, I used them quite liberally. I have added two locations (XON and XOFF) to the end of the Intertec configuration area, for storing the transmission control characters for software handshaking. Currently, ^ S (13H) and ^ Q (11H) are stored in these locations, but they can be modified as required.

Incorporation of the modified BIOS into your operating system requires an assembler which recognizes Z80 mnemonics and produces relocatable code. Merger of the assembled BIOS with the SYSGEN utility requires that the code be relocated from high memory into the transient program area (TPA), without changing operand addresses. I used Microsoft's MACRO-80 to assemble the modified BIOS, putting the SuperBrain configuration area in the data relative segment (DSEG), and the actual code in the program relative segment (CSEG). Correct addressing for the two segments was encoded through use of MACRO-80's PHASE AND DEPHASE directives. Use "PHASE 0EF00H" to phase the configuration area and "PHASE 0DE00H" to phase the BIOS, followed by "DEPHASE" at the end of each segment.

Modification of Intertec DOS 3.x is relatively easy because there's enough room for everything in the Intertec BIOS area. Remove the following Intertec routines: CONST, CONIN, CONOUT, LIST, PUNCH, READER, AUXIN, AUXOUT, MAININ, and MNOUT, and replace them with the new routines listed below. Assemble the modified BIOS and relocate the BIOS to location 1F80H and the configuration area to 3080H. Make sure to generate a HEX file so that the modified BIOS can be patched into SB31CPM.COM using DDT. The following is an example of this procedure using Microsoft's M80 assembler and L80 linking loader:

```
A>M80 = NEWBIOS/L
A>L80 NEWBIOS/P: 1F80/D:3080, NEWBIOS/X/N/E
A>DDT SB31CPM.COM
-INEWBIOS.HEX
-R
NEXT PC
3100 100
-G0
A>SAVE 48 NEWCPM.COM
```

Finally, execute SB31CPM1 to write the

modified operating system onto a diskette. Then boot the diskette and try it out.

Modification of CMC Targa BIOS is more difficult, because the I/O driver routines have to be split into two parts. First, remove the same routines that were removed from the Intertec BIOS, and replace them with: CONST, CONIN, CONOUT, LIST, PUNCH, LPOUT, READER, TTYST, TTYIN, TTYOUT, AUXIN, and MNOUT. Then add PORTST, PORTIN, PRTOU, and GETST to the end of the CMC hard disk driver routine (starting at location EE01H). The contents of CSEG and DSEG have to be carefully ordered to prevent overlapping errors during linkage. DSEG contains the Intertec configuration area (EF00H), and the uninitialized RAM data areas starting at EF80H. Be sure to zero fill

the area between the end of the configuration area and EF80H, or else the linker will start the uninitialized data area immediately after the configuration area. This can be accomplished by putting "DS 0EF00H-\$" at the end of the configuration area. Don't forget to PHASE and DEPHASE each data area to get the proper addressing. CSEG begins with the standard BIOS starting at DE00H. As with the data segment, blank spaces will have to be zero filled. The first of these is the space following the autoboot command: DS 32-(\$-AUTOLD). The standard BIOS ends at E400H, while the hard disk and port drivers start at EC00H. CMC has inserted two patches in this area which gives us three spaces to zero fill. An example of the organization of both data and program segments is given below:

```
*****
INTERTEC CONFIGURATION TABLE
*****
      DSEG
      PHASE 0EF00H
BAUD  DB 0EEH
      *
      *
      *
XOFF  DB 13H
XON   DB 11H
      DS 0EF80-$
      DEPHASE

***** MODIFIED CMC BIOS *****

      CSEG
      PHASE 0DE00H
      JMP BOOT
      *
      * (JUMP TABLE)
      *
AUTOLD DB 3,'DIR',0
      DS 32-($-AUTOLD)
      *
      * (BIOS)
      *
USRSTRT EQU $
USRSIZE EQU 0E400-$
      DS 0E549H-$
      DW STACK1 (CMC PATCH #1)
      DS 0EAESH-$
      DW STACK3 (CMC PATCH #2)
      DS 0EC00H-$
      DEPHASE

***** UNINITIALIZED RAM DATA AREAS *****

      DSEG
      PHASE 0EF80H
BEGDAT EQU $
SEKDSK DS 1
      *
      * (UNINITIALIZED DATA AREAS)
      *
ENDDAT EQU $
DATSIZ EQU $-BEGDAT
      DEPHASE

***** HARD DISK AND PORT I/O DRIVERS *****

      CSEG
      PHASE 0EC00H
RETRIES EQU 10
      *
      * (HARD DISK AND PORT DRIVERS)
      *
GETAUX IN A,(AXSTAT)
      RET
      DEPHASE
      END
```

*Continued on page 3*

**Technical Corner** continued from page 2  
 Assemble and link the modified CMC BIOS as described above. However, after the NEWBIOS. HEX file is generated some editing is required to keep the Intertec video and floppy disk I/O drivers from being destroyed. Use a text editor to remove areas 2580H-2D7FH and 30C0H-3436H from the NEWBIOS. HEX file. Remember to remove entire lines, because making changes within a line will invalidate the checksum. Leave the last line in the file intact, because it flags End of File. Finally, use DDT to patch the edited NEWBIOS. HEX file into CPMH10S. COM (or any of the other CMC sysgen programs). An example is given below:

```
A>M80 =NEWBIOS/L
A>L80 NEWBIOS/P: 1F80/D: 3080, NEWBIOS/X/N/E
A>EDIT NEWBIOS.HEX
  Use text editor to remove areas
  2580H-2D7FH and 30C0H-3436H
A>DDT CPMH10S. COM
-NEWBIOS. HEX
-R
NEXT PC
3200 100
-GO
A>SAVE 49 NEWCPM. COM
```

**IOBYTE IMPLEMENTATION  
 OF SUPERBRAIN CONSOLE AND  
 PORT DRIVER ROUTINES**

The following drivers provide a full implementation of CP/M IOBYTE device reassignments for the Intertec SuperBrain. The assignment of physical to logical devices emulates that provided by Information Engineering's SB/E:

Logical Device	STAT device Assignment
CON: TTY:	CRT: BAT: UC1:
RDR: TTY:	PTR: UR1: UC2:
RUN: TTY:	PTP: UP1: UP2:
LST: TTY:	CRT: LPT: UL1:

Logical Device	SuperBrain Assignment
CON:	Console, Main, Batch, Aux
RDR:	Keyboard, Main, Aux, Null
RUN:	Screen, Main, Aux, Null
LST:	Screen, Main, Aux, Null

**FEATURES:**

- 1) The CP/M batch device is implemented, which takes its input from the current reader and outputs to the current list device.
- 2) A remote terminal may be attached to the SuperBrain by reassigning the console device to either the main or auxiliary ports.
- 3) Undesired I/O can be eliminated by assigning logical devices to the null device.
- 4) The port output driver supports software handshaking. The transmission control

character may be changed by storing different values in locations XOFF and XON. Currently, ^ S and ^ Q are the respective XOFF and XON characters. If software

handshaking is desired DSR handshaking must be disabled by storing 00H in location HDSHAK. Software handshaking is disabled by storing 00H in location XOFF.

\*\*\*\*\*  
**SUPERBRAIN CONFIGURATION  
 AREA**

```
Note: Locations XOFF AND XON are placed at the end of the
SuperBrain configuration area as shown below:

BAUD: DB 0EEH ;BAUD RATE (9600) FOR MAIN & AUX PORTS
MNMCD: DB 4EH ;MAIN PORT MODE (8 BITS, 1SB, NO PAR)
MNCMD: DB 17H ;MAIN PORT COMMAND
AUXMOD: DB 4EH ;AUX PORT MODE (8BITS, 1SB, NO PAR)
AUXCMD: DB 17H ;AUX PORT COMMAND
FREQ: DB 4BH ;4BH=60HZ; 0BH=50HZ
HDSHAK: DB 00 ;DSR DISABLED = 00H; DSR ENABLED = 01H
RAW: DB 0FFH ;DISK READ-AFTER-WRITE
;00H = NO READ VERIFICATION AFTER WRITE
;FFH = READ VERIFICATION
TIMENB: DB 00H ;00 = TIME FUNCTION DISABLED; FF = TIME ENABLED
SYNC: DS 1 ;SYNC CHARACTER VALUE STORED HERE
CLKENB: DS 1 ;INDICATES KEY CLICK STATUS
; DS 3
KEYPAD: DB 81H,82H,83H,85H,0DH,2CH,2DH,2EH,30H
; DB 31H,32H,33H,34H,35H,36H,37H,38H,39H

XOFF: DB 13H ;THIS CHARACTER STOPS PORT TRANSMISSION
XON: DB 11H ;THIS CHARACTER STARTS PORT TRANSMISSION
```

Continued on page 4

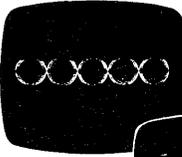
\*\*\*\*\*

## HIGH RESOLUTION GRAPHICS

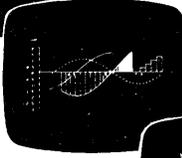
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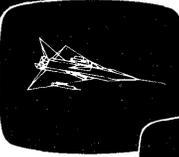
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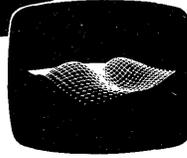
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# Letters to the Editor

DEAR SUPERLETTER:

We market the SuperBrain and its derivatives, and find your Superletter extremely useful and enlightening.

We would be grateful if you would permit us to copy extracts from the Superletter on occasion to include in our own newsletter which we circulate free of charge to our customers. Please let us know.

Yours faithfully,  
 Pete E. Beckles  
 Interactive Systems Ltd.  
 6 Stanmore Avenue  
 Port of Spain  
 Trinidad & Tobago, West Indies

**Editor's note:** We appreciate your asking prior to publication. The answer is yes.

Continued on page 5



## SEEK AND SEARCH

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## Technical Corner continued from page 3

```

; *****
; *****      EQUATES REQUIRED BY IOBYTE IMPLEMENTATION ROUTINES      *****
; *****

```

```

; Note: These equates should be provided by your current BIOS. They
; are included here to enable independent assembly of IOBYTE
; implementation routines.

```

```

AUXDAT EQU 40H ;AUXILIARY DATA PORT
AUXST EQU 41H ;AUXILIARY STATUS PORT
MNDAT EQU 58H ;MAIN DATA PORT
MNSTAT EQU 59H ;MAIN STATUS PORT
PFICW EQU 6BH ;PPI (8255) CONTROL PORT
STACK2 EQU 0F3BFH ;STACK DURING CONOUT (32 BYTES) - INTERTEC DOS
;STACK2 EQU 0F540H ;STACK DURING CONOUT (32 BYTES) - CMC TARGA DOS
CRTIN EQU 0E409H ;KEYBOARD INPUT ROUTINE
CRTOUT EQU 0E40CH ;SCREEN OUTPUT ROUTINE
CONSTK EQU 0E402H ;TEMP AREA FOR SAVING STACK POINTER
KBBUFF EQU 0E45BH ;CCP'S KEYBOARD BUFFER
BUFCNT EQU 0E45DH ;TYPE-AHEAD BUFFER COUNT

```

```

;*****

```

```

; *****
; *****      IOBYTE IMPLEMENTATION OF I/O DEVICE DRIVER ROUTINES      *****
; *****

```

```

; Notes: These I/O device driver routines replace the
; following SuperBrain BIOS device drivers:

```

```

;          CONST CONIN CONOUT LIST PUNCH
;          READER AUXIN AUXOUT MAININ MNOUT

```

```

; *** Z80 OP CODES ***

```

```

;          Z80 ;MICROSOFT MACRO-80 INLINE SWITCH
;          ;... FOR Z80 OP CODES

```

```

; *** CONSOLE STATUS ***

```

```

CONST: LD A,(0003H) ;GET IOBYTE
        AND 03H ;MASK FOR CONSOLE BITS
        CP 00H ;TTY?
        JR Z,TTYST ;JMP TO TTY STATUS ROUTINE
        CP 01H ;MAIN?
        LD B,10H ;SET FLAG FOR MAIN
        JP Z,(PORTST) ;JMP TO PORT STATUS ROUTINE
        CP 03H ;AUXILIARY?
        LD B,01H ;SET FLAG FOR AUX
        JP Z,(PORTST) ;JMP TO PORT STATUS ROUTINE
        LD A,0FFH ;BATCH, ALWAYS READY
        RET

```

```

; *** CONSOLE INPUT ***

```

```

CONIN: LD A,(0003H) ;GET IOBYTE
        AND 03H ;MASK FOR CONSOLE BITS
        CP 00H ;TTY?
        JR Z,TTYIN ;JMP TO TTY INPUT ROUTINE
        CP 01H ;MAIN?
        LD B,10H ;SET FLAG FOR MAIN
        JP Z,(PORTIN) ;JMP TO PORT INPUT ROUTINE
        CP 03H ;AUXILIARY?
        LD B,01H ;SET FLAG FOR AUXILIARY
        JP Z,(PORTIN) ;JMP TO PORT INPUT ROUTINE
        JR READER ;BATCH=READER

```

```

; *** CONSOLE OUTPUT ***

```

```

CONOUT: LD A,(0003H) ;GET IOBYTE
        AND 03H ;MASK FOR CONSOLE BITS
        CP 00H ;TTY?
        JR Z,TTYOUT ;JMP TO TTY OUTPUT ROUTINE
        CP 01H ;MAIN?
        LD B,10H ;SET FLAG FOR MAIN
        JP Z,(PRTOUT) ;JMP TO PORT OUTPUT ROUTINE
        CP 03H ;AUXILIARY?
        LD B,01H ;SET FLAG FOR AUX
        JP Z,(PRTOUT) ;JMP TO PORT OUTPUT ROUTINE
        JR LIST ;ELSE, BATCH (CONTINUE TO LIST:)
;          ;...JR LIST ISN'T NEEDED IF LIST:
;          ;... IMMEDIATELY FOLLOWS CONOUT:

```

Continued on page 5

```

; *** IOBYTE IMPLEMENTATIONS OF LIST AND PUNCH ROUTINES ***
LIST: LD A,(0003H) ;GET IOBYTE
AND 0C0H ;MASK FOR LIST BITS
JR LPOUT ;JMP TO IOBYTE OUTPUT DISPATCH ROUTINE

PUNCH: LD A,(0003H) ;GET IOBYTE
AND 030H ;MASK FOR PUNCH BITS
RLCA ;ROTATE TWICE, INTO LIST CONFIGURATION
RLCA

LPOUT: CP 00H ;TTY?
JR Z,TTYOUT ;JMP TO TTY OUTPUT ROUTINE
CP 40H ;MAIN?
LD B,10H ;SET FLAG FOR MAIN
JP Z,(PRTOUT) ;JMP TO PORT OUTPUT ROUTINE
CP 80H ;AUXILIARY?
LD B,01H ;SET FLAG FOR AUX
JP Z,(PRTOUT) ;JMP TO PORT OUTPUT ROUTINE
RET ;ELSE, NULL

; *** IOBYTE IMPLEMENTATION OF READER ***
READER: LD A,(0003H) ;GET IOBYTE
AND 0CH ;MASK FOR READER BITS
CP 00H ;TTY?
JP Z,(TTYIN) ;JMP TO TTY INPUT ROUTINE
CP 04H ;MAIN?
LD B,10H ;SET FLAG FOR MAIN
JP Z,(PORTIN) ;JMP TO PORT INPUT ROUTINE
CP 08H ;AUXILIARY?
LD B,01H ;SET FLAG FOR AUX
JP Z,(PORTIN) ;JMP TO PORT INPUT ROUTINE
LD A,00H ;ELSE, NULL
RET

; *** Z80 TRANSLATION OF INTERTEC KEYBOARD AND SCREEN DRIVER ROUTINES ***

; *** TTY INPUT STATUS ROUTINE ***
TTYST: LD A,0FH ;RESET KEYBOARD
OUT (PPICW),A
LD A,(BUFCNT) ;ANYTHING IN THE BUFFER?
OR A
RET Z ;RETURN IF EMPTY
TTYST1: LD A,0FFH ;CHARACTER READY STATUS
RET

; *** TTY INPUT ROUTINE ***
TTYIN: LD HL,KBBUFF ;BDOS'S KEYBOARD CHARACTER
LD A,(HL) ;GET CHARACTER
OR A ;ANYTHING THERE?
JR Z,TTYIN1 ;NO, TRY TYPE-AHEAD BUFFER

LD (HL),0 ;INDICATES NO CHARACTER
RET

TTYIN1: LD A,(BUFCNT) ;TYPE-AHEAD BUFFER COUNT
OR A ;ANYTHING THERE
JR Z,TTYIN1 ;NO, WAIT UNTIL THERE IS
JP CRTIN ;KB CHARACTER RETURNED IN REG A

; *** TTY OUTPUT ROUTINE ***
TTYOUT: LD (CONSTK),SP ;SAVE STACK POINTER
LD SP,STACK2
PUSH HL ;SAVE HL
CALL CRTOUT ;CHARACTER IN REG C
POP HL
LD SP,(CONSTK) ;RETRIEVE STACK POINTER
RET

; *** Z80 TRANSLATION OF INTERTEC AUX PORT SERIAL DATA INPUT ROUTINE ***
AUXIN: LD B,01H ;FLAG AUXILIARY
JP PORTIN ;JMP TO THE PORT INPUT DRIVER

```

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Jeff A. Ferris

### Letters to the Editor

Continued from page 4

#### DEAR SUPERLETTER

Having acquired a Kaypro II, I wanted a patch so as to be able to keep my SuperBrain disks compatible with my Kaypro running UNIFORM. My SuperBrain has 40 tracks, single side, double density, running under IE's prom. In looking around in Micro Solution's UNIFORM with DDT, I discovered that the newly acquired version I just updated from my dealer was a bit different from UNIFORM's earlier versions of SETDISK and INITDISK. I have found the addresses to patch to change the SuperBrain format from 35 tracks with 165K to 40 tracks with 190K and I've included them for your readers.

	ADDRESS	CHANGE FROM	CHANGE TO
SETDISK, Version 1.01	1022	51	5E
SETDISK, Version 1.02	109F	51	5E
INITDISK, Version 1.0	0E1C	23	28
INITDISK, Version 1.02	0E45	23	28

UNIFORM allows the Kaypro II to read and write to 13 additional disk formats and is produced by Micro Solutions, Inc. 125 S. Fourth Street DeKalb, IL 60115 (815) 756-3421

Yours faithfully,  
Bob Hickey  
P.O. Box 222  
Eagle River, AK 99577-0222  
Phone:(907) 688-2331

# -New Products-

## MCS MENU CONTROL SYSTEM

Commercial Micro, Inc.  
 P.O.Box 28877  
 Atlanta, GA 30328  
 (404) 587-0139  
 Contact: Mr. Jeff Ferris

### SOFTWARE:

MCS combines the feature of a Password System, Batch Processing System, Electronic Mail System and a Time Accounting System to give you security, automated throughput, electronic communications and audit trail information of a mainframe type computer on a SuperBrain or CompuStar.

The Menu Control System provides the user with the ability to build his system access menus fast and efficiently with security and control that up to now has not been available on microcomputers. The user can direct and control his computer system environment without having to be a programmer or technician. Authorized personnel can be assigned their computer applications by a password. Other individuals can be locked directly into a particular pro-

*Continued on page 7*

## Technical Corner *continued from page 5*

```

*** Z80 TRANSLATION OF INTERTEC MAIN PORT SERIAL OUTPUT ROUTINE ***
--- CTS MUST BE TRUE TO TRANSMIT ---

MNOUT: LD      B,10H      ;FLAG MAIN
        JP      PRTOUT    ;JMP TO THE PORT OUTPUT DRIVER
  
```

\*\*\*\*\*

```

*****
*****                                PORT I/O DRIVERS                                *****
*****
  
```

The following port drivers implements full software handshaking for both the main and auxiliary ports. The code is a general port driver which tests register B for the selected port.

```

B = 10H, MAIN
B = 01H, AUXILIARY
  
```

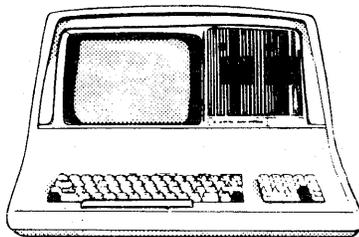
The output routine allows user customization of the handshake characters by storing the "TURN-OFF" character in location XOFF, and the "TURN-ON" character in location XON. If 00H is stored in XOFF, then the output routine assumes that no software handshaking is desired. It is not possible to use both DSR, and software handshaking. So if software handshaking is desired, the DSR should be disabled by storing 00H in location HDSHAK.

Filename: PORT.MAC

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Note: If CMC/TARGA DOS is being modified, port driver routines will have to be relocated to the end of the hard disk driver routines. Insert the port drivers at location 0EE01H (immediately after HDISK:).

*Continued on page 7*



NEW PRODUCT

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```

; *** PORT STATUS ROUTINE ***
PORTST: CALL   GETST      ;GET STATUS BYTE
        AND    02H      ;MASK FOR CHAR READY
        RET    Z         ;RETURN IF NO CHAR
        LD     A,0FFH   ;CHAR READY
        RET

; *** PORT INPUT ROUTINE ***
PORTIN: CALL   PORTST    ;GET STATUS BYTE
        OR    A         ;CHAR READY?
        JR    Z,PORTIN  ;WAIT FOR CHAR
        BIT   4,B       ;MAIN?
        JR    Z,PORTIN1 ;IF NOT, HAS TO BE AUX
        IN   A,(MNDAT)  ;GET CHAR FROM MAIN
        RET

PORTIN1: IN    A,(AUXDAT) ;GET CHAR FROM AUX
        RET

; *** PORT OUTPUT ROUTINE ***
PRTOUT: PUSH   HL       ;SAVE CONTENTS OF HL
        LD    A,(HDSHAK) ;LOAD DSR CONTROL BYTE
        AND   B         ;DSR ENABLED?
        JR    Z,PRTOT1  ;NO DSR

PRTOT0: CALL   GETST    ;GET STATUS BYTE
        AND   80H      ;MASK FOR DSR=1
        JR    Z,PRTOT0  ;WAIT UNTIL DSR=1
        JR    PRTOT3    ;JMP TO CHAR OUTPUT
        ;GET HANDSHAKING CONTROL BYTE
PRTOT1: LD    A,(XOFF)  ;CONTROL CHAR PRESENT?
        OR    A         ;IF NOT, JMP TO CHAR OUTPUT
        CALL  PORTST    ;CHECK PORT FOR INPUT CHAR
        OR    A         ;ANYTHING THERE?
        JR    Z,PRTOT3  ;IF NOT, JMP TO CHAR OUTPUT
        CALL  PORTIN    ;GET CHAR
        LD    HL,XOFF   ;POINT TO XOFF
        CP   (HL)      ;CHAR = XOFF?
        JR    NZ,PRTOT3 ;IF NOT, JMP TO CHAR OUTPUT
PRTOT2: CALL  PORTST    ;ANOTHER CONTROL CHAR READY?
        OR    A         ;ANYTHING THERE?
        JR    Z,PRTOT2  ;IF NOT, WAIT FOR ANOTHER CHAR
        CALL  PORTIN    ;GET CONTROL CHAR
        LD    HL,XON    ;POINT TO XON
        CP   (HL)      ;CHAR = XON?
        JR    NZ,PRTOT2 ;IF NOT, WAIT FOR ANOTHER CHAR
PRTOT3: CALL  GETST    ;GET STATUS BYTE
        AND   01H      ;MASK FOR TRANSMITTER EMPTY

        JR    Z,PRTOT3  ;WAIT UNTIL EMPTY
        LD    A,C       ;GET CHAR
        POP  HL        ;RESTORE CONTENTS OF HL
        BIT  4,B       ;MAIN?
        JR    Z,PRTOT4  ;IF NOT, HAS TO BE AUX
        OUT  (MNDAT),A ;CHAR TO MAIN

PRTOT4: OUT   (AUXDAT),A ;OUTPUT CHAR TO AUX
        RET

; *** COMMON SUBROUTINE FOR FETCHING STATUS BYTE ***
GETST:  BIT    4,B      ;MAIN?
        JR    Z,GETAUX  ;IF NOT, HAS TO BE AUX
        IN   A,(MNSTAT) ;GET STATUS BYTE FROM MAIN
        RET

GETAUX: IN    A,(AUXST) ;GET STATUS BYTE FROM AUX
        RET

; *** SWITCH BACK TO 8080 OP CODES ***
.8080   ;MICROSOFT MACRO-80 INLINE SWITCH
        ;FOR 8080 OP CODES
END

```

gram, such as word processing and never see a menu displayed. User passwords, and batch job streams can be setup and be operational in minutes.

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