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APPRENTICE PORT by Don Gottwald, President, Sorcerer's Apprentice

In this column, I will try to help the neophyte computerist by solving the mysteries and exploring the magic of the Sorcerer computer. If you are a beginner and need help, please address your questions to: Apprentice Port, c/o this publication. Because the volume of mail makes it impractical to answer each letter individually, look to this column for your answers. However, if your system is down and you've exhausted the local talents without success, then we will try to help you via telephone. Send us a complete description of your problem and we'll get back to you with the name of the person to call and when they will be available for your call. (If you have the necessary skills and would like to assist other members in this fashion, please let us know.)

Now to answer some of the more frequently asked questions about the group. We are a membership organization devoted to providing hardware and software support for the Sorcerer computer (more details p.48). We have members on five continents, representing most of the western world. We are not affiliated with Exidy Systems Inc. in any way. Anyone can become a member. Memebership rates and benefits can be found on the back page. An additional benefit, the Sorcerer remote CP/M system with MINICBBS program, has just gone on-line (details p.42).

We will announce a program exchange service, as well as additional services, as they become available. The SORCERER'S APPRENTICE functions solely through volunteer help, therefore, extra services can only be implemented as additional help is found. We would appreciate your help, regardless of where you live.

If anyone is interested in starting a local chapter of the SORCERER'S APPRENTICE (anywhere in the world), please contact us for details.

The topic of my next column will be concerned with the cassette interface.

```
*****************************************
*                                       *
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*                                       *
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*                                       *
*****************************************
```

DUSTINGS FROM THE LIBRARY - CBBS ON-LINE by Robert Hageman, Librarian and Systems Operator

As of 1-April-81 our remote CP/M - MINICBBS formally went on line. This remote CP/M computer, should ease the distribution and exchange of non-proprietary software. The MINICBBS program will also provide members a means of exchanging ideas, submitting short articles and advertisements for publication, posting messages, advertising items wanted to buy, sell or barter, etc. Contacts between members with similar interests should also be easier to make with this service. (Only 16 lines allowed per message. Longer messages as a CP/M file.)

To use, set your acoustic modem, such as the CAT (which operates at up to 300 baud), to the Originate mode and full duplex, load Smart Terminal program (or something similar), dial (313) 535-9186 and listen for one or two rings then hangup. Now redial the same number (this is what Ringback means) and wait for the high pitched tone indicating CBBS is ready to communicate. Place the phone into the modem cradle and type <CR>'s until CBBS requests a number (0-9) specifying how many nulls your system needs. In most cases you will respond with '0'. (I am assuming users with an S-100 modem or CP/M will already know how to operate their modem system. The CBBS supports 110, 300, 450, 600 and 710 baud (the latter via the 'NEWBAUD' program) and requires 8 data bits and no parity - 2 stop bits at 110 baud.)

CBBS will then welcome you and ask you to enter the password. You now have five tries to type the correct password - SORCERER. The system then will tell you it is booting CP/M and a 'A>' prompt will appear to indicate that you are logged into the 'A' disk and CP/M is ready to receive your command (the 'B:' command brings up the 'B' drive). The 'DIR' command requests that CP/M print a directory of disk files to the CRT. The 'HELP' command brings up the system instructions. To use the message service, type MINICBBS and follow the program instructions.

The other command you will want to know is 'TYPE'. This command sends ASCII files with file types of: ADS (advertisement), ASC (ASCII file), ASM (assembler file), BAS (BASIC related file), DOC (documentation file), REV (review), or TIP to the console device (i.e. your computer, as in all remote CP/M systems). With proper use of Smart Terminal's commands you should be able to download ASCII files from CBBS. (When communicating with CP/M about a file, you must indicate the filename.filetype [fn.ft] separated by a period unless a .ft is not present.)

NOTE: At this time the Sorcerer's Apprentice system does not support the uploading of ASCII files from Smart Terminal, except in the MINICBBS program.

Future plans for CBBS in the next issue. Your comments and suggestions welcome.

DISK NOTES - by Bryan Lewis, CP/M Editor

It's clear that quite a few of us are using or contemplating the purchase of a disk system. Just take a look at the topics in the January Apprentice -- MDOS subroutines, Spellbinder, rumors of an Exidy hard disk, and Ralph LaFlamme's request for articles on disk interfacing, CP/M, and MDOS. So when Ralph called me and asked me to write a column on CP/M, I volunteered. (Voluntered isn't the right word if you have to be asked, I guess.)

First let me offer some strong encouragement. Many of you have gotten frustrated trying to add a disk system -- especially if you're on your own, with the next Sorcerer owner 50 miles away (and with your luck, he has 8-inch while you've bought 5). You're overloaded with memory conflicts, writing I/O drivers, learning how to use CP/M from its poor manuals, trying to save all your cassette software on disks, boosting weak bus signals, and choosing Exidy/Lifeboat/CP/M single/double-density/MDOS/5-inch/8-inch/Vista/Micropolis/1.4/2.2, all with no help from Exidy.

Don't give up! All of those obstacles are temporary. The Sorcerer does make a very nice disk-based machine, honest! On mine, for example, I have two Micropolis Mod II disks (for 630K storage), 55K of RAM, a personalized CP/M operating system (so all the keys on my keyboard work like you'd expect -- TAB tabs, CLEAR clears, and STOP stops), with all my old cassette files on disks, and Spellbinder. (I did want to mention Spellbinder once although it belongs to Steven Guralnick's column. It's superb as a file editor or printer, for assembler, BASIC, or any other files. Don't buy VEDIT or Exidy's full-screen CP/M editor or Rom Pac linkers if you ever expect to get Spellbinder.)

For the remainder of this first column, I'll compare Exidy's and Lifeboat's versions of CP/M 1.4 for Micropolis disks, with a few words about Vista's CP/M where relevant.

(1) Neither Exidy's nor Lifeboat's BIOS (the section of CP/M that contains all the input-output code, sort of like the Exidy Monitor) has any personality. They don't take advantage of the keyboard: TAB, CLEAR, ESC, and RUN/STOP aren't used well. GRAPHIC isn't used at all. That lack of customization is not surprising from Lifeboat, but Exidy should have done more. (Vista CP/M does fix TAB, and uses the unshifted RUB key.)

(2) Neither handles a character deletion well. The deleted character is echoed (displayed twice) rather than erased as you'd expect. Another instance of lack of personalization.

(3) Lifeboat's CP/M gives a slow video display. This is especially noticeable during long program listings; the disk can supply characters faster than the screen can show it, resulting in a lot of head loading and unloading. Why? The console-status-checking procedure (CONST, part of the BIOS) calls the Monitor's complete KEYBRD routine, with all its table look-ups. That's unnecessary when we only want to know <u>if</u> a key is pressed, not <u>what</u> is pressed. This defect can be fixed by substituting a condensed keyboard poller, even as small as:

```
CONST: CALL   QUIKCK    ;Call 0E015H in Monitor.
       RZ               ;This is 8080 mnemonics, remember.
       MVI    A,0FFH    ;Return with A=TRUE if
       RET              ;RUN/STOP was pressed.
```

(continued on next page)

(DISK NOTES continued)

(4) Exidy writes blocks to the disk with a slightly non-standard "skew pattern." It writes a sector and then lets two sectors spin by while it's busy moving new data into a buffer. Thus a file large enough to fill an entire track on Micropolis (16 sectors, 4K) will be written sequentially onto sectors 16, 13, 10, 7, 4, 1, 14, ..., 3.

Lifeboat uses a different skew pattern, writing every 5th sector (I think). I haven't been able to detect any difference in speed between the two methods, and at first glance the choice is unimportant. But the rest of the Micropolis users in the world chose the 5 pattern. Thus Exidy CP/M cannot read a disk written by a Vector Graphic computer, but Lifeboat can. Exidy does provide a one-way conversion program (rest of world into Exidy), but it requires two drives.

This difference alone causes me to use Lifeboat's version, in spite of some other points in Exidy's favor. Compatibility with other computers is, after all, one of the main reasons for using CP/M.

(5) The memory occupied by CP/M is approximately the same (6K) for both. Let's take a 32K Sorcerer, for instance, with the disk's bootsrtap ROM out of the way (located above 8000H).

	Exidy	Lifeboat
origin of BIOS	7500H	7600H
origin of BDOS	6800H	6900H

Exidy's starts 256 bytes lower, trying to preserve the monitor work area and stack at the top of RAM, as discussed in the next section.

I'm pointing out the equivalence of the two overheads to clear up a confusion caused by the sign-on messages. In a 32K Sorcerer, Exidy CP/M announces 32K, while Lifeboat says 30K. Lifeboat chose to tell you that you're losing 2K by using Micropolis drives; Exidy didn't.

Vista's BDOS starts at 7700H.

(6) Exidy takes care not to disturb the Sorcerer's monitor work area, where the control bytes are stored for cassette and other I/O operations. Hence you can freely jump between CP/M and the Monitor, as by:

```
A>DDT           ;From CP/M, use DDT's ...
-GE003          ;GO command to jump to ...
>               ;the Monitor (warm start).
```

In Lifeboat CP/M, that sequence won't work; the MWA was partially over-written. To get back to the Monitor you must do a cold start, either with -GE000 in the example, or by pressing RESET (which does NOT erase memory, by the way).

This is a fine point, but it can drive you crazy if you try to modify the BIOS. Do not call the general-purpose I/O addresses (SEND, RECEVE) from Lifeboat; the vectors aren't preserved. Call the specific routines (VIDEO, KEYBRD).

(continued next page)

(DISK NOTES continued)

(7) Lifeboat malfunctions if you have a recent-vintage Micropolis drive, one that turns the drive motor off when it's not in use. It doesn't allow enough time for the motor to get up to speed from rest. Lifeboat refuses to correct the bug, saying, "CP/M 1.4 is a dead product. Buy 2.2." I have sent a fix (changing one byte in the BIOS) to the Apprentice. (See next issue - RL)

(8) The documentation with both is poor, in the sense that you can't find what you want to know if you don't know the answer to start with. Vista is the winner here: it provides a better tutorial section, and gives a source listing of the BIOS. With Exidy and Lifeboat, I had to disassemble the BIOS before I could modify it.

That's it. I favor Lifeboat, but the choice is close. If anyone wants to implement my improved BIOS for Lifeboat, I'll send a Micropolis-format disk for $20 or pick it up for free on the new Sorcerer CBBS [BIOS11.ASM]. But if you don't have CP/M yet, I recommend instead that you buy Version 2.2 from Mentzer Electronics. His BIOS is also well-tailored, and the cost isn't much more than for Version 1.4.

I will be happy to answer questions here or direct to you if you send a SASE.

MENTZER ELECTRONICS
590 SOUTH HILL BOULEVARD
DALY CITY, CALIFORNIA 94014
(415) 584-3402

****

SPELLBINDER - WP Disk Word Processor for the Exidy Sorcerer	$395.00
SPELLGUARD - DICTIONARY Program checks for spelling errors. Requires CP/M and 32K.	$295.00
EXIDY 1.1 MONITOR ROMS	$ 45.00
EXIDY FLOPPY DISK SYSTEM 1 Drive with CP/M and Microsoft Basic	$900.00
EXIDY FLOPPY DISK ADD-ON DRIVE	$725.00
EXIDY EXTENDED CASSETTE BASIC	$ 85.00
CP/M 2.2 with BIOS.ASM FILE For use on Exidy with Micropolis Disk ONLY	$190.00
DISK COPYING SERVICE 8" SD to Micropolis Mod I or II (Diskette included)	$ 10.00

****

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EDITOR/TOOLKIT: 16K, 32K and 48K - £12

10 functions include: LINK, RENUMBER, OLD (recovers from NEW or CLOAD), DUMP (variables used), FIND (string or statement), AUTO (autonumber), TRACE (prints out each line number as it executes), CONVERT (hex to decimal and visa-versa), CLOADG (load & go), KILL (deletes lines from to). Monitor commands executed directly. Edit Commands include: Move cursor; butt lines together; enter all characters to left of cursor (regardless of NP cursor movements); open up space at cursor; close up space at cursor; reduce line; toggle direct entry mode (enter 'hidden characters'), plus many more. Listing is in special easy to read form, and may be listed 'from to'.

Updates are available at nominal charge to existing users as and when new features are added.

To provide free memory space, use a 16K version on 32K etc. All sizes are supplied to each customer.

REVERSE ASSEMBLER: runs at 7300H (REV1 £4) and 7000H (REV2 £8) REV1 is for those with no Dev Pac. Options on menu:

F - causes line feed and 8 nulls printed at the end of lines
P - paged output with headings and 65 lines per page
L - produces labels on listing
X - produces cross reference table at end of listing
T - directs output to Centronics (conversion instr included)
N - No opcodes or addresses in output
S - No multiple spaces on output

Data areas can be specified by operator. Code does not have to be at running address for disassembly. REV2 has all this plus Dev Pac compatible (nearly) output and will in addition produce (with care) a Dev Pac compatible tape with the Dev Pac in position. REV2 is available at £4, subject to usual ordering conditions, to REV1 customers.

CRYONICS INVADERS £4 - Keep an invading army from some cryonics capsules. You have a shield and a gun, but it isn't easy! Add an A/D convertor (simple curcuit diagram supplied) & you get sound with this game. Principle will work with your programs too.

CRYONICS QUEST £2 - Try to set up suspension arrangements. But you are not sure as to the integrity of the professionals used. Produces patterns as a byproduct.

CLOAD$ £2 - Loads strings from BASIC programs. Machine code program finds its own position depending on size of machine.

DATA £2 - Compiles tape of pokes for BASIC pictures in your program.

DATAM £2 - Similar idea for assembly programs. Useful if block move memory uneconomic or for magazine published programs.

MOVP £2 - Copies program from one cassette to another. Requires two machines and motor control. Will copy at differing baud rates.

CRC £2 - Loads faulty tapes and you sort out CRC errors. (Except for name)

Minimum order £6. Add £2 per order for cassette and airmail. Add £1 if not remitting in sterling drawn on a UK bank. (Look up exchange rate in newspaper). (£ = British Pound Sterling)

REEVES TELECOMMUNICATIONS LABORATORIES LTD., West Towan House, Porthtowan, Truro, Cornwall TR4 8AX, United Kingdom.

```
100 PRINT CHR$(12);:CLEAR 100:FOR N=16TO22:READ N1:POKEN,N1:NEXT
110 DATA 205,24,224,50,23,0,201
120 POKE 260,16:POKE 261,0
130 PRINT"Star Wreck":PRINT"----------":PRINT
140 PRINT" (c) Reeves Telecommunications Laboratories Ltd 1980"
150 REM Presented free with Sorcerer's Apprentice April 1981
160 REM Listed using the Editor published by RTL and advertised
170 REM in this issue.
180 PRINT
190 PRINT"Your star ship has exploded. You have escaped in an"
200 PRINT"escape plane with little fuel but an inexhaustable"
210 PRINT"supply of bombs. You are gliding down to a planet"
220 PRINT"whose vegetation is known to have toxic pollen."
230 PRINT"However, you have found an island to land on far from"
240 PRINT"any neighboring continents. If you can destroy all"
250 PRINT"the vegetation and form a landing site, you can land"
260 PRINT"safely. If you don't destroy all the vegetation, not"
270 PRINT"only will you crash, but the fine toxic pollen will"
280 PRINT"eventually seep into your damaged plane and kill you."
290 PRINT"Your plane moves across the screen from left to right"
300 PRINT"and you can drop a bomb by pressing the spcace bar"
310 PRINT"when the plane is over the target. You may only drop"
320 PRINT"a bomb when there is no bomb falling.":PRINT
340 PRINT" Are you ready to start?"
350 A=USR(0): B=RND(9): IF PEEK(23)=0 THEN 350
360 PRINT CHR$(12);:FOR NX=1TO64:IF RND(9)<.5 THEN 410
370 FOR NY=1 TO 20*RND(9)
380 POKE-64*(32+NY)+NX,128+INT(RND(9)*64):NEXT NY
400 POKE-64*(32+NY)+NX,187+INT(5*RND(9))
410 NEXT NX
420 REM ROUTINE TO MAKE PLANE FLY ACROSS SCREEN
430 PA=-64*62:PB=-64*33+63:PC=PB:FOR NF=PA TO PB-4
440 IF NF=PA THEN 460
450 POKE NF-1,32
460 POKE NF,158
470 POKE NF+1,170:POKE NF+2,170:POKE NF+3,174
480 REM ROUTINE TO DROP BOMBS
490 IF FB=1 THEN 520
500 A=USR(0) :IF PEEK(23)=0 THEN 570
510 FB=1:NY=NF+1
520 NY=NY+64:IF NY=NF+1 THEN NEXT NY
530 POKE NY,32:POKENY+64,149
550 IF PEEK(NY+128)<>32 AND (NY+128)<PC THEN FD=1
560 IF NY>PC THEN FB=0:NB=NB+1:ND=ND+FD:FD=0
570 IF PEEK(NF+4)<>32 THEN 610
580 NEXT NF:GOTO 700
600 REM END OF GAME ROUTINE
610 PRINT"You have dropped";NB;"bombs,and have hit";ND;"plants."
620 PRINT"However, you have crashed."
630 CLEAR
640 PRINT"Do you want another game Y or N"
650 A=RND(9): A=USR(0)
660 IF PEEK(23)=0 THEN 650
670 IF PEEK(23)=78 THEN END
680 IF PEEK(23)=89 THEN 340
690 GOTO 650
700 PRINT"You have landed safely and bombed";ND;"plants."
710 PRINT"You have dropped";NB;"bombs.":GOTO640
```

ODDS & ENDS - by Ralph LaFlamme, Editor, Sorcerer's Apprentice

The SORCERER'S APPRENTICE is a registered non-profit group organized: 1) to promote and encourage public interest in the use of computers for educational, scientific, business and personal use; 2) to aid in the development of software, firmware and hardware for computer use; 3) to edit, publish and distribute to members and patrons periodicals and other printed or computer encoded matter useful to computer users.

As a non-profit organization, all income, such as from membership dues, goes back into its operation, for the benefit of its members. The board members receive no remunerations whatsoever. Their time is freely given to provide the neccessary input to make the SORCERER'S APPRENTICE function.

This publication is produced from your membership dues for your benefit, as is the new bulletin board service announced on page 42. We plan to provide more services. (Let us know if there is something in particular you would like to see offered.) However, the unauthorized reproduction of this Newsletter for friends, etc. deprives the group of revenues that would benefit all of us. In order to continue membership benefits and develop new member services, we ask that you not reproduce this Newsletter for others. Instead, please hand them the membership application form found in the center of each issue.

If your address should change please use this same form to advise us of your new address. We would like to keep our mailing list current.

We've had more back issues prepared since there has been such a demand for them.

From time to time I will be using the new on-line service as an 'Electronic Magazine'. As material becomes available, I will drop off unpublished articles, routines, programs, etc. I will try to keep them as up to date as possible. By their very nature, some articles (e.g. containing schematics) will not be possible to drop off and so will have to await publication. I invite you to try this new service. I believe you will be pleasantly surprised.

NOTE: Articles, newsworthy items and advertisements can be submitted via the Sorcerer-based CBBS (313) 535-9186R, the SOURCE (TCF656), or MicroNET (70150, 365); Word Processor cassettes, CP/M Word Processor/Editor files on Micropolis Mod II diskettes (any of above preferred) or hardcopy. Magnetic media returned upon request. Hardcopy will be returned if requested and accompanied by SASE.

We have received numerous requests, from overseas, for information about the SORCERER'S APPRENTICE Users Group/Newsletter. Evidently, a number of you have heard of us through foreign computer clubs, newsletters, magazines or Ham Radio contacts. We would appreciate your sending us the names and addresses of any such groups so that we can establish on-going dialog with these groups.

Since I asked for a Pascal Editor, Daniel Conde has volunteered to write such a column. He feels he has more to offer you in Pascal than FORTH. His Pascal column will, therefore, begin with the next issue. Anyone with Pascal articles to submit to Dan, is invited to send them in c/o this publication.

We need editors and articles to cover the following languages also: Assembly (with and w/o the Development Pac), Forth, APL, FORTRAN, COBOL, PL/1, etc.

We have established reciprocal exchange priviledges with the Toronto User's Group, P.O. Box 1173, Station 'B', Downsview, ON CANADA M3H 5V6. They publish a newsletter called PORT FE.

THE WORD PROCESSING CORNER by Steve Guralnick, Word Processing Editor

I want to mention that I am happy to talk with any of you who call; however, I would appreciate it if you could call me at home, in the evening or on the weekend. My home phone number is (415) 991-0155. I will also reiterate my policy on calls and letters: I will not use the name of any person who calls or writes, unless they ask me to or have no objection. You are entitled to your privacy.

Round two on global routines. The latest version of SPELLBINDER has a nice change. If you are entering text from scratch, i.e., with no previously set up diskfile, you can send all of it to disk without using the W or WD commands. With the cursor anywhere in text, simply enter GD. If the program finds that there is no read or write file open, it will ask you for a write file only. Enter that and all the text in your workspace will go to disk under that name. We use that approach frequently in our office. If the secretary has to take a break and wants to get her space cleared in one swoop, it's very handy. It has a minor drawback; it clears the workspace and screen. You have to read your document back into memory to add to it.

In an earlier column, I wrote about the global search and replace routines; this is a good place to expand on it. It's easiest to understand if you start with this: all global searching and replacing does is to take advantage of the fact that there are read and write files open (if there are). So, supose you open a read file called A:TEST and also open a write file, called B:TEST1. You can do this by simply entering "GO" (zero) and entering the read and write names and drives (which can be the same). Then, you are on the way to do anything. If you want to search and replace, then enter "sg", and so forth, as I described earlier. But, here is what to remember. When you get to the search location and don't want to search any more, then you can go on with the routines. You can enter "GD" and chain out the rest of the read file to the write file. You can enter "RD" and close the read file and then do a GD to send out what is in the work space to disk. You can do a PG and start printing what you have plus what remains on your read file and write the file out to disk as it finishes printng. And so forth.

The trick is to remember what it is you did when you started. If you just want to examine a file and find a piece of it, you would enter RO (zero) and then you can do SG routines or PG routines; you won't, of course, get a write file because you never opened one.

I encourage you to experiment. Take a file that has been backed up somewhere and try the global routines out. Enter GO and then try various routines. The global commands are probably the safest in the set.

Next time, I will finish this up with some firedrills on what to do if you get in trouble in the middle of a global routine. See you soon!

'SCREEN TYPEWRITER' - REVISITED

Don Myklebust, 19710 Guthrie; Strathmore, CA 93267, reports that Frank Voss' Screen Typewriter (issue 3.2, p.33), jumps back to the Monitor when the '@' key is struck.

In response to our request for the names of dealers who 'know' the Sorcerer, he recommends, Nycom Inc.; 4500 El Camino Real; Los Altos, CA 94022, (415) 948-4500

SINGLE VOICE SOUND GENERATION by Howard Arrington, 9522 Linstock, Boise ID 83704

Generating sound from your Sorcerer is not that difficult, and this artile will help you get started by detailing a machine language routine to generate music.

Let's use the parallel port as a means to output a signal to an external speaker since the Sorcerer does not have an internal speaker like some other computers. I DO NOT recommend connecting a small 8 ohm speaker directly between one of the parallel port's output bits and ground. It is safer to have an output bit drive a transistor's base via a 1K resistor, and let the transistor switch current through a small speaker. One may also wish to use the Music interface board that comes with our four voice Music System.

The statement: 10 FOR I=1 TO 100:OUT 255,255:OUT 255,0:NEXT I generates a low pitched note by toggling the output bits on the parallel port from high to low, back to high. It may be sufficient for your needs, but provides no control over the pitch of the sound. However, it illustrates the principle of how sound will be generated in machine language.

The following code generates notes:

```
F5          ENTER PUSH AF             ;SAVE REGISTERS USED
C5                PUSH BC
E5                PUSH HL
21 60 00          LD   HL,DURATION    ;LENGTH OF SOUND
79          TOP   LD   A,C
2F                CPL                 ;TOGGLE OUTPUT BITS
4F                LD   C,A
06 40             LD   B,PITCH        ;FREQUENCY CONTROL
D3 FF             OUT  (0FFH),A       ;TO PARALLEL PORT
10 FE       LOOP  DJNZ LOOP-$         ;DELAY
2B                DEC  HL             ;DOWN COUNT DURATION
7D                LD   A,L
B4                OR   H              ;IS COUNT = 0 ?
20 F2             JR   NZ,TOP-$       ;LOOP WHILE HL<>0
E1                POP  HL
C1                POP  BC
F1                POP  AF             ;RESTORE REGISTERS
C9                RET                 ;RETURN FROM SUBROUTINE
```

You can vary the pitch by changing the values loaded into register B. How long the note is played is controlled by the duration value loaded into HL.

This routine suffers from the effect of having the delay loop nested inside of the duration loop. If the delay loop is tight, then the duration is accordingly shortened, since the total time in the routine is the product of the two loop parameters. A routine which has a duration independent of the frequency is given below.

```
          FREQ      EQU  0FCH      ;STORE PITCH # IN 253
          DURATION  EQU  0FDH      ;DURATION # IN 254 AND 255.
          SPEED     EQU  14FFH     ;TEMPO FOR ENTIRE SONG.
          ;
                    ORG  0D0H      ;LOCATE ON ZERO PAGE
DO: F5              PUSH AF        ;SAVE REGISTERS
```

(continued on next page)

(SINGLE VOICE SOUND GENERATION continued)

```
    C5              PUSH BC
    D5              PUSH DE
    E5              PUSH HL
    FD E5           PUSH IY
D6: 21 FC 00  ENTER LD   HL,FREQ
    4E              LD   C,(HL)     ;GET FREQUENCY #
    11 FF 14        LD   DE,SPEED
    FD 2A FD 00     LD   IY,(DUR)   ;GET DURATION
E1: D3 FF     LOOP  OUT  (OFFH),A   ;TO PARALLEL PORT
    0D              DEC  C          ;IS IT TIME TO TOGGLE
    C2 E9 00        JP   NZ,SKIP
    2F              CPL             ;TOGGLE OUTPUT
    4E              LD   C,(HL)     ;RELOAD FREQUENCY COUNT
E9: FD 19     SKIP  ADD  IY,DE
    DA E1 00        JP   C,LOOP     ;LOOP UNTIL DURATION UP
    FD E1           POP  IY
    E1              POP  HL
    D1              POP  DE
    C1              POP  BC
    F1              POP  AF         ;RESTORE REGISTERS
F4: C9              RET             ;RETURN
```

To use the above routine from Basic, store the frequency number in byte 253 with POKE 253, FREQ. Store the duration in bytes 254, and 254 with POKE 254, DURATION: POKE 255, 0. Usually control from (254) is sufficient, and keep (255) at zero.

Call the routine through the USR() function by poking the entry address into 260, and 261: POKE 260, 214: POKE 261, 0: X=USR(0).

Here are frequency numbers to generate notes for one octave. Higher octaves can be obtained by dividing these numbers by 2, 4, and 8, etc.

```
C  - 268   C# - 253   D  - 239   D# - 226
E  - 213   F  - 201   F# - 190   G  - 179
G# - 169   A  - 160   A# - 151   B  - 142
```

Although the above music routine is fun and easy, its usefulness is no comparison to the enjoyment you'll get from the four voice Music System from Arrington Software Service.

The first routine can be added to our version of SPACE INVADERS by following the steps below. This generates a sound when the aliens are hit by your missiles.

```
1.  >LO INVAD              ;LOAD THE INVADERS TAPE
2.  >EN 26E4
    26E4: C3 C0 1F /       ;THIS PATCHES IN THE SOUND
3.  >EN 1FC0
    1FC0: F5 C5 E5 21 60 00 79 2F 4F 06 40 D3 FF
    1FCD: 10 FE 2B 7D B4 20 F2 E1 C1 F1 C9 /
                           ;THIS IS THE SOUND ROUTINE
4.  >SE X=2020             ;AUTO-EXECUTE ADDRESS
5.  >SE F=4D               ;AUTO-EXECUTE FILE TYPE
6.  >SA INVAD 1FC0 37FF    ;SAVE ON SEPARATE TAPE PLEASE
```

(continued on next page)

(SINGLE VOICE SOUND GENERATION continued)

If you have purchased joysticks from Arrington Software Service or have made some yourself according to the joystick standard adopted by Arrington Software Service, you may wish to upgrade our old version of SPACE INVADERS to conform to the joystick standard. The author of SPACE INVADERS wrote the program before the joystick standard was adopted, which means most of you have a version of invaders that does not conform to the joystick standard.

Old version pin inputs:
b0 - pin 10 - Move Left
b1 - pin 22 - Fire
b2 - pin 11 - Move Right

Joystick Standard version:
b0 - pin 10 - Move Left
b1 - pin 22 - Move Right
BOTH b0&b1 - Fire

The following steps will patch in the joystick standard to work with the joysticks marketed by Arrington Software Service.

```
1. >LO INVAD          ;LOAD INVADERS GAME
2. >EN 20C7
   20C7: CD E0 1F / ;THIS PATCHES IN NEW JOYSTICK
3. >EN 1FE0
   1FE0: DB FF 2F E6 03 FE 03 20 03 3E 02
   1FEB: C9 FE 02 C0 3E 04 C9 /
4. >SE X=2020         ;AUTO-EXECUTE ADDRESS
5. >SE F=4D           ;AUTO-EXECUTE FILE TYPE
6. >SA INVAD 1FC0 37FF          ;SAVE ON NEW TAPE
```

Now your invaders will work correctly with the ATARI joysticks that we market. Both of the above patches can be made to the program, however, with only one parallel port you can't get sound at the same time that you want to use the joysticks. You can still use the keyboard to control the game even though you have added the joystick patch.

DUMP CRT IMAGE TO PRINTER by Roger Harrison Jr 59 Momar Dr, Bergenfield NJ 07621

Here's a DUMP CRT to PRINTER subroutine that leaves the CRT intact (except for home position). Also, by changing the values of I, you can print the top half, last 5 lines, etc. Changing J allows you to print left side/right side of CRT, etc. You can even print a "window" of CRT by setting I and J accordingly.

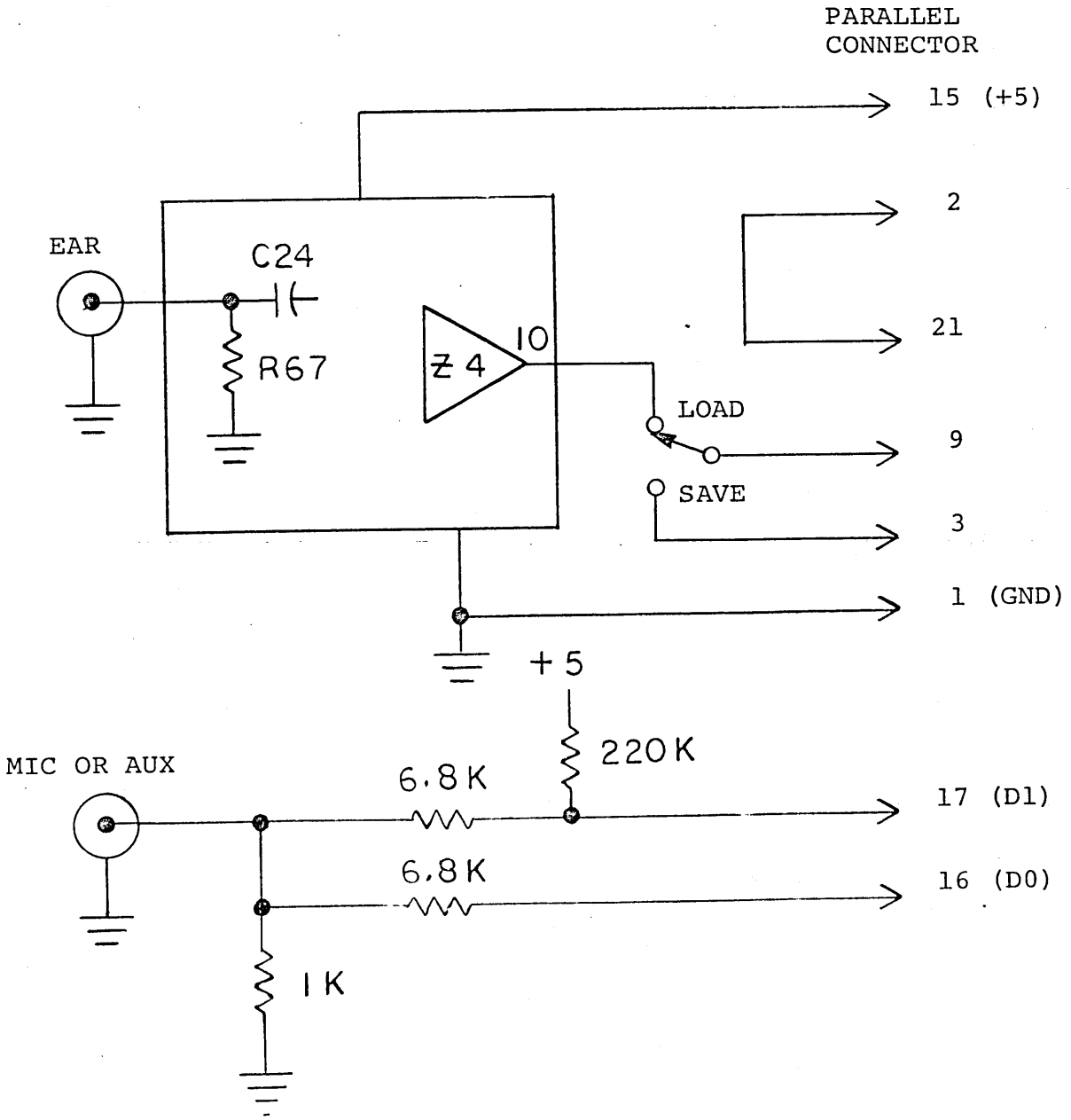
Thanks go to Ed Brzezowski for the I/O vectors.

```
100 POKE 32720, 147 : POKE 32721, 233   :REM SET O = L
200 FOR I = 0 TO 29
300 FOR J = 0 TO 63
400 PRINT CHR$(PEEK(-3968 + I * 64 + J));
500 PRINT CHR$(17);
600 NEXT J
700 IF J < 64 THEN PRINT
800 NEXT I
900 POKE 32720, 27 : POKE 32721, 224: REM SET O = V
```

TRS80 TAPE READER INTERFACE TO SORCERER PARALLEL PORT by Ron Lomax

This circuit is the only hardware required to read or save TRS80 Level II format tapes using the Sorcerer parallel port. Refer to the TRS80 Technical Reference Handbook, page 108 for the circuit in the block. It is a simple filter and amplifier using one integrated circuit. Also the book has a section on theory of operation for the circuit and troubleshooting advice.

PLEASE NOTE: Software is also required to load and run programs using this hardware. Software will be discussed in the next issue.



TRS80 TAPE READER HARDWARE

HARDWARE NOTES- by Russell Frew, Hardware Editor

A frequently asked question is "will the Cracker Jack Memory Corporation's 16K RAM S-100 board work in my Exidy Expansion Box?". The answer often confuses the user because what is supposed to be a standard is not really standard. The main problem is that we are trying to make a Z-80 processor look like an 8080 processor circa 1975. A lot of changes have been implemented on silicon since then. The IEEE Society recently published their proposed S-100 standard and most OEM's are now offering IEEE standard boards. Today then a better question would be "will an IEEE S-100 board work in my Expansion Box?".

Your best approach is to ask the dealer if his board is running without modification on any systems. If that cannot be determined, you are left with a technical analysis problem. Here are some of the more common problem areas you should examine to determine compatibility.

The Direct Memory Access convention used by Exidy does not conform to IEEE. If you are evaluating a disk controller that transfers data via DMA, look at this set-up closely. Along the same lines, the three clock signals provided on the bus can give you trouble. The Phase 1 TTL clock (Pin 25) is inverted and has a slightly different period. The Phase 2 clock (Pin 24) is within spec's, however, the 2MHz clock (Pin 49) is strictly a Z-80/Exidy signal. The IEEE has designated eight Vectored Interrupt lines (Pins 4-11). These pins, while available, are unsupported by Exidy. Your Box does have a Non-Maskable Interrupt (Pin 12) as specified by Zilog, and this most likely will be the signal needed by controllers and slave processors. If the board you are considering is designed to function under the Master/Slave concept, you will have to find a new way to implement Status Disable, Command/Control Disable, Address Disable and Data-Out Disable. All four of these are Master signals and must be present for a shared bus environment. A second problem arises with the above four signals and XRDY, PRDY, PINT and PHOLD. The IEEE requires these eight signals to be generated by "open-collector bus drivers". The key consideration here is that an open-collector driver is capable of sinking at least 20 mA of current at logic state 0. Exidy, however, has gone with the Zilog requirements and used 74LS08 drivers which can only sink 15 mA.

Certain hardware designs try to increase available address space by using variations of bank select or memory overlays. Often this is implemented via the Phantom Disable signal. Unfortunately, Exidy did not support this signal and the pin is unspecified. This one signal would be a great help in many designs. The subject of how we might add this function to the Expansion Box will be the topic of my next column.

If you have any hardware questions you would like to see addressed in future columns, drop me a line via Source TCA651 or c/o this publication.

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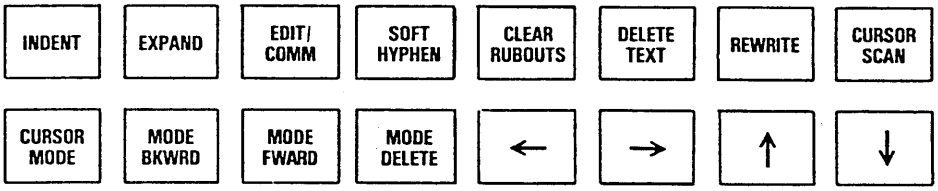
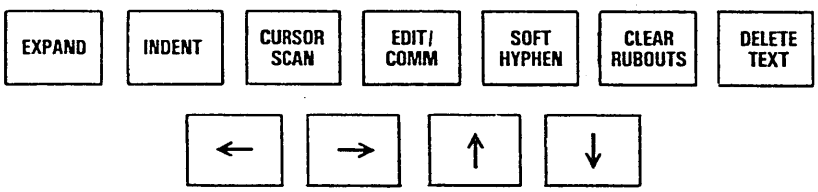


Word processing ROM Pac consists of the following:



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RELOCATED WORD PROCESSOR - 48K VERSION by Larry Stempnik, Technical Director

The article on relocating the Word Processor in Volume 3, No. 1, was written for a 32k Sorcerer. I call the program generated by the article, WORD5, since it is located starting at address 5000 hex. In order to be useful to as wide an audience as possible, the article was very specific about changes and procedures. Larry Kobylarz put a lot of effort into polishing up the article for clarity and accuracy. To have included a 48k version in the same article, would have resulted in confusion.

Sorcerer users, with 48k or more of RAM, will find it advantageous to relocate the Word Processor to address block 8000 to A08F. I call this version WORD8.

The procedure for creating WORD8 is similar to creating WORD5. (Do not try to modify WORD5 to produce WORD8.) In part 1 a. (issue 3.1, p.4) MOve C000 DFFF 8000 and then save on tape (SAve WP 8000 9FFF). Change line 260 of the MOVIT program for the new addresses:

```
260 DATA 0,0,0,0,192,223,- 64,-32768,-24576,-32768
```

Use the MOVIT program to modify the source code addresses. In part 1 d., change all 5XXX addresses to 8XXX, 6XXX to 9XXX, and 7XXX to AXXX. The RAM reader, in part 3, uses BFD2 instead of 7FD2.

Now add a new lower boundary so the W.P. does not 'hangup' by overwriting itself (32K version modification also included):

WORD8:	ENter 8018 <CR> 21 FF 7E/ <CR>	WORD5:	ENter 5018 <CR> 21 FF 4E/ <CR>

In either case, this new limit will be stored in 0742 and 0744. Test the change by going into the Word Processor Command mode and typing "M". The available memory should be about 20k for a 32k Sorcerer and 30k for a 48k Sorcerer.

Mark Northrup sent a solution, to this 'overwrite' problem, based on computer memory size. Bryan Lewis sent a lot of information on the Word Processor which also helped to resolve this problem.

Now I have added a 'G' command to WORD8. This stands for GO to ST48, the 48K version of the Quality Software Smart Terminal program. Since G is not used in the ROM PAC version, just add the address into WORD8's jump table:

```
ENter 8F5E <CR>, B1 BA/ <CR>
```

Instead of the normal ST48 entry address of AA00, I used BAB1. This goes directly into the internal processor and displays the menu. This makes life easier and lets you concentrate more on objectives and less on detailed addresses and procedures.

Further customizing could use "N" and "O" for printer subroutines. For example, MX80 printers could be sent codes for emphasized print or reduced characters without going into the Monitor.

Now save WORD8, with 'G' command (or with one or both of the other two additional commands), on tape: SE X=8000 <CR>, SA WORD8 8000 A086 (this also saves the RAM READER). Now to use WORD8, just 'LOG' it while in the Monitor.

RELOCATED WORD PROCESSOR WITH SMART TERMINAL by Larry Stempnik

WORD8 offers a very powerful and flexible software combination. It allows 32k of text to co-exist with Quality Software's 48K Smart Terminal (ST48). Thus, you can have WORD8 (8000 to A086), ST48 (AA00 to BE08) and the BASIC ROM PAC (C000 to DFFF) all in your computer at the same time. Files can then be moved around (BASIC to W.P. and W.P. to BASIC) or they can be transferred in or out of the computer over the phone lines. NOTE: You cannot have an active program in both BASIC and WORD8 simultaneously but you can activate either by a cold start:

GO C000 to cold start BASIC or GO 8000 to cold start WORD8

Now, if you have a BASIC program you want to edit, just insert the BASIC ROM PAC, go into the Monitor (type BYE), LOad WORD8, LOad ST48, type GO C000 and then CLOAD the BASIC program. Next, type BYE, GO AA00, CTRL I, and FI. This will put you into the Smart Terminal ready to transfer the file. Type FB, LIST, CTRL X to transfer the file to ST48. Do FI to verify that the file exists in ST48. At this point you have a Smart Terminal version of the BASIC program.

Before you can transfer this file to WORD8, you must set up WORD8. Type GO 8000, enter the command mode and type G. This activates the Word Processor and then jumps to the ST48 menu. Type TW 1 to transfer the ST48 file to WORD8. After the file transfers, you are in the Word Processor ready to edit the original BASIC program with the full editing capabilities of the W.P. (inserting returns or spaces, global editing or specific line number changes). Once finished editing, enter the 'J' command to transfer the edited file to BASIC. You can now proceed as usual with your BASIC program.

EDITOR'S NOTE: The Sorcerer's Apprentice endeavors to offer all types of articles, routines, fixes, etc. which will enhance the utility of your software and the enjoyment of your system. The two previous articles are offered with these objectives in mind. We do not approve of the copying of copyrighted programs for the purpose of exchange or providing free programs for friends.

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PIANO PLAYER

This program is option for the above music system and adds delightful graphical animation of a high resolution piano player tinkling the ivories. The little man's arms move in synchronization with the beat of the music. A large keyboard is displayed upon which four cursors jump around on the keys to the four notes being played. Piano player comes with another sample song file. Being both graphical and musical, this program is a crowd pleaser twice over.

MACHINE CODE TUTORIAL

Many have requested additional knowledge about your Sorcerer and help in learning to program in machine language. This package will help you understand video and keyboard routines, Z80 registers, instructions and flags, Monitor and Basic work areas and useful routines in ROM, and sound generation. I particularly like the interactive environment where one can immediately try the exercise ideas being presented. The eight programs lead the user step-by-step in their development. Highly recommended! (Even though I consider myself well versed, the author taught me some new tricks. HA)

CADAS 1.1 ---- DATABASE SYSTEM

The program is written in machine language and stands alone as a complete database manager. Features include storing up to 500 records consisting of up to 9 fields. One can sort on any field, or search any field for either a partial or complete match. The powerful report feature allows one to arrange the placement of data fields for printing of mailing labels, for example. The RANGE options allow you to select one, ALL, or those records that satisfy the field match criteria. The database is cassette based, Files can be loaded, saved and merged. Edit features include ADD, DELETE, EDIT. One can elect to use their own printer driver, the serial driver, or the parallel printer driver. The latest feature to have been added is a Column TOTAL with a range of +-9999999999.99. (P.S. Owners of the first version who do not have the TOTAL feature can upgrade for $5.00.)

PARSIPLOT ---- HI-RES GRAPHICS

Machine language routines manage all 128 Graphic characters to give the programmer ultimate flexibility in plotting in high resolution of 512x240. You pass to the routine the coordinates of the lines or points to plot, and the routines do the rest with graphic characters until all 128 are used. As characters are freed up, they rejoin the pool of available characters, all of which is transparent to the user. If an existing character pattern matches the one needed, it is reused rather than defining a redundant character cell. The mileage one can get out of 128 characters is amazing. Coordinates are passed in variables for plotting or erasing both points and lines. Documentation is excellent!

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